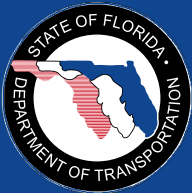


District 4 Transit Facilities Guidelines

Version 3



Florida Department
of Transportation



October 2007

TABLE OF CONTENTS

DEFINITIONS.....	V
INTRODUCTION.....	1
STREETSIDE FACTORS.....	2
A. BUS STOP LOCATIONS.....	2
1. Bus Stop Location Alternatives	3
2. Driveways.....	7
3. Railroad Crossings.....	8
4. Bicycle Lanes	8
5. Special Features	9
A. Canals.....	9
B. Guardrails/Adjacent Hazards	9
B. BUS STOP DESIGN TYPE.....	10
1. Curb-Side.....	10
2. Nubs / Curb Extensions / Bulbs	10
3. Bus Bays (Pullouts, Turnouts)	11
A. Closed Bus Bays	13
B. Open Bus Bays	13
C. Combination Bus Bay / Right Turn Lane.....	14
4. Bus Bay Signing & Pavement Markings.....	14
5. Grading and Drainage.....	14
6. Pavement Section	15
7. Bus Bay Lighting.....	15
CURBSIDE FACTORS	16
C. BUS STOPS	16
1. Stop Landing and Waiting Pads.....	16
2. Shelters.....	17
A. Shelter Location	18
B. Shelter Pad Design	19
C. Maintenance	19
3. Bus Benches	20
4. Bicycle Parking.....	21
5. Other Infrastructure.....	23
6. Signage	23
7. Lighting.....	23
D. SIDEWALK ACCESS TO TRANSIT	24
1. Drainage.....	26
E. CURB RAMPS.....	28

F. PEDESTRIAN CROSSINGS	30
1. Crossing Placement.....	30
2. Intersections.....	31
A. Signalized Intersections	31
B. Unsignalized Intersections	32
C. Intersection Control Beacon.....	32
D. Guidelines for Crosswalk Installation.....	32
3. Mid-block Crossings	33
A. Mid-block Crossing Warrants.....	35
B. Pavement Markings.....	37
C. Alternative Paving Materials.....	37
D. Raised Crosswalks / Speed Tables.....	38
4. Signs	38
A. Standard Signs.....	38
B. Signs with Pedestrian-Actuated Flashing Beacon or Illuminated Signs	39
C. Pedestrian Prompting Signs	39
5. Vehicular and Pedestrian Signals.....	39
6. Flashing Beacons.....	40
7. Medians / Refuge Islands.....	41
G. LANDSCAPING	43
1. Design.....	43
2. Maintenance	43
BIBLIOGRAPHY	45

LIST OF TABLES AND GRAPHICS

Table 1. Bus Stop Spacing.....	3
Table 2. Comparison Of Bus Stop Locations	6
Table 2. Comparison Of Bus Stop Locations (Cont.).....	7
Table 3. Advantages / Disadvantages Of Providing Bus Bays	13
Table 4. Guidelines For Placement Of Bus Stop Shelters.....	18
Table 5. Guidelines For Placement Of Bus Stop Benches	20
Table 6. Sidewalk Guidelines	25
Table 7. Guidelines For Sidewalk Installation.....	27
Table 8. Factors Affecting Curb Ramp Design	29
Graphic 1. Guideline For Crosswalk Installation At Uncontrolled Intersections & Mid-Block Crossings	33
Table 9. Median Requirements For Mid-Block Crossings	41

APPENDIX I. LIST OF APPENDICES**TRANSIT FACILITIES GUIDELINES**

Figure 1-1	Streetside Bust Stop Locations & Design Types
Figure 1-2	Streetside Combination Bus Stop Locations
Figure 1-3	Bus Stop Location Relative to Access Points
Figure 1-4	Bus Stop Location Relative to Railroad Crossings
Figure 1-5	Curbside Landing Pads and Signage
Figure 1-6	Curbside Bus Shelter Details
Figure 1-7	Curb Ramps and Concrete Crosswalk
Figure 1-8	Closed Bus Bay Layout – Urban / Curb & Gutter
Figure 1-9	Closed Bus Bay Layout – Rural / Shoulder
Figure 1-9A	Bus Bay Layout with Sidewalk Connection
Figure 1-9B	Layout with Sidewalk Connection
Figure 1-10	Near side Bus Facility Decision Tree
Figure 1-11	Turn Lane Requirements
Figure 1-12	Near Side Bus Stops
Figure 1-13	Near Side Bus Bays
Figure 1-14	Near Side Bus Bays
Figure 1-15	Near Side Bus Bays / Stops
Figure 1-16	Near Side Bus Bay / Stops
Figure 1-17	Far Side Bus Facility Decision Tree
Figure 1-18	Far Side Bus Stops
Figure 1-19	Far Side Bus Bays
Figure 1-20	Far Side Bus Bays
Figure 1-21	Far Side Bus Bays
Figure 1-22	Far Side Bus Bays / Stops
Figure 1-23	Mid-Block Bus Facility Decision Tree
Figure 1-24	Mid-Block Bus Details
Figure 1-25	Mid-Block Bus Stops
Figure 1-26	Mid-Block Bus Bays / Stops
Figure 1-27	Mid-Block Bus Bays / Stops
Figure 1-28	Mid-Block Bus Stops
Figure 1-29	Mid-Block Bus Bays / Stops
Figure 1-30	Bus Stop Location Adjacent to Canal
Figure 1-31	Bus Stop Location Adjacent to Canal
Figure 1-32	Bus Stop Location Adjacent to Canal
Figure 1-33	Bus Stop Location Adjacent to Canal
Figure 1-34	Bus Stop Location Adjacent to Canal
Figure 1-35	Bus Stop Location Adjacent to Canal

APPENDIX II. MULTIMODAL SCOPING FORM TRANSIT
CHARACTERISTICS SUMMARY PROCESS

APPENDIX III. MID-BLOCK CROSSING PROCESS

Figure 3-1.	Mid-block Pedestrian Crossing - Key Implementation Considerations
-------------	--

APPENDIX IV. ROADWAY PLANS REVIEW FOR TRANSIT
CONNECTIVITY – DESIGN REVIEW CHECKLIST

DEFINITIONS

3R: Reconstruction, rehabilitation and resurfacing projects.

A.D.A.: Americans with Disabilities Act of 1990- Public Law 101-336.

Articulated Bus: Transit vehicle more than 40-feet in length (generally up to 60'), made up of two or more sections that can bend to maneuver around corners.

Bicycle: A vehicle having two tandem wheels, either of which is more than 16" in diameter or having three wheels in contact with the ground any of which is more than 16" in diameter, propelled solely by human power, upon which any person or persons may ride.

Bicycle Lane: A portion of a roadway that has been designated by striping, signing, and pavement markings for the exclusive use of bicyclists.

Bicycle Path: A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way.

Bus Bay (Pullout): A dedicated stopping area for buses outside of the travel lane.

Bus Shelter: A facility that provides protection from the weather for waiting passengers.

Bus Stop: A designated location from which passengers board a bus, usually designated by a sign.

C.B.D.: Central Business District

Channelization: The separation or regulation of conflicting traffic movements into defined travel paths through the use of traffic islands or pavement markings.

Crash: A collision between a vehicle and another vehicle, a pedestrian, a bicycle or a fixed object.

Department: Florida Department of Transportation

Facilities: Curbside and Streetside infrastructure which improves access to public transportation.

Far Side Bus Stop: A bus stop that is located immediately following an intersection as indicated by the direction of travel.

Fixed Route: Transit service provided on a repetitive, scheduled basis along a specific route with vehicles stopping to pick up and discharge passengers at bus stops.

Mid-block Bus Stop: A bus stop that is located between intersections.

Near Side Bus Stop: A bus stop that is located immediately before an intersection as indicated by the direction of travel.

Transit Generator: A location that generates a higher than average number of transit passengers.

Sidewalk: A paved path generally located adjacent to a roadway for preferential or exclusive use by pedestrians.

Traffic Calming: Treatments used to slow traffic speeds or discourage the use of a roadway by non-local traffic.

Transit-Oriented Development (TOD): Development that, through land-use patterns and site development practices, supports a relatively large number of transit trips. TOD's combine a mix of land uses with a walk-able environment and supporting network of roads, bicycle paths and pedestrian ways.

TWLTL: Two-way, left turn lane.

TDLC: Transportation Design for Livable Communities. Adopted policy of the Florida Department of Transportation to consider features when designing facilities that balance transportation efficiency with livable environments. Refers to Chapter 21 of the FDOT Plans Preparation Manual.

Wheelchair Accessible Vehicle: A vehicle that a person may enter while remaining in a wheelchair.

INTRODUCTION

The Transit Facilities Guidelines outlined herein are applicable to Florida Department of Transportation District 4 (FDOT District 4) facilities as well as to transit facilities located within the jurisdiction of FDOT District 4 and developed by local agencies or developers. The design guidelines provide a basis for engineers to interact with local stakeholders during project development. As with all engineering designs, these guidelines must be applied using sound engineering judgment.

The guidelines provided herein are consistent with the following standards:

- ☐ American Association of State Highway and Transportation Officials (AASHTO). A Policy on Geometric Design of Highways and Streets, 2004.
- ☐ FDOT. Plans Preparation Manual: Design Criteria and Process, 2007.
- ☐ FDOT. Roadway and Traffic Design Standards, 2006.
- ☐ FDOT. Manual of Uniform Minimum Standards for Design, Construction, and Maintenance for Streets and Highways, 2005.
- ☐ American with Disabilities (ADA) Accessibility Guidelines for Buildings and Facilities (ADAAG). Standard July 1994 (Guidance September 2002).
- ☐ FDOT. Bicycle Facilities Planning and Design Handbook, April 2000.
- ☐ FDOT. Pedestrian Facilities Planning and Design Handbook, April 1999.

It is the intention of FDOT District 4 to facilitate the design process for transit facilities through the development of these guidelines. The guidelines are both qualitative and quantitative in nature, intended to provide context for design decisions that are governed by engineering judgment.

Project teams are encouraged to work with the FDOT District 4 staff, local transit agencies, Metropolitan Planning Organizations (MPO), local government transportation planners, and planning departments during the planning and preliminary design process for projects that include or affect transit facilities to ensure early consideration of transit needs and identification and resolution of design decisions and conflicts.

Please forward comments related to the District 4 Transit Facilities Guidelines to:

District Modal Development Administrator
Florida Department of Transportation
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309-3421

Phone (954) 777-4490
FAX (954) 677-7892

STREETSIDE FACTORS

A set of decision trees to help the designer decipher which streetside standards to apply based on various design issues are depicted in **Figures 10, 17 and 23 of Appendix I**. The decision trees are based on preferred stop placement, near side, far side or mid-block, and reference specific drawings also included in **Appendix I**. The designer should always implement the “Most Desirable” alternative when feasible; the “Minimum” design should only be implemented if constraints exist such that the other desirable designs cannot be accommodated.

In addition, the Department developed a Multimodal Scoping Form Transit Characteristics Summary Process in order to quickly assess transit characteristics along a given corridor. The goal of the process is to identify potential concerns and/or opportunities for transit on all reconstruction, rehabilitation and resurfacing (3R) roadway projects. The Multimodal Scoping Form Process is explained in greater detail in **Appendix II**.

A. BUS STOP LOCATIONS

Bus stop locations, established by the local transit agency, are selected to meet the needs of passengers and maximize passenger convenience. The bus stop is likely the first physical contact between passenger and bus service. The concepts adopted by the Department under the “Transportation Design for Livable Communities” (TDLC) Guidelines emphasize the importance of locating mixed-use development near transit facilities to create communities where one can live, work and play. Placing living and working opportunities adjacent to transit contributes to the economic viability of the transit system.¹ The spacing, location, design, and operation of bus stops significantly influences transit system performance and customer satisfaction. During the scope development for FDOT District 4 projects, it is the designer’s role to coordinate with the transit agency.

Bus stops should utilize sites that:

- ☐ maximize transit efficiency;
- ☐ encourage safe pedestrian and bicycle access;
- ☐ offer proximity to activity centers;
- ☐ minimize disruptions to other street traffic;
- ☐ satisfy distance requirements; and
- ☐ provide convenient connections to other modes of travel.

Passenger comfort and convenience is critical to the success of a transit stop. Comfortable and safe waiting areas should be designed to supply the appropriate transit infrastructure for each level of bus stop based on boardings and alightings at the location.

It is the policy of the Department to consider TDLC features on the state and federal highway system when such features are desired, appropriate and feasible. TDLC

¹ The Center for Livable Communities. Building Livable Communities: A Policymaker’s Guide to Transit-Oriented Developments. 1999: 1.

principles provide for integration of the transit system into the everyday life of a community to realize its full potential. Transit is proven to attract new development, acting as a tool for revitalizing deteriorating neighborhoods. Transit is often the transportation solution for those that are unable to drive, such as senior citizens, teenagers, low-income citizens, and individuals with disabilities. Transit can also greatly extend the trip length for bicyclists when buses and bus stops provide racks for bicycles. Accessible bus stops encourage transit ridership.

1. Bus Stop Location Alternatives

All factors involved in transit performance should be considered by the designer when selecting bus stop locations. Key factors include spacing between bus stops and their proximity to transit generators. Research has identified that few potential passengers will walk more than one quarter of a mile to ride a bus.² On this basis, recommended bus stop spacing is one half mile or less, with closer spacing recommended in urban areas. Closer spacing is recommended if the population served is elderly. In Florida, the extreme heat and thunderstorms should be considered when determining the spacing of bus stops. **Table 1** lists the recommended distances between bus stops based on development patterns.

Once the designer has identified the general location for the stop, the most critical factors in bus stop placement are safety, access, convenience for the passengers, and avoidance of conflicts that would otherwise impede bus, car, bicycle, or pedestrian flows. The designer must consider whether transit infrastructure such as benches, shelters, bicycle racks, or other street furniture are desirable or required within the public right-of-way and future maintenance of the infrastructure; this will be discussed in greater detail in the **Curbside Factors Section**.

Table 1. Bus Stop Spacing³

Development Pattern	Spacing Range (feet / miles)	Typical Spacing (feet / miles)
Central Business District	300-1000 / 0.056 – 0.189	600 / 0.114
Urban Areas	500-1200 / 0.095 – 0.227	750 / 0.142
Suburban Areas	600-2500 / 0.114 – 0.473	1000 / 0.189
Rural Areas	650-2640 / 0.123 – 0.500	1250 / 0.237

² Transportation Research Board (TRB), Transit Cooperative Research Program. Transit Capacity and Quality of Service Manual. Washington D.C.: National Research Council, 2003: 5-7.

³ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996.

General alternative bus stop locations are depicted in **Figures 1 and 2 of Appendix I**. The final decision on bus stop location is dependent on several safety and operating elements that require on-site evaluation, including an assessment of personal security. The choice of well-lit, open spaces that are visible from the street increases passenger safety at a bus stop and encourages transit usage. Following is a list of some of the relevant factors involved in the selection of the location for a bus stop.

Passenger Use:

- ☐ Proximity to major trip generators
- ☐ Presence of sidewalks, well marked crosswalks, bicycle lanes, and curb ramps
- ☐ Connection to nearby pedestrian circulation system
- ☐ Access for people with disabilities
- ☐ Convenient passenger transfer to other routes
- ☐ Bus route requirements

Traffic and Passenger Safety:

- ☐ Conflict between buses and other traffic
- ☐ Street lighting
- ☐ All-weather surface to step from/to the bus
- ☐ Open, well lit stops and, as applicable, routes to parking

Operation:

- ☐ Adequate stop clearance for the number of buses expected at the stop at the same time
- ☐ Impact of the bus stop on adjacent properties
- ☐ On-street automobile parking and truck delivery zones
- ☐ Width of sidewalks
- ☐ Types of signals and traffic control devices located near the bus stop
- ☐ Proximity to railroad crossings
- ☐ Existence of bicycle lanes or paths
- ☐ Pedestrian activity through intersections / well marked crosswalks
- ☐ Proximity and traffic volumes of nearby driveways

Near Side, Far Side and Mid-block Bus Stop Placement

Bus stops are generally located close to intersections where they may be placed at the near side or the far side of an intersection. The third stop location alternative is mid-block. Near side stops are preferred on two-lane roadways without a bus bay, where vehicles are restricted from going around the bus.⁴ The potential for trailing cars to stack through the intersection is created by far side stops on two-lane roadways. Far side stops are recommended in most other applications, particularly when the street is wide enough to permit other vehicles to pass uncontrolled around the stopped bus. Bus stops should

⁴ Oregon Department of Transportation. Public Transportation Guidelines, DRAFT. February 2000: 4.

always be located in such a way that they minimize traffic conflicts and do not create hazardous conditions at intersections or driveways.

Bus stop locations should minimize the need for the transit vehicle to change lanes before intersections and approaches to left turns. An assessment of the requirement for lane changes created by a particular stop location requires the designer to evaluate the routes for all buses that will serve the proposed stop. **Figures 16, 22 and 26-29 of Appendix I** depict near side, far side and mid-block bus stop locations respectively.

Table 2 identifies the advantages and disadvantages of near side, far side and mid-block stop locations. Near side and mid-block locations may be desired in special cases. Far side locations are used most frequently because they create the least interference with traffic flow and provide the best sight distance for transit and non-transit vehicles.

Locating a bus stop on the near side of an intersection creates conflicts with turning traffic when a right turn lane is present. If a far side bus stop cannot be provided, the near side bus stop should be located in advance of the leading taper for the right turn lane to provide sufficient distance for drivers to see and access the turn lane. When the right turn lane is a through lane that is being dropped at a signalized intersection, a bus stop should also be located at least 100-feet in advance of the intersection to avoid creating a conflict with vehicles merging to the inside lane or turning right at the intersection. Bus stops can be provided in advance of a right turn lane but travel distances to generators and connecting stops should be considered. A bus stop should not be placed in free-flow right turn lanes.

Mid-block crossings may be applicable in areas that already experience high frequency of pedestrian activity and may improve the visibility of the pedestrians. The most appropriate locations for designated mid-block crossings are areas where a high pedestrian generator and attractor are located directly across from each other. For example, a university located across the street from a fast food restaurant.⁵ A mid-block crossing may increase the risk to the pedestrian, each location must be analyzed on a case-by-case basis. An outline identifying the steps to perform a mid-block crossing study is provided in **Appendix III**.

The design of mid-block crossings warrant similar considerations and standards as the design of intersections including:

- | | |
|---|--|
| <input type="checkbox"/> Stopping sight distances | <input type="checkbox"/> Cross-slope |
| <input type="checkbox"/> Effects of grade | <input type="checkbox"/> Need for lighting |

⁵ Toole, Jennifer and Bettina May. Bicycle and Pedestrian Facilities, Chpt 16. RBA Group, Morristown New Jersey.

Table 2. Comparison of Bus Stop Locations⁶

FAR SIDE STOP	
Advantages	<ul style="list-style-type: none"> • Minimizes conflict between right turning vehicles and buses • Provides additional right turn capacity by making approach curb lane available for traffic • Minimizes sight distance problems on approaches to intersections • Encourages pedestrians to cross behind the bus and in the crosswalk • Requires shorter deceleration areas for buses since the bus can use the intersection to decelerate • Permits bus operators to take advantage of gaps in traffic flow that are created at signalized intersections to re-enter traffic • Supports signal prioritization schemes • Simplifies transfers
Disadvantages	<ul style="list-style-type: none"> • May increase the number of rear-end collisions since drivers do not expect buses to stop again after stopping at a red light • Can produce a traffic queue through the intersection when a bus is stopped in the travel lane
NEAR SIDE STOP	
Advantages	<ul style="list-style-type: none"> • Minimizes interference on the far side of the intersection • Allows passengers to access buses closest to crosswalks • Eliminates the potential of double stopping • Allows passengers to board and alight while the bus is stopped at red light • Provides bus operator with the opportunity to look for oncoming traffic, including other buses with potential passengers and passengers approaching the bus from other corners
Disadvantages	<ul style="list-style-type: none"> • Interferes with flow of right turning vehicles • May result in stopped buses blocking view of curbside traffic control devices and crossing pedestrians • May block view of oncoming vehicles by crossing pedestrians • May create sight distance conflicts for crossing pedestrians • Stopped bus may interfere with dedicated turning lane

⁶ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996.

Table 2. Comparison of Bus Stop Locations (cont.)

MID-BLOCK STOPS	
Advantages	<ul style="list-style-type: none"> • Provides clearest sight distance for vehicles and pedestrians • May result in passenger waiting areas with lower pedestrian congestion • May be closer to passenger origins and destinations on long blocks
Disadvantages	<ul style="list-style-type: none"> • Requires no-parking restrictions on parking at stop locations • Encourages patrons to cross street at mid-block (jaywalking) • Increases walking distance for patrons crossing at intersections or requires installation of mid-block crossing features

Another primary consideration is the connection of “desire lines.” Pedestrian and bicyclists have a strong desire to simply continue their intended path of travel without having to go out of the way. When considering mid-block crossings, look for natural patterns of travel behavior.⁷

2. Driveways

Transit stops should ideally be located at minimum of 200-feet from any existing driveway. Considering the number of buses expected to use the stop at a given time, the selected location of a bus stop should not cause stopped buses to block driveways. If blocking a driveway cannot be prevented, at least one entrance and exit to a property should remain open at all times while a bus is loading or unloading passengers. It is recommended that a bus stop be located downstream of a driveway. Bus stops should be located where there is good visibility for drivers and conflicts between automobiles leaving or entering the driveway and the bus are minimized. **Figure 3 of Appendix I** depicts recommended bus stop locations in the vicinity of driveways.

The actual passenger loading area for a stop should not be located in a driveway. Stopping in a driveway may create potential problems for boarding and alighting passengers due to the driveway slope. In an urban section, the stop should be located where a full curb is provided.

⁷ Federal Transit Administration (FTA). Mid-block Crossings, Lesson 16.
<http://safety.fhwa.dot.gov/pedbike/univcourse/swless16.htm>.

3. Railroad Crossings

Index 17346 of the FDOT Roadway and Traffic Design Standards identifies railroad crossing pavement markings and control devices. Placement of markings, control devices and curbside bus stops depends on the design speed of the facility and the available Stopping Sight Distance (SSD). For example, a facility with a design speed of 45 MPH requires a 360-foot separation from a curbside bus stop to the railroad crossing stop bar. Bus stops should be placed a minimum of 25-feet in advance of the railroad crossing pavement markings. If a bus bay/pullout is provided, it should be located a minimum of 50-feet from the railroad crossing stop bar⁸.

Bus stops should be located on the near side of the crossing in advance of the railroad crossing stop bar. Locating the bus stop on the near side of the railroad crossing eliminates any queue that may extend into the crossing behind a stopped bus. If a bus stop must be located on the far side of a crossing, it should be located at least 450-feet beyond the crossing.⁹ The designer must identify special conditions and traffic characteristics at every bus stop located near a railroad crossing.¹⁰ See **Figure 4 of Appendix I** for bus stop location criteria in proximity to railroad crossings.

4. Bicycle Lanes

The width and aerodynamic effect of moving buses negatively affect bicyclists. Where bus stops are located on a roadway with a bicycle lane, bus loading and unloading and pavement deterioration can also conflict with bicyclists.¹¹ An identified hazard exists for bicyclists when buses are moving into the bike lane to pick-up/drop-off passengers. When the bus stop is located in a bus bay, dashed line pavement markings should be used to notify bicyclists and transit operators of the potential conflict.

Where bicycle paths (facilities not immediately adjacent to the travel lane) are provided, bus stops should be coordinated so that they are located in the proximity of the bicycle path access points to the roadway. Refer to the AASHTO Guide for the Development of Bicycle Facilities for information on the design of bicycle facilities.

⁸ 2003 Florida Statutes. Chapter 316, Section 1945.1(c)1.

⁹ Value to allow sufficient distance for the queue that would develop during a 60 second bus stop period.

¹⁰ These are recommended values that must be adjusted by the designer based on the specific design conditions of each crossing (traffic projections, expected bus delays, etc.).

¹¹ American Association of State Highway and Transportation Officials (AASHTO). Guide for the Development of Bicycle Facilities. 1999: 9.

5. Special Features

A. Canals

Roadways adjacent to a canal and utilized by transit buses warrant special attention in the design of the bus stops. If there is adequate right-of-way to provide a standard bus stop design, this design should be implemented. In constrained right-of-way locations, the bus stop could be designed to encroach into the canal right-of-way or be built partially or wholly over the canal. Adequate canal flows must be maintained in areas where the bus stop encroaches into the canal section. A continuous handrail or pedestrian/bicycle rail on barrier wall should be provided around stops immediately adjacent to canals.

The critical design element along canal bus stops is sight distance. This includes the sight distance from the driver to the pedestrian crossing and the sight distance from the pedestrian to approaching vehicles. This is particularly important at mid-block locations where:

- ☐ Motorists are not expecting to stop at a signal that is not at an intersection; therefore there is anticipated to be a significant amount of red light running;
- ☐ Pedestrians may not always wait to cross during a red indication for motorists and will cross instead during the green indication; and
- ☐ Vehicle speeds will tend to be high adjacent to a canal due to the limited amount of vehicular (and pedestrian) access created by the natural barrier.

Pedestrians that will utilize the stop and crossing will include individuals in wheelchairs, young children and individuals of short stature that could be significantly obstructed by either guardrail and or barrier wall located upstream from the crossing. A clear sight triangle (free of all obstructions) is to be maintained on the approaching side of all bus stops with pedestrian crossings. Examples of the treatment of bus stops adjacent to a canal are depicted in **Appendix I, Figures 30-35**.

B. Guardrails/Adjacent Hazards

When a guardrail runs parallel to a roadway that has or will have transit service, the bus stop should be located outside the guardrail and an opening provided in the guardrail to permit pedestrian access. A landing pad must be provided at the guardrail opening to permit access to the bus. If there is adequate right-of-way to provide a standard bus stop design, this design should be implemented. The purpose of the guardrail may be to protect motorists from a steep slope adjacent to the roadway. In these locations, the designer must review the conditions adjacent to the proposed bus stop and protect pedestrians from any identified hazards with a handrail or fence. Pedestrian access behind the guardrail should be limited to the area of the bus stop. Refer to **Figures 30-35**.

B. BUS STOP DESIGN TYPE

There are three general bus stop design types: curb-side, nubs and bus bays. All three design types are linear configurations and discussed in greater detail below.

1. Curb-Side

Curb-side, particularly right lane curb-side stops, are the most common, simplest and convenient form of bus stops. Curb-side bus stops are located adjacent to the travel lane requiring only a sign to designate a stop. Only a single stopping position at the head of the stop is defined; if multiple buses approach, they simply line-up behind the preceding bus. Due to its simple design, curb-side stops are easy and inexpensive to install, easy to relocate, and provide easy access for bus drivers causing minimal delays to buses. Disadvantages include potential queues behind buses causing congestion as well as encouraging drivers to make unsafe lane maneuvers to avoid delay behind stopped buses.¹²

2. Nubs / Curb Extensions / Bulbs

Nubs, also called curb extensions or bus bulbs, consist of a section of sidewalk that extends up to the through travel lane from the curb of a parking lane. Nubs are a form of a curbside stop. In areas with high pedestrian use such as CBDs, curb extensions may be constructed along streets with on-street parking. When the bus stop is located at a nub, the bus will stop within the travel lane instead of weaving into the parking lane. This allows nubs to operate similar to curbside stops. Nubs offer additional area for pedestrians to wait for a bus and space to provide additional transit infrastructure such as shelters, benches, and bicycle facilities. Nubs also create opportunities for additional on-street parking. Nubs have particular application along streets with lower traffic speeds and/or low traffic volumes, where it would be acceptable to stop buses in the travel lane.

Common reasons for installing nubs include:

- ☐ High transit ridership in corridor;
- ☐ Re-entry problems for buses, particularly during peak travel times;
- ☐ Need to separate transit and pedestrian activity on crowded sidewalks; and
- ☐ Need to provide additional transit infrastructure.

According to an article published in the Institute of Transportation Engineers (ITE) Journal¹³, nubs are not appropriate on facilities with:

- ☐ High operating speeds, generally 45 MPH or greater;
- ☐ High traffic volumes;
- ☐ Transit corridors that serve a large wheelchair dependent population;

¹² Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 23.

¹³ Fitzpatrick, Kay, Kevin Hall, Melisa Finley and Stephen Farnsworth. Guidelines for the Use of Bus Bulbs. ITE Journal. May 2002.

- ☐ Less than 24-hour on-street parking available;
- ☐ Low transit ridership or pedestrian activity; or
- ☐ Transit layover stations.

Figures 12/15, 18 and 25/28 of Appendix I identify typical nub design for near side, far side and mid-block stops respectively.

3. Bus Bays (Pullouts, Turnouts)

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. 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.¹⁴ Additionally, bus bays may be constructed in downtown or shopping areas where many passengers may board and alight at the same time. The following factors should be considered when deciding to incorporate bus bays in a design:

- ☐ Buses are expected to layover at the end of a route or bus routes intersect and buses have extended stops to allow for transfers.
- ☐ Traffic in the curb lane exceeds 250 vehicles during the peak hour.
- ☐ Actual traffic speed is greater than 40 MPH.
- ☐ Bus volumes are 10 or more per peak hour on the roadway.
- ☐ Passenger volumes exceed 20 to 40 boardings an hour.
- ☐ Average peak-period dwell time exceeds 30 seconds per bus.
- ☐ History of repeated traffic and/or pedestrian crashes at stop location.
- ☐ Right-of-way width is adequate to construct the bay without adversely affecting sidewalk pedestrian movement.
- ☐ Improvements, such as widening, are planned for a major roadway such that the expansion provides an opportunity to include the bus bay as part of the improvement, reducing the cost of the bus bay.

At a specific location, the factors may be conflicting and 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. Even though Florida law (F.S. 316.0815) identifies that right-of-way is afforded to exiting buses, incorporating an acceleration distance, signal priority, or a far side (versus near side or mid-block) placement, are potential solutions when traffic volumes exceed 1,000 vehicles per hour per lane.¹⁵

¹⁴ Hillsborough Area Regional Transit. Transit Friendly Planning and Design Handbook and Technical Manual. Hillsborough County, October 1995: 18.

¹⁵ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 27.

The decision of whether or not to provide a bus bay depends on the priorities that are established for the transit facility and available right-of-way. Even though standards for bus bays have been developed and incorporated in many locations, some agencies are opposed to their construction because they prioritize vehicular traffic contradicting the concepts to build livable communities. In high-density commercial locations with on-street parking, nubs are a potential alternative to bus bays. The advantages and disadvantages of bus bays are summarized in **Table 3**.

The total length of the bus bay should allow room for an entrance taper, a deceleration lane, a stopping area, an acceleration lane, and exit taper. However, in some cases it may be acceptable to use the through lane as the acceleration and deceleration lane and provide only the tapers and the stopping area.¹⁶ The actual design of a bus bay/turnout will depend on local site conditions and the volume of service and passenger transfer needs. Space constraints may limit the size of bus bays while service volumes may necessitate their expansion to accommodate additional buses.¹⁷

The dimensions for mid-block bus bays are highly variable and depend on the design speed and classification of the roadway in order to afford buses sufficient distance for deceleration and acceleration. The physical location of the roadway, local characteristics, level of transit service and the type of bus (regular or articulated) will dictate the type and design of mid-block bus bay appropriate for a particular location. The level of transit service may require a larger bus bay to accommodate multiple buses; likewise, the length of the bus will ultimately depict the length of the bus bay.

The following are guidelines for locating bus bays:

- ☐ Far side bus bays should be placed at signalized intersections so the signal can create gaps in traffic for the bus to re-enter the traffic stream.
- ☐ Near side bus bays should be avoided because of conflicts with right turning vehicles, delays to transit service as buses attempt to reenter the travel lane, and obstruction of traffic control devices and pedestrian activity. In addition, near side bus bays may cause operational conflicts as transit drivers may not pull completely into the bus bay due to the difficulty of re-entering the mixed-travel lane.
- ☐ Mid-block bus bay locations may be associated with key pedestrian access to major transit-oriented activity centers.

¹⁶ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 28.

¹⁷ Pace News Page. Chicago Illinois. 12 December 2000. <www.pacebus.com/subguidelines/default.asp>.

Table 3. Advantages / Disadvantages of Providing Bus Bays¹⁸

<p>Advantages</p> <ul style="list-style-type: none"> • Allows vehicles to proceed around the bus, reducing delay for other roadway traffic and minimizing the probability of a crash • Assists in maximizing the vehicle capacity of the roadway • Clearly defines the bus stop • Passenger loading and unloading may be conducted in a safer manner • Less potential for rear-end crashes <p>Disadvantages</p> <ul style="list-style-type: none"> • On streets with high traffic volumes, it is difficult for buses to re-enter traffic, increasing delays and average travel time. In high volume locations, bus operators may not utilize bus bays once constructed. • Creates additional paving and may require additional right-of-way • May increase rates of sideswipe crashes as buses re-enter the traffic stream
--

In addition to the standard or closed bus bay design, there are two general variations of bus bays: open bus bays and partial open bus bays. These variations can be used in certain locations based on specific conditions. The use of partial open bus bays is not recommended for use in these guidelines. The following section summarizes the differences between closed and open bus bays. In addition, combination right turn lane and bus bay option is discussed.

A. Closed Bus Bays

A closed bus bay may be located either near side, far side or mid-block and consists of a physical entrance taper, a stopping area and a physical exit taper. The closed bus bay is also referred to as a turnout since it is a specially constructed area separated from the travel lanes and off the normal section of the roadway.

Design for bus bays along urban versus rural street configurations are depicted in **Figures 8 and 9 of Appendix I**. Near side bus bays with and without on-street parking are depicted in **Figures 13-16 of Appendix I**.

B. Open Bus Bays

The Open Bus Bay is always located on the far side of the intersection. The open bus bay does not have a physical entrance taper and is thus open to the upstream intersection. On facilities of four-lanes or less, Open Bus Bays facilitate U-turns from the opposing direction. Open Bus Bays are not recommended on six or more lane facilities. With the open bus bay design, the pavement width of the upstream cross street is utilized for deceleration and to move the bus from the travel lane. The major advantages of the open bus bay are; 1) the ease with which the bus can exit the traffic stream and stop out of the

¹⁸ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996.

travel lane and 2) the shorter overall length of the bay (compared to a closed bus bay). The most significant disadvantage of this design is the increased distance a pedestrian must walk to cross the street and traverse the length of the bay. Re-entry difficulties remain the same as a closed bus bay. At a signalized intersection the re-entry difficulty is overcome as the signal permits the bus operator to exit the bay during the gaps created by the traffic signal. **Figures 19 and 21 of Appendix I** depict locational criteria for open bus bays with and without on-street parking for far side stops.

C. Combination Bus Bay / Right Turn Lane

In addition to the alternative designs described above, designers may want to consider a bus bay / right turn lane combination. In many instances conflict between buses and right turning vehicles exists. To address this conflict, it may be appropriate to develop a combined bus bay / right turn lane which can accommodate both transit and right turning vehicles. **Figures 12 and 18 of Appendix I** depict combined bus bay-right turn lane configurations for near and far side locations respectively. These combinations can be applied to either near side bus bays with an intersection auxiliary right turn lane or far side bus bays with an auxiliary right turn lane for a succeeding turnout connection. The various bus bay and right turn configurations include three basic options:

- ☐ Most desirable design: the bus bay is placed entirely upstream from the right turn lane;
- ☐ Second most desirable design: the bus bay is placed partially upstream from the right turn lane since the bus bay and right turn lane share the bus exit and right turn entry taper; and
- ☐ Minimum design: the bus bay and right turn lane share space but with the bus bay located as far upstream as feasible.

4. Bus Bay Signing & Pavement Markings

Signing and pavement markings near bus bays should differentiate bus bays from travel lanes. Sample striping is provided in all applicable **Figures of Appendix I**. Generally, a broken 6-inch white stripe, 2-feet by 4-feet skip, should be used in the areas where buses will be entering and leaving the bus bay (acceleration and deceleration tapers). A solid 6-inch white stripe should be used between the dashed areas to delineate the travel lane for through vehicles.

5. Grading and Drainage

Bus bays should not be located on profile low points to avoid placing passengers in areas of potential ponding. In curb and gutter locations, bus bay pavement should slope into the roadway at a 2% cross slope that directs run-off to a drainage structure located outside of the bus bay area. When possible, runoff should be directed to adjacent native landscaping areas. In the absence of curb and gutter, bus bay pavement or landing pads should be sloped away from the roadway (2% cross slope minimum or matching the adjoining roadway pavement slope) to direct runoff to roadway drainage ditches.

6. Pavement Section

Bus bays are to be constructed with a flexible (asphalt) or rigid (concrete) pavement section that covers the entire turnout area. To decrease long-term maintenance costs, the use of a concrete pavement section is recommended. Asphalt pavement will deteriorate when in frequent contact with petroleum distillate deposits from buses and may become deteriorated due to the loads and shear forces applied to the pavement surface during bus starting and stopping movements. In addition to soil conditions, projections for the number of buses to use a bus bay and expected layover times at the stop should be taken into account to determine a concrete pavement design.¹⁹ The recommended pavement design is a 9-inch concrete slab with a 12-inch sub-base (LBR 40). This design is based on the criteria provided in the AASHTO Guide for Design of Pavement Structures (1993) for a standard bus arriving every 15 minutes for a design period of 20 years. Refer to the FDOT Pavement Design Manuals for additional pavement design criteria.

7. 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 FDOT Lighting Design Criteria²⁰. 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. When possible, the use of solar panel lightening should be installed; refer to section C-7 of these guidelines.

¹⁹ Pace News Page. Chicago Illinois. 12 December 2000. <www.pacebus.com/subguidelines/default.asp>.

²⁰ Florida Department of Transportation (FDOT). Plans Preparation Manual: Chapter 2. 2007.

CURBSIDE FACTORS

C. BUS STOPS

1. Stop Landing and Waiting Pads

Where new bus stop landing pads are constructed at bus stops, bus bays, or other areas where a bus will deploy a lift or ramp, landing pads should have a firm, stable surface, a minimum clear width of 8-feet (measured perpendicular to the back of curb or vertical roadway edge), length of 40-feet and a minimum clearance width of 5-feet (measured parallel to the vehicular roadway). The width should be extended to the maximum extent allowed by legal or site constraints and connected to streets, sidewalks or pedestrian paths by an accessible route.²¹ A landing pad with these dimensions provides sufficient room for a person in a wheelchair to board the lift mechanism of a bus. **Figure 5 of Appendix I** identifies typical bus stop landing pad size and location criteria. For proper drainage, a maximum slope of 1:50 (2%) perpendicular to the roadway is allowed. Landing pads should be sloped toward or away from the roadway as appropriate to be compatible with the adjoining drainage system.

The landing pad must be located before the bus stop sign so the door of the bus is aligned with the landing pad when the bus stops. In some cases, buses have rear door lifts. As applicable, landing pads should be installed at both the rear and front entrance locations. It may be desirable to build a continuous sidewalk or shoulder strips 8-feet wide along the entire length of the bus stop. Landing pads must be clear of utility poles, fire hydrants, street furniture, and similar obstacles.

The designer should contact the transit agency to determine if shelters will be installed at any existing or new bus stop locations. If shelters are to be installed, the designer should coordinate with the agency to provide concrete waiting pads that will meet the bus shelter requirements. A bus stop waiting pad is a paved area at a bus stop provided for bus passengers that can contain a bus shelter or other infrastructure. The size of the waiting pad depends on several factors such as the length and width of shelters and benches, right-of-way availability, location of the ADA landing pad, the size of the bus, and passenger demand. It is desirable to locate waiting pads adjacent to but separate from the sidewalk to preserve general pedestrian flow. Waiting pads that are not adjacent to the sidewalk should be connected to the sidewalk with a paved surface that meets ADA standards. It is generally recommended that 5-feet of clearance be preserved on sidewalks to reduce potential pedestrian conflicts and limit congestion during boardings and alightings.²² A minimum of 3-feet of clearance must be provided on sidewalks to maintain ADA clearance on the sidewalk. A variance from FDOT standards is required for clearance of less than 4-feet.

²¹ ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Minimum Dimensions of an ADA Landing Pad. July 1994: Section 10.2.1.

²² Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 56.

2. Shelters

Bus shelters are recommended at high volume boarding stops. FDOT District 4 applies the Transit Capacity and Quality of Service (TCQSM) standards outlined in the Highway Capacity Manual, Chapter 27²³ to identify shelter locations based on boardings and alightings. Other factors to consider when determining whether a stop warrants a shelter include number of routes served, presence of transit dependent populations and elderly populations, location of universities and schools, and adjacent social service providers and employment density. The size and design of passenger shelters will vary depending on the available amount of right-of-way and the number of potential passenger boardings.²⁴

A shelter that is accessible by individuals with disabilities must have a minimum clear floor area entirely within the perimeter of the shelter of 2-feet 6-inch wide by 4-feet deep to permit wheelchair or mobility aid user access. Even though shelters vary between transit agencies, the recommended minimum dimensions are 10-feet by 4-feet by 6-feet 8-inches high (interior clearances).²⁵ When available right-of-way is limited, it is recommended that a smaller shelter be provided rather than not providing any shelter. If provided, shelters should be constructed with vandal and graffiti resistant clear side panels for visibility.

Private vendors that have contracted with a local municipality may fund the purchase and installation of bus shelters by the transit agency in return for advertising space. The shelter is generally placed on an easement negotiated by the municipality or transit agency and the vendor designs, installs, operates, and maintains the shelter while providing advertising on the shelter and collecting revenues. Vendor contracts may include provisions for dissolution of the contract if the shelter experiences excessive vandalism. Bus shelters provided by the private sector, whether located on the public right-of-way or private property, must meet all applicable local building codes, permit requirements, land development codes and these guidelines. Advertisements on bus shelters must not exceed the established requirements as defined in the Florida Administrative Code Section 14-20.004. When feasible, every effort to develop a public-private partnership with adjacent land owners should be made.

The design and construction of bus shelters as a component of an FDOT project requires coordination with the local municipality and transit agency to determine shelter location and appearance. A critical factor for design and construction will be the contractual acceptance of maintenance responsibilities for the shelter and its infrastructure by the transit agency, the municipality or an adjacent business.

Figure 6 of Appendix I depicts various shelter size options.

²³ Transportation Research Board (TRB), Transit Cooperative Research Program. Highway Capacity Manual 2000. October 2000.

²⁴ Pace News Page. Chicago Illinois. 12 December 2000. <www.pacebus.com/subguidelines/default.asp>.

²⁵ The maximum height of a shelter is 10-feet.

A. Shelter Location

Shelters are often desired at locations where bus routes intersect to provide a waiting area for patrons. The designer should coordinate with the transit provider and local jurisdictions during the project development phase. Shelter location will vary depending on space availability, utility placement, passenger counts and operator visibility needs. Shelters should have a minimum 5-foot setback from the street. Guidelines for the placement of bus stop shelters are provided in **Table 4**.

Table 4. Guidelines for Placement of Bus Stop Shelters²⁶

1. Transit bus shelters shall be located a minimum of 12-feet from the intersection as measured along the tangent line of the road beginning at the point of intersection of the radius of the connecting road and tangent to the road.
2. Shelters are prohibited in medians and on limited access roads.
3. Shelters shall not be located within 15-feet of any fire hydrant or disabled parking space.
4. A shelter shall not obstruct any sidewalk, bike path, pedestrian path, driveway, drainage structure, or ditch, etc. At least 3-feet of clearance for pedestrian traffic shall be maintained.
5. Bus stop shelters should not be placed in the 5-foot by 8-foot wheelchair landing pad.
6. Shelter location and design is subject to ADA mobility clearance guidelines, Chapter 14-20 of the Florida Administrative Code, and any applicable Federal, State, or local building code.
7. Locating shelters completely or partially on the sidewalk should be avoided if general pedestrian traffic flow is blocked or restricted. A minimum clearance of 3-feet should be maintained between the shelter and an adjacent sidewalk. Greater clearance is preferred in high pedestrian volume locations.
8. To permit clear passage of the bus and its side mirror, a minimum distance of 2-feet should be maintained between the face of the curb and the roof or panels of the shelter. Greater distances are preferred to separate waiting passengers from nearby vehicular traffic.
9. The shelter should be located as close as possible to the downstream end of the bus stop zone to maximize visibility for approaching buses and passing traffic and to reduce the walking distance from the shelter to the bus. However, when bus shelters are provided in conjunction with bus bays, shelters should be located to minimizing conflict between passengers entering and exiting the bus.
10. Placing bus stop shelters in front of store windows should be avoided when possible to limit interference with advertisements and displays. Blocking the window of a store can increase the possibility of vandalism.
11. When shelters are directly adjacent to a building, a 12-inch clear space should be preserved to permit trash removal or cleaning of the shelter.
12. Shelter installations must provide a clear opening between the structure and the ground or foundation to facilitate cleaning and removal of debris.

²⁶ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 28.

Orientation and design of a shelter can positively or negatively influence passenger comfort. In Florida's tropical climate, a shelter facing east or west can be uncomfortable because of the intensity of the sun. The height and dimensions of the shelter canopy should be adjusted to provide shade as well as rain protection to waiting passengers. Shelters should not be enclosed in impervious material; the design should be completely open to permit the flow of air or perforated panels may be used to reduce glare and maintain ventilation. Landscaping may contribute to passenger comfort by providing shade.

Many shelters are used for advertising purposes. Generally, advertisements are placed on panels attached to the bus shelter to take advantage of the visibility that the bus stop receives from passing traffic. Passenger and pedestrian safety and security are a greater concern at shelters with advertisements. The advertising panels may limit views in and around a bus stop, making it difficult for bus drivers to see passengers. Approaching passengers may also have a restricted view of the shelter interior. To prevent restricted sight lines, advertising panels and kiosks should be placed downstream of the traffic flow. Approaching traffic should be able to easily view the interior of the shelter.²⁷

B. Shelter Pad Design

Generally, vendors that install shelters also provide the associated concrete pad. All applicable federal, state, county, and city codes must be followed. Concrete pads with 8-inch thickness and adequate reinforcement are recommended. While the ideal size for an accessory pads is 10-feet by 30-feet, adequate area to construct the shelter and other infrastructure such as newspaper stands and telephones to be installed may not be available. In many cases, existing right-of-way does not allow construction of a shelter pad of this size to be installed. The minimum recommended concrete pad size is related to the shelter size. The concrete pad should extend 6-inches beyond the shelter canopy to minimize erosion at the shelter roofline caused by runoff. Easements obtained for the installation of a shelter should extend 2-feet beyond the concrete pad. The design of the pad could incorporate conduits and junction boxes for shelter utilities and should be coordinated with the utility service providers. Coordination with individual municipalities and transit agencies is also recommended as municipalities begin to develop and implement their own shelter programs and designs.

C. Maintenance

All shelters should be fabricated with vandal resistant materials and must be properly maintained for aesthetics, function and safety. It is common to apply an anti-graffiti coating to shelters to facilitate maintenance. Vendor contracts usually include a provision to allow the removal of a shelter when maintenance costs related to vandalism become excessive. Before this action is taken, the municipality may post warnings to users that the shelter may be removed due to vandalism in hopes of having the community participate in protecting the shelter. Shelter facilities must be strictly maintained to avoid any deterioration that is hazardous to the transit patrons. Florida Administrative Code Section 14-20.003 provides that a clear opening between the

²⁷ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 70.

structure and the foundation must be maintained to facilitate cleaning and prevent the accumulation of debris.

3. *Bus Benches*

A bench, even without a bus shelter, provides comfort and convenience at bus stops. As with shelters, benches are usually installed on the basis of existing or projected ridership figures as well as other factors such as high elderly population. It is very common to have bench only stops and to have advertising on the benches. Benches may be provided by private vendors through agreements with municipalities. Preserving minimum pedestrian circulation guidelines, coordinating with existing landscaping, and providing additional waiting areas can improve bench and site utilization. Preferably, benches should be set back a minimum of 10-feet from the travel lane; if 10-feet can not be accommodated, setback should meet FDOT design criteria.²⁸ Guidelines for the placement of benches at bus stops are provided in **Table 5. Figure 6 of Appendix I** depicts general bench dimensions.

Table 5. Guidelines for Placement of Bus Stop Benches²⁹

1. Transit bus benches placed in the right-of-way shall not exceed 74-inches in length, 28 inches in depth, and 44-inches in height (Chapter 14, Florida Administrative Code).
2. Any bench placed on any part of the sidewalk shall leave at least 3-feet (4-feet per FDOT standards) of clearance for pedestrian traffic between the bench and the nearest edge of the road. This distance should be increased as the speed of traffic on the adjacent road increases. Bus benches/shelters should be placed outside the horizontal clearance/ clear zone in order to not become a traffic hazard.
3. Transit bus benches shall not be placed in the median of any divided highway or on limited access facilities.
4. Avoid locating benches in completely exposed locations. Coordinate bench locations with existing shade trees if possible. Otherwise, install landscaping to provide protection from the wind and other elements.
5. Coordinate bench locations with existing streetlights to increase visibility and enhance security at the stop.
6. Locate benches on a non-slip, properly drained, concrete pad. Avoid locating benches in undeveloped areas of the right-of-way.
7. Locate benches away from driveways to enhance patron safety and comfort.
8. Bench and other street furniture locations are subject to ADA mobility clearances between the bench and other street furniture or utilities at a bus stop.
9. Benches are not to be located within the 5-foot by 8-foot wheelchair landing pad.
10. At bench-only stops, additional waiting room near the bench should be provided (preferably protected by landscaping) for passenger comfort.

²⁸ Florida Department of Transportation (FDOT). Florida Intersection Design Guide, Objects and Amenities: 6-17.

²⁹ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 70.

4. Bicycle Parking

The lack of secure and safe bicycle storage facilities at transit stops is a major deterrent to some cyclists who may otherwise use transit. Bicycle parking facilities will be defined in terms of two classes. Class I refers to storage units that protect the entire bicycle from theft, vandalism and inclement weather. Class II racks provide a secure place in which to lock a bicycle but do not provide any direct protection from vandalism or weather.

When determining which type of bicycle storage facility is most appropriate, existing and potential demand should be considered. Factors to consider include:

- ☐ Presence of on-street bicycle lane;
- ☐ Existing bicycle activity/evidence of bicycle use at stops;
- ☐ Boarding data and number of routes; and
- ☐ Surrounding land uses.

In addition, the length of time a bicycle is parked at a location is a key factor when determining whether or not to provide Class I facilities. Bicycle lockers, or completely enclosed storage containers, maybe be appropriate at locations where long-term bicycle parking is predominant. Class I facilities, however, are large and awkward to place next to bus stop shelters.

Class II racks are appropriate for short-term parking, defined by two hours or less. Class II racks should provide for the following factors:

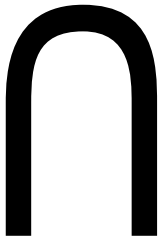
- ☐ Support the bike in 2 locations;
- ☐ Prevent wheel from tipping;
- ☐ Allow both the frame and one wheel to be secured using standard U-shape lock;
- ☐ Support all bicycle types; and
- ☐ Allow front-in parking (U-lock secures front wheel and down tube) and back-in parking (U-lock secures back wheel and seat tube)³⁰.

The Association of Pedestrian and Bicycle Professionals recommends standard inverted U, A or Post and Loop bicycle racks. The Association of Pedestrian and Bicycle Professionals does not recommend comb, wave or toast style racks. Standard wave racks are not recommended because they are typically misused by cyclists, greatly reducing the advertised capacity. If used as intended by the manufacturer, bicycles are parked perpendicular to the rack and are not supported in two areas; often bicycles are locked parallel to the rack, similar to the U-racks, allowing bicycles to be supported in two places but reducing the capacity of the rack.

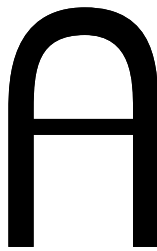
³⁰ Association of Pedestrian and Bicycle Professionals. [Bicycle Parking Guidelines](#): 1.

Class II Bicycle Rack Elements

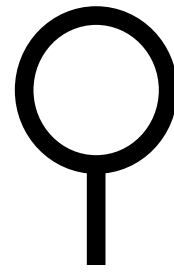
RECOMMENDED – One rack element supports two bikes



Inverted “U”



“A”



Post and Loop

NOT RECOMMENDED – One rack element is a vertical segment of the rack



Wave



Comb

If standard U-racks are used, they should be mounted in a row with a minimum distance of 30”, allowing sufficient room for two bicycles per rack. Multiple racks can be installed to create a “bicycle parking lot” depending on the size of the transit stop and projected use.

The following should also be considered when locating bicycle storage facilities at transit stops:

- ☐ Paved access between bicycle lane/sidewalk, bicycle parking lot and transit stop;
- ☐ Waiting area constructed with non-slip concrete or asphalt that is properly drained;
- ☐ Racks securely mounted to a reinforced concrete slab, minimum of 4” thick extending 4” beyond the vertical rail foot-print;
- ☐ Rack height should not exceed 48”;
- ☐ Located storage area away from other pedestrian or patron activities to improve safety and reduce congestion;
- ☐ Coordinate the location of the storage area with existing on-site lighting; and
- ☐ Do not locate the storage area where views into the area are restricted by the shelter, landscaping or existing elements, such as walls.³¹

³¹ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 79.

The location of the bicycle rack should be such that it is visible and is compliant with ADA standards, preferably on the approach side of the shelter. If long-term bicycle parking is expected, at least 50% of the bicycle parking spots should be covered by an overhang or actual storage facility.³² Upper elements of the bicycle rack should not protrude, creating an obstacle for a blind traveler.³²

5. Other Infrastructure

Depending on the size of the transit stop, available right-of-way and usage at a particular stop, other transit infrastructure such as trash receptacles, newspaper vending machines and additional street furniture may be warranted. When providing other infrastructure, all ADA and roadside clear zone requirements must be met.

There should be direct coordination with the applicable transit agency to determine if space is available and if specific requirements or requests can be met.

6. Signage

Bus stop signs must be located outside of the horizontal clear zone. For curb and gutter (urban) sections, the minimum distance from the face of the curb to the bus stop sign is 2-feet. For shoulder (rural) sections, the minimum distance varies according to the design speed of the road. The maximum distance from the curb to the signpost should be 8-feet to maintain visibility for bus operators. The designer must coordinate the location of the bus signs with the transit agency.

ADA requirements specify that all new bus route identification signs provide 84 inches minimum vertical clearance over the sidewalk. If the vertical clearance of an area adjoining an accessible route is reduced to less than 84 inches, a barrier to warn blind or visually impaired persons shall be provided. Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke-to-width-to-height ratio between 1:5 and 1:10. The characters and numbers shall be sized according to the viewing distance from which they are to be read. The minimum character height is 3 inches. The characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their backgrounds, either light characters on a dark background or dark characters on a light background.³³

7. Lighting

Every attempt to provide lighting at all transit stops should be made. Adequate lighting increases visibility at a bus stop and serves as a deterrent to criminal activities. The Crime Prevention Through Environmental Design (CPTED) Program seeks to prevent certain crimes within a specific boundary by manipulating variables within the physical

³² City of Portland Office of Transportation. [Bicycle Parking Facilities Guidelines](http://www.trans.ci.portland.or.us/bicycles/parkguide.htm).
www.trans.ci.portland.or.us/bicycles/parkguide.htm

³³ ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Minimum Dimensions of an ADA Landing Pad. July 1994: Section 4.4.

environment. The physical environment of the bus stop can be manipulated to produce behavioral effects that will reduce the incidence and fear of crime, thus improving the quality of the service provided at the bus stop. Lighting is the most critical factor in the CPTED Program.

Illumination at a bus stop is desired but optional. When possible, bus stops should be located next to an existing light pole that illuminates the stop location during anticipated usage. Coordination with the transit provider to adjust stop locations to permit the use of existing lighting systems is recommended. If an existing light pole is located at the desired stop location, the designer should verify that the level of illumination provided over the entire bus stop is the same as the adjacent roadway per FDOT Lighting Design Criteria.³⁴ Additional lighting may be considered when the bus stop is located between light poles. The designer should coordinate with the transit agency regarding the location of the light poles and bus stop.

In addition to illumination level, the uniformity of lighting is an indication of the quality of illumination and should be considered when installing new lighting systems or enhancing an existing system.³⁵ Mounting height and spacing of luminaries should be sufficient to provide the desired lighting intensity over the entire bus stop, meeting FDOT Lighting Design Standards for the adjacent roadway.³³ Lighting that is selected for installation should be vandal resistant and meet clear zone requirements. Coordination with the local electrical provider and local government is required when existing lighting is enhanced or a new system proposed for installation.

Solar panels are another option to provide light at transit stops. Advances in technology make solar panel lighting a feasible option as costs continue to decrease and the technology becomes more reliable. Solar powered systems consist of a solar panel and a charged controller that charges batteries, which operate the lights. Costs for a basic solar kit range from \$1,200 to \$1,500 per shelter. Traditionally, solar panels are mounted to the roof of the shelter. In instances where the shelter location does not allow solar panels to face 45-degrees due south, pole-mounted systems are better option. Most stand-alone systems do not require trenching or wiring and there is very little that the end-user has to do to install such systems.³⁶

D. SIDEWALK ACCESS TO TRANSIT

Providing defined access to and from the bus stop increases transit ridership. Sidewalks are a system of paved walkways parallel to roadways that are designed for use by pedestrians. They are an integral part of city streets but may not be prevalent in rural locations. Sidewalks in rural areas are most justified at points of community development such as schools, parks, and local businesses that produce pedestrian concentrations near or along roadways. Generally, every attempt should be made to

³⁴ Florida Department of Transportation (FDOT). *Plans Preparation Manual: Chapters 2 and 7*. 2007.

³⁵ American Association of State Highway and Transportation Officials (AASHTO). *A Policy of Geometric Design of Highways and Streets*. 1994: 441.

³⁶ Starcic, Janna. *Designing Bus Shelters for the Savvy Passenger*. Metro Exchange, February/March 2003. <http://www.metro-magazine.com/t_featpick.cfm?id=90505004>. January 22, 2004.

construct sidewalks along both sides of arterial roadways especially those that are not provided with shoulders, even though pedestrian traffic might be light. Sidewalks should be constructed along both sides of arterial and collector roadways where transit service is provided. Local streets that provide access to roadways with a higher functional classification on which bus stops are located, or local streets with bus stops may not require sidewalks if traffic volumes are very low. The construction of sidewalks on both sides of streets may not be required in cases when the roadway parallels a railroad or a drainage canal and there are no bus stops or pedestrian attractions that can be accessed from the roadway.

Sidewalks provide direct pedestrian connections between uses. Sidewalks should be included in all roadway construction plans unless a hazard to pedestrians exists. Pedestrian connections that are not adjacent to a roadway should be incorporated into public and private development designs based on the location of attractions, parking and residential uses. One strategy to improve pedestrian access at a bus stop is to coordinate land development with the location of bus stop. Coordination and cooperation with the landowner or developer can enhance the connectivity between the land use and bus stop. Access to the bus stop from the intersection or adjoining property should be as direct as possible. Access from non-residential uses located adjacent to bus stops should be provided. This adjustment may require coordination with existing or planned developments to modify landscaping, fencing or walls and sign locations. Paved access (sidewalks) from the perpendicular side streets for a distance of one-quarter mile should be considered. When possible, sidewalks and bus stops should be coordinated with existing streetlights to provide lighting and security.³⁷ **Table 6** provides design parameters for sidewalks.

Table 6. Sidewalk Guidelines

1. The minimum width of a sidewalk shall be 5-feet when separated from the curb by a buffer strip.
2. The minimum separation from the curb (width of buffer strip) shall be 2-feet, 6-foot is recommended.
3. When a buffer is not provided, sidewalk width shall be 6-feet.
4. Grades for sidewalks should not exceed 5% when not adjacent to a travel way.
5. Cross slope should be sufficient to allow for adequate drainage; maximum cross slope is 2%.
6. Minimum clear width for single wheelchair passage shall be 32-inches at a point and 36 inches continuously ³⁸ and 48 inches at curb ramps and driveway turnouts.

³⁷ Transportation Research Board (TRB). Guidelines for the Location and Design of Bus Stops, adapted from TCRP Report 19. Washington D.C.: National Academy Press, 1996: 56.

³⁸ ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), Minimum Dimensions of an ADA Landing Pad. July 1994: Section 4.2.

The minimum 5-foot sidewalk width should increase under the following circumstances:

- ☐ Street furniture such as benches and shelters are present;
- ☐ Pedestrians and queuing volume is high;
- ☐ Car and building doors open toward the sidewalk;
- ☐ Utility poles are anchored within the limits of the sidewalk;
- ☐ Congregation areas such as walk-up windows, bus stops/transfer stops, and windows displays are present; and
- ☐ Local municipality and transit agency support.

The improvement of existing sidewalks and construction of new sidewalks should be in accordance with Chapter 8 of the FDOT Plans Preparation Manual, Index 310 of the FDOT Roadway and Traffic Design Standards and Section 522 of the FDOT Standard Specifications for Road and Bridge Construction. **Table 7** provides guidance on sidewalk installation based on road and land use characteristics. Guidelines for the installation of sidewalks on local streets are derived from national standards. Local development regulations and design standards should be reviewed and recognized as the minimum requirements within a jurisdiction. In the presence of transit service, the following guidelines represent the recommended level of improvement.

1. Drainage

All bus stops in urban sections that include sidewalks should be located at least 20-feet from the edge of a drainage structure to limit placing the pedestrian in standing water or at grade changes. Where possible, native vegetation should be considered to absorb the runoff associated with the drainage at a bus stop. The edge of the structure is defined as the point where the drainage structure opening begins along the gutter line. Designers should be aware of potential hazards relating to people alighting through rear bus doors at the transit stops. Bus stops should be located 15-feet or more from a fire hydrant or on-street disabled parking space as required by Florida Administrative Code Section 14-20.003.09.

Table 7. Guidelines for Sidewalk Installation

Land Use /Roadway Functional Classification/ Residential Density	New Urban and Suburban Streets	Existing Urban and Suburban Streets
Commercial and Industrial	Both Sides	Both sides. Every effort should be made to add sidewalks where they do not exist and complete missing links.
Residential/Major Arterials	Both Sides	Both Sides
Residential/Collectors	Both Sides	Multi-Family-Both sides Single Family Dwellings-Prefer both sides; require at least one side.
Residential/Local Streets/ Greater than 4 Units Per Acre	Both Sides	One side preferred, min. 5-foot width; Shoulder on both sides required.
Residential/Local Streets/ 1 to 4 Units per Acre	Prefer both sides; require at least one side	One side preferred, min. 5-foot width; Shoulder on both sides required.
Residential/Local Streets/ Less than 1 Unit per Acre	One side preferred, shoulder on both sides required	At least 5-foot wide shoulder on both sides required.

Notes:

Any local street within two miles of a school site is considered to be on a walking route to school-sidewalk and curb and gutter required.

In the presence of service roads, the sidewalk adjacent to the main road may be eliminated and replaced by a sidewalk adjacent to the service road on the side away from the main road.

For rural roads not likely to serve development, a shoulder at least 5-ft in width, preferably 8-ft on primary highways, should be provided. Surface material should provide a stable, mud-free walking surface.

All guidelines are subject to local approval.

E. CURB RAMPS

When designing a project with sidewalks, accommodation of the disabled is required. Once a curb ramp has been provided to facilitate street crossings for disabled persons, it is imperative that a receiving facility on the other side of the intersection is available. Placement of curb ramps in locations other than corners and crosswalks must be supported by an engineering study. Incorrectly placed curb ramps may encourage pedestrians to cross at dangerous and illegal locations. **Table 8** identifies factors affecting the design and placement of curb ramps.

The location of the curb ramp must be carefully coordinated with the pedestrian crosswalk lines and the locations of existing and planned bus stops. All new curb ramps must meet the FDOT Standard Index 304 and the following requirements:

- ☐ The maximum slope in all curb ramps shall be no more than 1:12.
- ☐ Transitions from ramps to walks, gutters, road surface immediately adjacent to the curb ramp, or accessible route shall not exceed a slope of 1:20.
- ☐ The minimum width of the curb ramp shall be 36 inches excluding the flared sides.
- ☐ Changes in level up to one-fourth of an inch may be vertical without edge treatment. Changes in level between one-fourth and one-half of an inch shall be beveled with a slope not greater than 1:2.
- ☐ Changes in level greater than one-half of an inch shall be accomplished by means of a ramp that complies with Sections 4.7 and 4.8 of the ADA Accessibility Guidelines for Buildings and Facilities, July 1994.
- ☐ If a curb ramp is located where pedestrians must walk across the ramp, flared sides shall have a slope not greater than 1:12.
- ☐ Curb ramps shall be located where obstruction by parked vehicles does not occur.
- ☐ Curb ramps at marked crosswalks must be wholly contained within the markings, excluding any flared sides.
- ☐ Curb ramps shall be located so that they do not interfere with normal functioning of a bus stop.
- ☐ Utility appurtenances (ie., valve covers, pull boxes, manholes, etc.) shall be flush with the surface of the curb ramp in both the lateral and longitudinal directions so as not to present a trip-and-fall hazard or shall be relocated outside the curb ramp.
- ☐ Detectable warnings must be installed.
- ☐ Maximum cross-slope in all curb ramps shall be no more than 1:50.

All curb ramps must be designed and constructed per the latest edition of Index 304 of the FDOT Roadway and Traffic Design Standards, the ADA Accessibility Guidelines for Buildings and Facilities, the FDOT Standard Specifications for Roads and Bridge Construction, A Policy on Geometric Design on Highways and Streets of the American Association of State Highway and Transportation Officials, and the FDOT Plans Preparation Manual. Details on the placement and configuration of ramps are provided in **Figure 7 of Appendix I**

Table 8. Factors Affecting Curb Ramp Design

FACTORS	AFFECT
Sidewalk width	Dictates the type of ramp that must be used.
Sidewalk location with respect to the back face of curb	The distance from the sidewalk to the back face of curb dictates what kind of ramp may be used and if a paved strip is needed to connect the ramp with the sidewalk.
Height and width of curb cross section	To comply with the maximum slope requirements, the height of the curb determines the length of the ramp.
Design turning radius and length of curve along the curb face	A ramp in a straight section will have less complex geometry. The larger the radius, the further the ramp must be located from the intersection.
Angle of street intersections	Determines location of the ramp: must be aligned with crosswalk lines or ramp in the opposing corner.
Planned or existing location of sign and signal control devices	Determines location of the ramp and crosswalk lines: must be installed ahead of the stop bar and not in conflict with signal control devices.
Storm water inlets and public surface utilities	Affects location of the ramp: should not be installed in a low point.
Possible sight obstructions	Affects the location of the ramp: sight obstructions like parked cars, utility poles, etc. can create a hazard for pedestrians crossing the street and should be removed or the ramp relocated.
Buffer width	Determines the ramp type: Buffer width will dictate what kind of ramp must be used and if a paved strip is needed to connect the street with the ramp with the sidewalk.
Roadway grade ³⁹	Influences the ramp design: roadway grade will influence the length of the flared sides of the ramp. Excessive grade can limit ability to construct a properly designed ramp.
Bus Stop Location	Determines location of the ramp: curb ramps shall be located so that they do not interfere with normal functioning of a bus stop.

³⁹ American Association of State Highway and Transportation Officials (AASHTO). A Policy of Geometric Design of Highways and Streets. 2004: 394.

F. PEDESTRIAN CROSSINGS

A pedestrian is any person afoot or in a wheelchair. The mix of pedestrians and traffic is a major consideration in highway planning and design. Pedestrians are an integral part of every roadway environment and their presence must be recognized in rural as well as urban areas. Pedestrian actions are less predictable than those of motorists. Many pedestrians consider themselves outside the law with regard to traffic regulations, and in many jurisdictions pedestrian regulations are not fully enforced. Marked crosswalks are meant to guide pedestrians to cross at the safest location, but they are not safety devices to protect pedestrians from vehicles. At mid-block locations, crosswalk markings legally establish the crosswalk.

Crosswalks are a critical element of the pedestrian network. It is of little value to develop a complete sidewalk and/or transit system if pedestrians cannot safely and conveniently cross intervening streets.⁴⁰ Crosswalk markings provide guidance for pedestrians crossing roadways by defining and delineating the pedestrian path within signalized intersections and other intersections where traffic stops.⁴¹ Pedestrian crossings should be short in distance to minimize the time a pedestrian is exposed to vehicular traffic. The designer should minimize pedestrian delays at an intersection in order to reduce the pedestrian's motive to cross against the light. Unclear controls may confuse pedestrians and increase the unpredictability of pedestrians at crossings. Signs, signals, and markings should be easy to understand and simple to obey.⁴²

1. Crossing Placement

In all cases, the crossing treatment design applied in a specific location should be guided by a traffic engineering study of existing conditions and the intended function of the crossing. The most essential tool to use in determining crosswalk placement is engineering judgment. The FDOT strives for uniformity in the placement of crosswalks. Placing a crosswalk is recommended but not limited to the following locations:

- ☐ Signalized intersections in urban areas should have marked crosswalks on all four legs unless it is desired for reasons of safety and/or capacity to direct pedestrians to cross at an alternative location (e.g., crossing against a dual left turn or a dual right turn or when a split phase pattern is used such that pedestrians cannot cross safely).
- ☐ Where a marked crosswalk can concentrate and channel multiple pedestrian crossings to a single location, whether at a mid-block or corner location.
- ☐ Where there is a need to delineate the optimal crossing location, due to confusing geometric or traffic operations.

⁴⁰ Portland Pedestrian Design Guide. June 1998: Section C.

⁴¹ U.S. Department of Transportation. Manual of Uniform Traffic Control Devices. Federal Highway Administration. 2003: Section 3B-17.

⁴² Wagner, Robert F. Large City Technical Exchange and Assistance Program. New York: New York University, Graduate school of Public Service, Rudin Center for Transportation Policy and Management, 2000: Chapter 3-2.

- ☐ Approved school crossings or at crossings on recommended safe routes to a school.
- ☐ Pedestrian crossings with pedestrian volumes of more than 25 pedestrians per hour and/or those with a record of pedestrian/vehicle conflicts.⁴³
- ☐ At channel islands when the volume of pedestrians times the number of vehicles exceeds 800 per hour (average). Crosswalks are not recommended at lower levels of service to reach channel islands.
- ☐ Where passengers transfer between intersecting bus routes as required by the location of bus stops.

2. Intersections

Crosswalks designate the portion of the roadway for pedestrians to use in crossing the street. If markings are not present, the width of the sidewalk or path extended across the street defines a legal crosswalk. Where markings are present, the legal crosswalk is defined by such markings. While markings are not needed to designate a crosswalk at intersections, they are needed to designate a mid-block crosswalk.²⁸

A. Signalized Intersections

At signalized intersections, crosswalks should be provided at each location where pedestrians are intended to cross the street. Intersections with marked crosswalks have been shown to be safer than unmarked intersections.⁴¹ Signal timing should provide adequate time for pedestrians to cross the street. Additional crossing time may be required if the population served is elderly, disabled or if the pedestrian volume is high. Marked crosswalks aid the elderly and the disabled to cross the street in a straight line and assure that they take the shortest path across the street. For crossing pavement markings refer to **Figure 3 of Appendix I**.

Pedestrian signal heads should be used under any of the following conditions:

- ☐ When necessary to assist pedestrians in making a safe crossing or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts.
- ☐ No vehicular signal indicators are visible to pedestrians or the vehicular signal indications that are visible to the pedestrians starting or continuing a crossing provide insufficient guidance as to when it is safe to cross, such as on one-way streets, at T-intersections, or at multi-phase signal operations.⁴⁴

⁴³ Highway Safety Research Center. Florida Pedestrian Planning and Design Handbook. University of North Carolina, April 1999: 76.

⁴⁴ U.S. Department of Transportation. Manual of Uniform Traffic Control Devices. Federal Highway Administration. 2003: Section 4E-3.

B. Unsignalized Intersections

The use of marked crosswalks at unsignalized intersections is governed by engineering judgment. The designer should consider crosswalks at the intersection of minor streets with arterials in locations where a sidewalk exists on both sides of the arterial road. Crosswalks should be marked at all intersections where there is substantial conflict between vehicular and pedestrian movements. Marked crosswalks should be considered at intersections with transit stops, location of intersecting transit routes and land uses oriented towards the pedestrian. For crossing pavement markings refer to **Figure 3 of Appendix I**.

C. Intersection Control Beacon

A flashing beacon is a highway traffic signal with one or more signal sections that operate in a flashing mode. It can provide traffic control when used as an intersection control beacon or warning in alternative uses. Flashing warning beacons at intersection crosswalks should only be used when additional warning is required or when special conditions exist at the desired intersection. There are two types of intersection control beacons that can be installed. One type utilizes a yellow beacon on one route and a red beacon on the other, while the second type utilizes red beacons on all legs of the intersection. An intersection with a yellow-red beacon should be treated similar to an unsignalized intersection (stop controlled), whereas intersections with all-red beacons should be treated similar to a multi-way stop intersection.

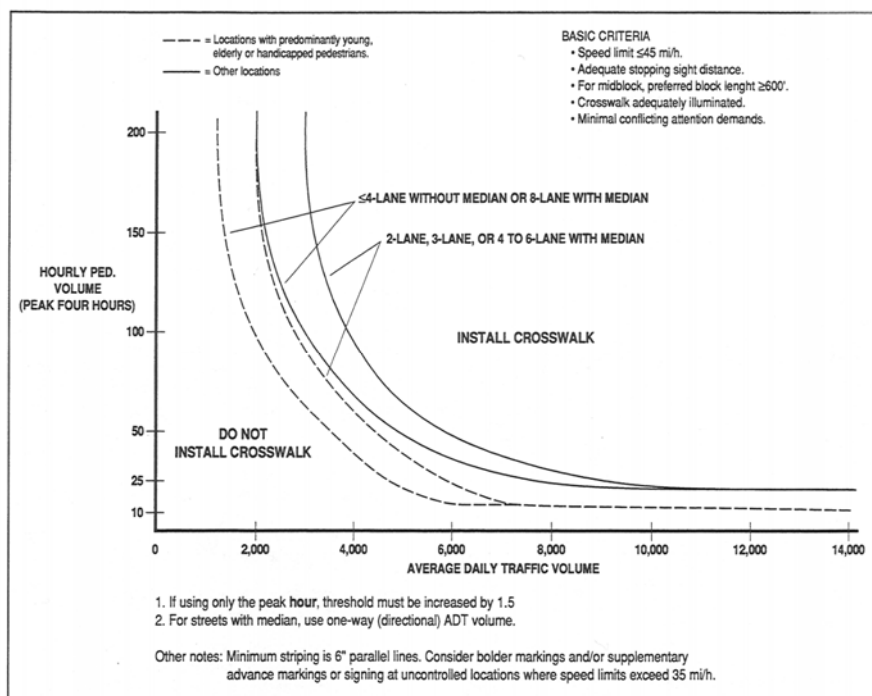
D. Guidelines for Crosswalk Installation

Criteria have been developed relating pedestrian and vehicle volumes for determining when crosswalk markings would be beneficial. These criteria are depicted in Graphic 1. The criteria recognize the role of street widths and other factors such as pedestrian concentrations of children and elderly/disabled pedestrians in the design of crosswalk markings. Crosswalk markings should be installed at:

- ☐ All signalized intersections with pedestrian signal heads. Although it is not necessary to mark crosswalks at all signalized intersections (as long as the stop bar is adequately set back from the intersection), marking crosswalks where pedestrian signal heads are in place reinforces that pedestrians can be expected.
- ☐ All locations where a school crossing guard is normally stationed to assist children in crossing the street.
- ☐ All intersections and mid-block crossings that satisfy the minimum vehicular and pedestrian volume criteria in Graphic 1 and the following basic criteria:
 - Speed limit ≤ 45 mph
 - Adequate stopping sight distance
 - For mid-block crosswalks, block length is at least 600-ft
 - Adequate crosswalk illumination
- ☐ All other locations at which there is need to clarify the preferred crossing location because the proper location for crossing would otherwise not be clear.⁴⁵

⁴⁵ Knoblauch, R.L. and S.A. Smith. Guidelines for the Installation of Crosswalk Markings. Washington, D.C.: 1987: 19.

Graphic 1. Guideline for Crosswalk Installation at Uncontrolled Intersections & Mid-block Crossings⁴⁵



3. Mid-block Crossings

In some urban areas where the distance between intersections is greater than ½ mile, mid-block crosswalks provide pedestrians an additional opportunity to safely cross the street. In less developed areas where pedestrian activity is high, mid-block crosswalks can be used to channel pedestrian traffic and minimize the number of vehicle/pedestrian conflicts. Locations for future mid-block crossings have to be carefully studied in order to address all safety and operational concerns.

Mid-block crosswalks and those marked at intersections immediately downstream (within 1/8 mile or 660-feet) of a traffic signal should be discouraged. Motorists do not expect pedestrians to cross at these locations and the distance to the intersection is reasonable (300 to 600- feet) to expect pedestrians to walk to a safer crossing location.⁴⁶ Marked mid-block crosswalks should be avoided on streets with posted speed limits above 45 MPH. In some locations it may be best to avoid the crossing and find other means for crossing the street.⁴⁷ Pedestrian overpasses/underpasses can be a solution to a documented pedestrian demand to cross a high-speed facility.

Marked crosswalks can be provided at mid-block crossing locations that are controlled by traffic signals and pedestrian signals, and at school crossing locations that are controlled

⁴⁶ Northwest Region Traffic Operations, Washington Department of Transportation. Crosswalks: Policy and Practice. July 1997. 4.

⁴⁷ Institute of Transportation Engineers. Design and Safety of Pedestrian Facilities. 1998.

by guards during school crossing periods. When crosswalks are unsignalized, mid-block crosswalks should be installed. They should be illuminated, marked, and outfitted with advance warning signs or warning flashers.⁴⁸

Mid-block crosswalk installation should also consider the following:

- ☐ Adequate sight distance for the motorist and pedestrian should exist. This includes examination of on street parking and loading, street furniture, utilities, signs, light poles and landscaping. Florida DOT requires that at least 50% of the vehicle and/or pedestrian be “visible” and if greater than 50% of the vehicle or pedestrian is not visible, that at least two seconds of unobstructed visibility exists.⁴⁹
- ☐ Mid-block crosswalks should not be located immediately downstream from bus stops, traffic signals, or other marked crossings.
- ☐ Mid-block crosswalks should be considered where there are significant pedestrian crossings and substantial pedestrian/vehicle conflicts as illustrated in Graphic 1.
- ☐ Mid-block crosswalks can be used in special cases where there is a pedestrian generator in the middle of the block, in central business districts or when the distance between crossings is more than 1,200-feet. Transit terminals, parking garages, office buildings, shopping centers, apartment complexes, schools, public buildings, community centers, and bus stops, are all examples of pedestrian generators.
- ☐ A mid-block crosswalk should be considered if it serves to concentrate or channelize multiple pedestrian crossings at a single location.
- ☐ A mid-block crossing should have adequate illumination. This is most important if the pedestrian crossing demand occurs in the early morning or evening hours. The minimum average illumination level for the entire crossing area per FDOT roadway lighting design criteria.
- ☐ When possible, it is best to mark mid-block crosswalks at 90° to vehicle traffic to designate the shortest path for the pedestrians (minimizing exposure) and to avoid placing the pedestrian’s back to oncoming traffic.

Inadequately marked and inappropriately located mid-block crosswalks may increase crash frequency and severity by lulling both pedestrians and motorists into a false sense of security. Pedestrians may assume that the motorist can stop in all cases. Collisions may increase because pedestrians enter the travel lane without waiting for adequate gaps in the traffic stream.⁴⁸

Some analyses have shown that 50% of all urban pedestrian crashes involve dashes into the street at mid-block locations or intersections. A frequently cited contributing factor in these types of crashes is the presence of on-street parked cars that obstruct visibility for the pedestrian and motorist. The designer should prohibit on-street parking in advance of

⁴⁸ Florida Department of Transportation (FDOT). Transportation Design For Livable Communities, Plans Preparation Manual. 20007. Chapter 21.

⁴⁹ Florida Department of Transportation (FDOT). Median Handbook: Chapter 3: 2.

all mid-block crosswalks and intersections.⁵⁰ If parking is an issue at a particular street, the designer should construct a bulbout to shorten the walking distance and to increase visibility.

A. Mid-block Crossing Warrants

A comprehensive engineering investigation of traffic, safety and physical characteristics of a site is required to support a decision to install an at-grade mid-block pedestrian crossing for a transit stop. Currently, formal warrants for mid-block crossing installation in the United States do not exist. An engineering study should indicate that the installation of the mid-block pedestrian crossing will improve the overall safety and/or operation of pedestrian and vehicular traffic. The study should evaluate existing conditions and the intended function of the site under anticipated future travel conditions.

The most essential tool for use in determining mid-block crosswalk placement is engineering judgment. No set of guidelines or warrants can cover every situation or guarantee improved safety or operations. The primary goal of guidelines is to create uniformity in order to provide a consistent and predictable travel environment for motorists and pedestrians. Refer to **Figure 1 of Appendix III** for the suggested decision making process to determine when an engineering study for a mid-block crossing is necessary.

Mid-block crossings can be signalized or unsignalized. Mid-block crossings on roadways consisting of more than a 3 lane cross section must be signalized and approved by FDOT Traffic Operations. All warrants for the use of a traffic signal are addressed in detail in the latest edition of the MUTCD. A comprehensive investigation of traffic conditions and the physical characteristics of a location is required to determine the necessity for a signal installation. Warrants number 4 and 7 of the MUTCD define the criteria for traffic control signals that apply to a mid-block pedestrian crossing for a transit stop.

Warrant Number 4, Pedestrian Volume, is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. The need for a traffic signal at a mid-block crossing shall be considered if an engineering study finds that both of the following criteria are met:

- ☐ The pedestrian volume crossing the major street at an intersection or mid-block location during an average day is 100 or more for each of any 4 hours or 190 or more during any 1 hour. This volume may be reduced by as much as 50% if the average cross speed of pedestrians is less than 4-feet per second.
- ☐ There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian criterion is satisfied. Where there is a divided street having a median of sufficient width for pedestrians to wait, the requirement applies separately to each direction of vehicular traffic.

⁵⁰ Zegeer, C.V. and S.F. Zegeer. "Pedestrian and Traffic Control Measures." National Cooperative Highway Research Program Synthesis of Highway Practice Report No. 139. Washington D.C.: National Academy of Sciences, National Research Council, and Transportation Research Board, 1988.

The Pedestrian Volume signal warrant is not applicable to locations where the distance to the nearest traffic control signal along the major street is less than 300-feet unless the proposed mid-block traffic control signal will not restrict the progressive movement of traffic.

At mid-block crossings, the traffic control signal should be pedestrian-actuated and parking and other sight obstructions should be prohibited for at least 100-feet in advance and 20-feet beyond the crosswalk.⁵¹ The criterion established in the MUTCD, Warrant Number 4 for a pedestrian volume crossing at a major roadway may be reduced as much as 50% if the average crossing speed of pedestrians is less than 4 feet/second.

Warrant Number 7, Crash Experience, addresses the need for traffic control signals based on the severity and frequency of crashes. Traffic control signals are needed if an engineering study finds that the following criteria are met:

- ☐ Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency;
- ☐ Five or more reported crashes, of susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and
- ☐ For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A as identified in Table 4C-1 in the MUTCD or the vph in both of the 80 percent columns of Condition B of the same table exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor-street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

A variety of considerations influence the need for a mid-block crossing, and each should be analyzed as part of the engineering study. **Appendix III** includes a discussion of the Mid-block Pedestrian Crossing Process, a summary of the key data collection and analysis variables and a sample table of contents for a typical mid-block pedestrian crossing study.

Once the engineering study has been performed and the recommendation is made that a mid-block crosswalk should be installed, the crosswalk should be adapted to the standard designs provided in the attached figures. Specific crossing design treatments vary and are briefly addressed in the subsequent sections.

⁵¹ U.S. Department of Transportation. Manual of Uniform Traffic Control Devices. Federal Highway Administration. 2003: Section 4C-8.

B. Pavement Markings

Mid-block crosswalks have to be clearly delineated. The MUTCD identifies several types of markings to be used depending on the specific location of the crosswalk. While standard crosswalk markings shall not be less than 6-inches or greater than 24-inches in width, FDOT Standards require a minimum width of 12-inches. FDOT Standards require a minimum width of 6-feet at intersection crosswalks and 10-feet of width for mid-block crosswalks. The crosswalk striping material shall be retro-reflective and slip resistant. Crosswalk lines should extend across the full length of the pavement to discourage diagonal crossings. When added visibility is desired, the area of the crosswalk may be marked with white diagonal lines at an angle of 45 degrees to the lines of the crosswalk or with white lines parallel to the direction of travel as shown in **Appendix I, Figure 1-7**. It is strongly recommended that all mid-block crossings be marked with high visibility crosswalks to clearly demarcate the designated crossing point.

One important pavement marking standard that affects pedestrian safety is the distance between a marked crosswalk and the stop bar. FDOT Standards require a minimum distance of 4-feet at intersection crosswalks and 35-feet at signalized mid-block crosswalks. Research has shown that placing advance stop lines 20-feet to 40-feet prior to the crosswalk at multi-lane roadway intersections significantly increases the percentage of motorists yielding to pedestrians. The use of advance stop limit lines is considered a striping enhancement.

It has been shown in previous studies that marked crosswalks may instill a false sense of security in pedestrians. It has also been demonstrated that mid-block and intersection crosswalks that are installed indiscriminately or too frequently might eventually become less obvious to motorists. Mid-block crossings should always include a marked crosswalk, but should only be located where a specific need has been determined.

Raised retro-reflective pavement markers (RPMs) can be placed in rows in advance of mid-block crosswalks. Use of RPMs along state roads requires approval by the District Traffic Operations Engineer. They should be placed far enough in advance of the crosswalk for the rumble effect to provide adequate warning to the motorist. RPMs should be placed in combination with and at the same distance as the advance warning signs to enhance motorist awareness. RPMs should not be utilized adjacent to or within bicycle lanes or proximate to pedestrian travel paths. Pavement word legends can be placed at each end of the crosswalk. These legends are effective in locations with large numbers of turning vehicle conflicts. The legends instruct pedestrians to look for turning vehicles but are not useful for visually impaired pedestrians. Audio signals may be warranted if visually impaired pedestrian use is documented.

C. Alternative Paving Materials

Alternative paving materials such as stamped asphalt, colored asphalt, patterned concrete and pavers may be used to accent the crosswalk area. The changes in pavement color and texture raise a motorist's awareness through increased visibility, noise and vibration. Also, they also provide a change of texture for visually impaired persons. The use of architectural pavers is not recommended on the state highway system. When the designer

desires to specify pavers, they should be limited to areas with speed limits of 35 MPH or less.

Brick pavers must meet ADA requirements and are restricted to local streets, medians and islands, curb extensions, sidewalks and borders.⁵² Alternative pavement materials are often maintained by local agencies through agreements with the FDOT.

For facilities with design speeds greater than 35 MPH, colored concrete pavement can be used in lieu of pavers. The concrete slab will generally be 12-inches and should be developed as part of the pavement design.

The use of traffic calming techniques in urbanized areas can be applied to emphasize the existence of a crosswalk. If pavers are installed they must be designed to resist the vehicular traffic loads. A solid granite or concrete parallel strip can be used along the pavers with a solid rebar reinforced concrete pad for the full length and width of the crosswalk. Pavers have to be carefully installed because if poorly placed they can be detrimental to the proper functioning of the crosswalk. Large paver joints can create a hazard for wheelchairs and other users crossing the street.

D. Raised Crosswalks / Speed Tables

The raised crosswalk is a form of pedestrian crossing prioritization and a traffic calming technique. The raised sidewalk is included within a “flat-topped” speed hump extending transversely across the travel way. They may be wider than typical speed hump designs. Raised crosswalks are only to be utilized mid-block for minor arterial and collector roadways with speed limits of 30 MPH or less and use along state roads requires approval by the District Traffic Operations Engineer. The entire area of the crosswalk can be raised by as much as 4-inches, however at locations where there is a significant number of trucks, buses or other long-wheel base vehicles, 3-inches is generally considered more acceptable. The approach and departure changes of grade must not be greater than 1:12. Raised crossings need to be marked with high visibility crosswalk designs and may be surfaced with special paving.

4. Signs

A. Standard Signs

Most crosswalks are difficult for motorists to see because they are primarily demarcated by pavement striping and by standard size warning signs on each right hand side of the road. These signs are easy to miss on a wide roadway, especially one with parking. Also, crosswalks are difficult to see at night because raised retro-reflective markings are not usually placed at crosswalks. Standard advance warning pedestrian crossing signs and crossing signs must be installed to warn motorists of pedestrian crossing activity at every mid-block crosswalk following the standards set in the MUTCD. Standard signs should be used except where visibility has been identified as an issue at a specific crosswalk. The use of standard signs installed on both sides of the approaching roadway

⁵² Florida Department of Transportation. Transportation Design For Livable Communities, Plans Preparation Manual. 2007: Chapter 21.

or double posting should be considered as an enhancement. The use of fluorescent yellow-green warning signs can be utilized to increase conspicuity. The “Cross Only at Crosswalks” regulatory sign (R9-2) discourages pedestrians from jay walking and crossing at unauthorized locations. The use of pedestrian railings and median landscaping can also be utilized to discourage crossings at unauthorized locations.

B. Signs with Pedestrian-Actuated Flashing Beacon or Illuminated Signs

Some crosswalks require special treatment when visibility or safety is an issue. Special warning sign set-ups can be used at certain locations to make motorists aware that they are approaching a crosswalk. Flashing beacons should not be used indiscriminately because the motorist can become unaware of their presence. The flashers should only be active when there is a pedestrian waiting to cross or crossing the crosswalk.

Pedestrian-activated internally illuminated or fiber optic/LED flashing warning or regulatory signs can be used in urban locations to assist motorists and pedestrians in locating the crosswalk, especially under dark conditions. The signs can be installed on existing light poles “overhead” at the appropriate clearance height. If light poles are not present in the vicinity of the crosswalk, a pole and a mast arm should be used for the installation of the pedestrian sign.

The motorist warning signs can be replications of the ground mounted advance crossing (W11-2) and crossing (W11A-2) signs. At mid-block crossings with signals, regulatory signs can be provided with the message “STOP FOR PEDESTRIAN IN CROSSWALK” in red LED lettering and supplemented with a “PEDESTRIAN CROSSING” or “CROSSWALK” regulatory sign with black lettering on a white background. At signalized and unsignalized intersections, regulatory “YIELD TO PEDESTRIANS” signs can be installed. At stop bar locations, a regulatory “STOP HERE FOR PEDESTRIANS” sign has been effective.

C. Pedestrian Prompting Signs

Many pedestrian crashes occur due to improper behavior by the pedestrian. Pedestrian prompting signs can be installed that are intended to instruct and direct pedestrians to use proper techniques when crossing a street. Different signs are utilized at unsignalized and signalized locations. At unsignalized crosswalks, pedestrians are encouraged to wait before stepping out into the street while signaling their intentions to cross the road. At signalized intersections pedestrians are urged to wait for the WALK signal, extend an arm to alert drivers and continue to look for vehicles while crossing the street.

5. Vehicular and Pedestrian Signals

Vehicular traffic control signals at mid-block locations shall be used where high volumes of pedestrians are expected, at locations where the pedestrian volume and/or crash experience warrants apply, and at all locations that are supported by an engineering study. Prior to installing a mid-block traffic control signal, consideration shall be given to the installation of other remedial measures that are less restrictive, such as flashing beacons or pedestrian refuge islands.

Pedestrian signals are special types of traffic signal indications intended for the exclusive purpose of controlling pedestrian traffic. The indications consist of the illuminated words “WALK” and “DON’T WALK” or the illuminated symbols of a walking person and raised hand. Pedestrian signals should be installed in conjunction with vehicular traffic signals, which meet one or more of the traffic signal warrants, under any one of the following conditions:

- ☐ A traffic signal is installed under the Pedestrian Volume, School Crossing or Crash Experience warrant.
- ☐ An exclusive interval or phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped.
- ☐ Vehicular indications are not visible to pedestrians such as on one-way streets, at “T” intersections, or when the vehicular indications are in a position that would not adequately serve pedestrians.
- ☐ At established school crossings at intersections signalized under any warrant.

Pedestrian signals also may be installed under any of the following conditions:

- ☐ When any volume of pedestrian activity requires use of a pedestrian clearance interval to minimize vehicle-pedestrian conflicts.
- ☐ When it is necessary to assist pedestrians in making a safe crossing.
- ☐ When multi-phase indications would tend to confuse pedestrians guided only by vehicle signal indications.
- ☐ When pedestrians cross part of the street, to or from an island, during a particular interval and they should not be permitted to cross another part of the street during any part of the same interval.

6. Flashing Beacons

Traffic beacons are less restrictive traffic control measures that provide a low cost solution for a mid-block crossing. They are used for warning the motorist of an upcoming crossing. The beacon may be mounted overhead or on a pedestal support. The flashing lights are intended to alert drivers in advance that pedestrians may be ahead without requiring a stop. Flashing beacons are more effective if they are operating only during times when there is a clear need to alert a motorist. Pedestrian-actuated flashing beacons with auxiliary flashers have been successfully used in many locations.

Several states utilize warrants that are approximately one half of the pedestrian signal warrants for installing flashing beacons at mid-block crossings.

In California, Florida and other states, flashing in-pavement warning lights are being installed at-grade to increase visibility of crosswalks at night. This has been found to solve the problem of the crosswalk being unnoticed by drivers. The flashing amber warning lights are embedded in the pavement to limit the impact on nighttime vision. The lights only flash when pedestrians are using the crosswalk. It is important to set up any flashing warning devices to be pedestrian activated.

7. Medians / Refuge Islands

Medians and refuge islands are raised longitudinal spaces separating the two main directions of travel along a roadway. Refuge islands are shorter than medians, intended to serve pedestrians at a crosswalk rather than separate opposing direction travel lanes. Refuge islands are recommended whenever the pedestrian crossing distance exceeds 60-feet. Refuge islands should be visible to motorists at all times and should be delineated by non-mountable curbs, guideposts, signs and other treatments. **Table 9** provides guidelines for median treatments to be considered when implementing mid-block crossings.

The outside curb and sidewalk do not have to be modified for the island construction on a roadway with parking on both sides. For the proposed island design with on-street parking, using a portion of the parking areas a bulb-out could increase the pedestrian area of the crossing. The area of the island located where the crosswalk passes should be level with the street to permit mobility impaired pedestrians to cross the street.

Table 9. Median Requirements for Mid-block Crossings⁵³

ROAD TYPE	MEDIAN REQUIRED	ADDITIONAL CONSIDERATIONS
Local Roads	No	May be provided at locations with very high pedestrian volumes or special needs populations (schools, elderly, etc.)
2 Lane Collector	No	Use to provide refuge when special needs populations are present and to reduce the travel speed of automobiles.
4 Lane Collector	Yes	None
4 Lane Arterial	Yes	In the absence of adequate right-of-way, signalization should be utilized in the following conditions: <ul style="list-style-type: none"> • High Volume Roads • Where adequate gaps are infrequent • School zone (following school zone guidelines) • Where slower pedestrians cross the street • High speed facilities
6 Lane Arterial	Yes	If a signal is used, a push button could be installed in the median or island for the use of slower pedestrians waiting in the middle of the road.

⁵³ Adapted from Florida Pedestrian Planning and Design Handbook, University of North Carolina, Highway Safety Research Center, April 1999.

If mid-block crosswalk placement is unavoidable at locations without a median, installing pedestrian refuge islands on the road should be considered. This method allows pedestrians to recognize traffic from one direction at a time. Refuge islands also indicate to motorists that roadway conditions are changing and to reduce speed. If a mid-block pedestrian crossing is installed in a rural location, calming techniques such as planting trees closer together or closer to the roadway (adhering to clear roadside design criteria) are effective in reducing speed by creating a sense of greater speed for motorists.

Additional crossing sign(s) installed on the left side of the travel way within a median or refuge island can provide an extra opportunity to inform the driver of the presence of the crosswalk. Within the median islands, angling the crossing (median path) provides an opportunity for pedestrians to better view oncoming vehicular traffic. The angled refuge area directs and encourages pedestrians to look in the direction of oncoming traffic and prevents pedestrians from directly darting out into traffic. The median and refuge island area should be illuminated.

G. LANDSCAPING

In the design of a bus stop, the inclusion of landscaping contributes to safety at the bus stop and promotes transit ridership. CPTED methods incorporate landscape design to help prevent crime in the vicinity of the bus stop by defining the territory and the ownership of the bus stop.

1. Design

Landscaping is a vital component of bus stop design. Landscaping enhances the waiting time for a bus by providing a buffer from traffic and a measure of climate control. Engineering standards that have the most influence on highway landscape designs are horizontal clearance, sight distance, and access management. CPTED standards identify that landscaping must not block the view of the patrons from outside of the bus stop as this obstruction can create an environment conducive to crime. To limit maintenance and increase the rate of survival, the landscaping plan should use native plants and wildflowers to the greatest extent possible. Exotic plants should be considered only to serve a specific limited purpose.

The selection of the plants for a landscape project should consider the natural environmental factors associated with the plantings. Such factors would include salt tolerance, sun or shade tolerance, drought tolerance, and wind exposure. Only plants that are compatible with Florida's natural environment should be used.⁵⁴

Landscaping must comply with the latest edition of the Florida Highway Landscape Guide, the FDOT Roadway and Traffic Design Standards Index 545 and 546, and FDOT Plans Preparation Manual Tables 2.11.5 and 2.4.15 when dealing with RRR projects. The designer must coordinate the location and size of bus stop landscaping with the other elements of the roadway project so that a uniform design is developed and conflicts are eliminated before the construction phase. Furthermore, for nighttime security, landscaping at transit stops should be planned so as to not shadow the stops from the available lighting.

2. Maintenance

When maintenance of ground cover within the bus stop area shall be the responsibility of FDOT, the installation of Bahia sod shall be used. The installation of other types of grass may be requested by a maintaining agency other than FDOT. The designer must coordinate with the FDOT and the local maintaining agency to assign responsibility for the maintenance of the enhanced landscaping in the bus stop area.

⁵⁴ Florida Department of Transportation (FDOT). Florida Highway Landscape Guide. Tallahassee: April 1995: 3.3.

BIBLIOGRAPHY

ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). Minimum Dimensions of an ADA Landing Pad. July 1994.

Alameda County Congestion Management Agency (ACCMA). Alameda Countywide Bicycle Plan, Design Guidelines and Best Practices. July 2001.

American Association of State Highway and Transportation Officials (AASHTO). A Policy on Geometric Design of Highways and Streets. 2004.

American Association of State Highway and Transportation Officials (AASHTO). Guide for the Design of Park-and-Ride Facilities. 2004.

American Association of State Highway and Transportation Officials (AASHTO). Guide for the Development of Bicycle Facilities. 1999.

Arizona Department of Transportation. Traffic Engineering Policies, Guidelines, and Procedures, Section 900 Pedestrians. January 2000.

Association of Pedestrian and Bicycle Professionals (apbp). Bicycle Parking Guidelines. <www.apbp.org>.

Broward County Transit (BCT). Transit Stop Installation Checklist.

Center for Urban Transportation Research, University of South Florida. TRB Bus Rapid Transit Committee Newsletter (Vol. 1, No. 1). 2000.

City of Portland, Office of Transportation. Portland Pedestrian Design Guide. June 1998.

City of Portland, Office of Transportation. Bicycle Parking Facilities Guidelines. 14 November 2003. <www.trans.ci.portland.or.us/bicycles/parkguide.htm>

City of West Palm Beach. 2010 West Palm Beach Comprehensive Plan, Transportation Element. Florida: Planning Zoning & Building Department.

The Center for Livable Communities. Building Livable Communities: A Policymaker's Guide to Transit-Oriented Development. 1999.

The Center for Livable Communities. Crime Prevention Through Environmental Design (CPTED). 2nd ed. 2000.

Florida Administrative Code, Chapter 14.

Florida Department of Transportation. Design Criteria and Process, FDOT Plans Preparation Manual. 2007.

Florida Department of Transportation. Flexible Pavement Design Manual. January 2002.

Florida Department of Transportation. Rigid Pavement Design Manual. September 2006.

Florida Department of Transportation. Florida Highway Landscape Guide. Tallahassee: April, 1995.

Federal Highway Administration (FHWA). Mid-block Crossings, Lesson 16. 13 January 2004. <<http://safety.fhwa.dot.gov/pedbike/univcourse/swless16.htm>>

Florida Statutes, Access Management Act, Chapter 335.1993.

Florida Statutes, State Uniform Traffic Control, Section 316.1945.

Florida Statutes, Pedestrian Obedience to Traffic Control Devices and Traffic Regulations, Section 316.130.

Glatting Jackson Kercher Anglin Lopez Rinehart, Inc. Central Florida Mobility Design Manual. 1994/1995 ed.

Highway Safety Research Center. Florida Pedestrian Planning and Design Handbook. University of North Carolina: 1999.

Hillsborough Area Regional Transit. Transit Friendly Planning and Design Handbook and Technical Manual. Hillsborough County, October 1995.

Institute of Transportation Engineers. Design and Safety of Pedestrian Facilities. 1998.

Institute of Transportation Engineers. Traffic Engineering Handbook. 4th ed. New Jersey: Prentice Hall, 1992.

Guidelines for the Use of Bus Bulbs. ITE Journal. May 2002.

Jacksonville Transit Authority (JTA). Mobility Access Program Handbook. September 2003.

Pace Development Guidelines, Roadway Design. <<http://www.pacebus.com/sub/guidelines/default.asp>>.

Palm Tran. Transit and Design Manual. January 2004.

Reid, Ewing. Pedestrian and Transit-Friendly Design. Florida Atlantic University/Florida International University: March 1996.

Robert F. Wagner Graduate School of Public Service, New York University. Large City Technical Exchange and Assistance Program. Rudin Center for Transportation Policy and Management: New York, 2000: Chapter 3-2.

Smith, S.A. and R.L. Knoblauch. Guidelines for the Installation of Crosswalk Markings, TRR 1141. Washington, D.C.: Transportation Research Board, 1987.

Transportation Research Board. Guidelines for the Location and Design of Bus Stops, TCRP Report 19. 1996.

Transportation Research Board. NCHRP Project 20-7, Interim Geometric Design Guide for Transit Facilities on Highways and Streets--Phase I. 2002.

Transportation Research Board. Transit Capacity and Quality of Service Manual. Washington D.C.: National Research Council, 2003.

Transportation Research Board. Transit-Friendly Streets: Design and Traffic Management Strategies to Support Livable Communities. TCRP Report 33.

Transportation Research Board. Evaluation of Bus Bulbs. TCRP Report 65. 2001.

U.S. Department of Transportation. Manual on Uniform Traffic Control Devices. 2003.

Washington Department of Transportation, Northwest Region Traffic Operations. Crosswalks: Policy and Practice. July 1997.

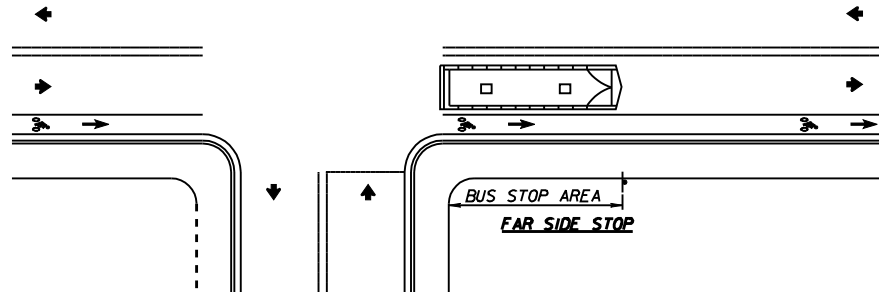
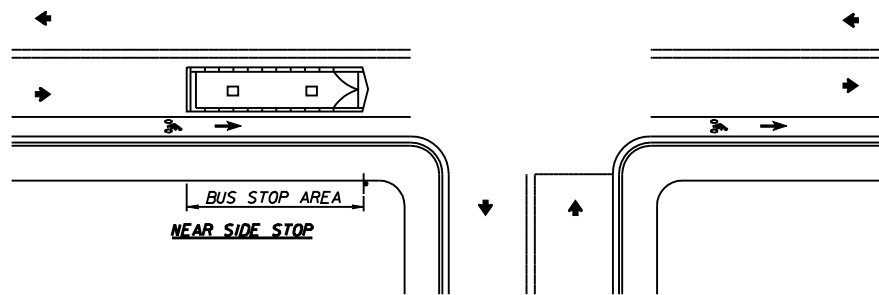
Washington Department of Transportation. Pedestrian Facilities Guidebook. September 1997.

Wood, Chris. Bus Stop Design for Minimum Conflict, Transition no. 5. October 1998.

Zegeer, C.V. and S.F. Zegeer. Pedestrian and Traffic Control Measures, National Cooperative Highway Research Program Synthesis of Highway Practice Report No. 139. Washington D.C.: Transportation Research Board, 1988.

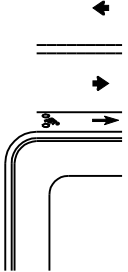
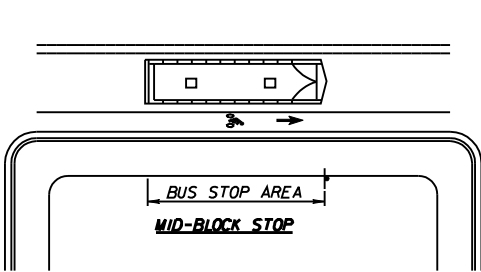
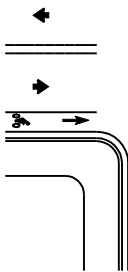
APPENDIX I

TRANSIT FACILITIES GUIDELINES

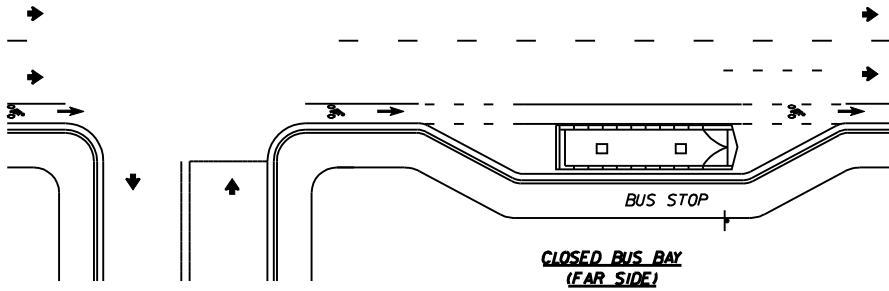
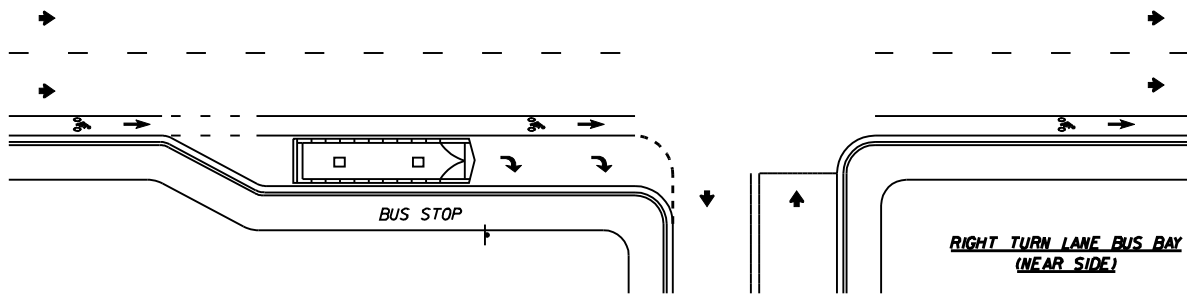
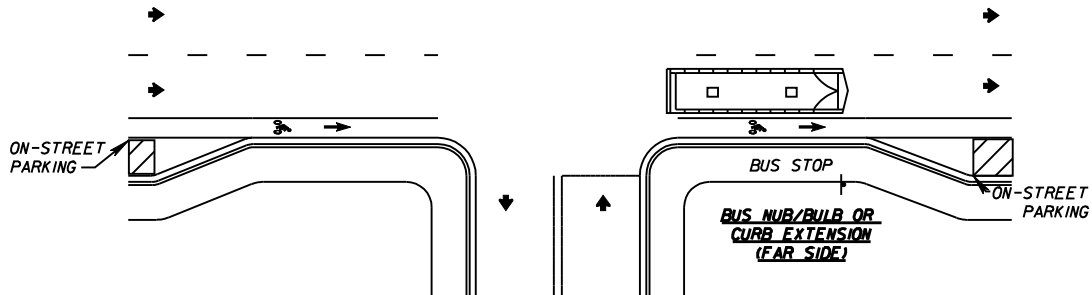
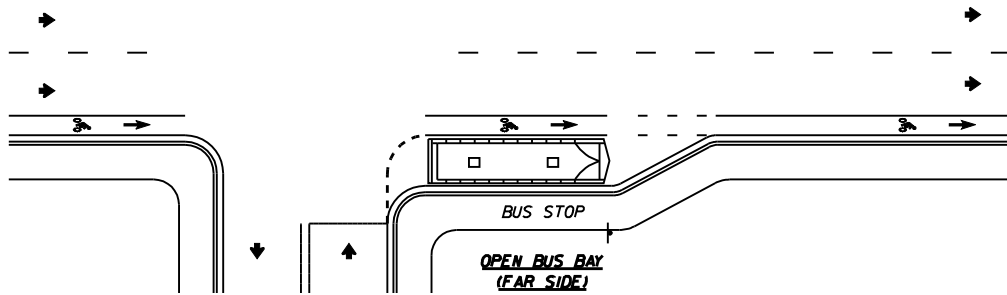
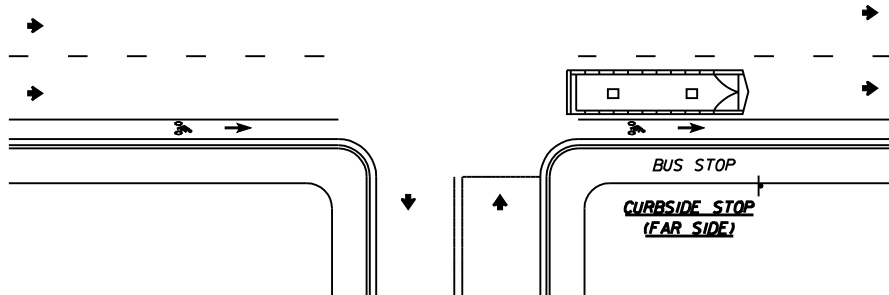


STREETSIDE BUS FACILITY GENERAL GUIDELINES (SEE TRANSIT DESIGN GUIDELINES FOR ADDITIONAL DETAILS)

- 1) FAR SIDE BUS STOPS AND BAYS ARE GENERALLY PREFERRED OVER NEAR SIDE STOPS AND BAYS
 - EXCEPTION IS AT TWO-LANE ROADWAYS WHERE VEHICLES ARE RESTRICTED FROM GOING AROUND THE BUS STOPPED AT A CURBSIDE STOP
- 2) BUS BAYS ARE GENERALLY PREFERRED OVER CURBSIDE BUS STOPS IN TRAVEL LANES
 - PARTICULARLY FOR ARTERIAL DESIGN SPEEDS GREATER THAN OR EQUAL TO 40 MPH AND
 - WHERE THERE IS SIGNIFICANT BUS AND PASSENGER VOLUMES AND
 - WHERE PLACED DOWNSTREAM FROM A TRAFFIC SIGNAL
- 3) CLOSED BUS BAYS ARE GENERALLY PREFERRED OVER OPEN BUS BAYS
 - EXCEPTION WOULD BE AT A PHYSICALLY CONSTRAINED SITE.

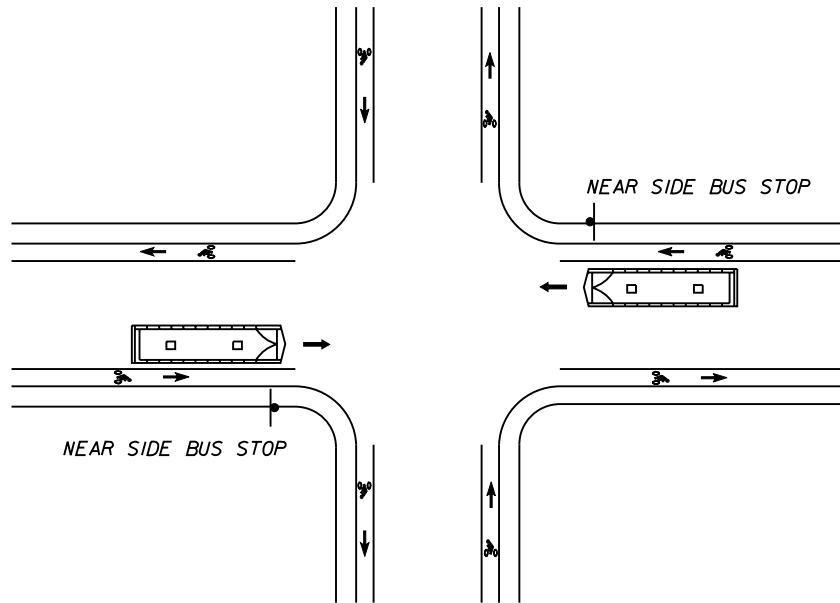
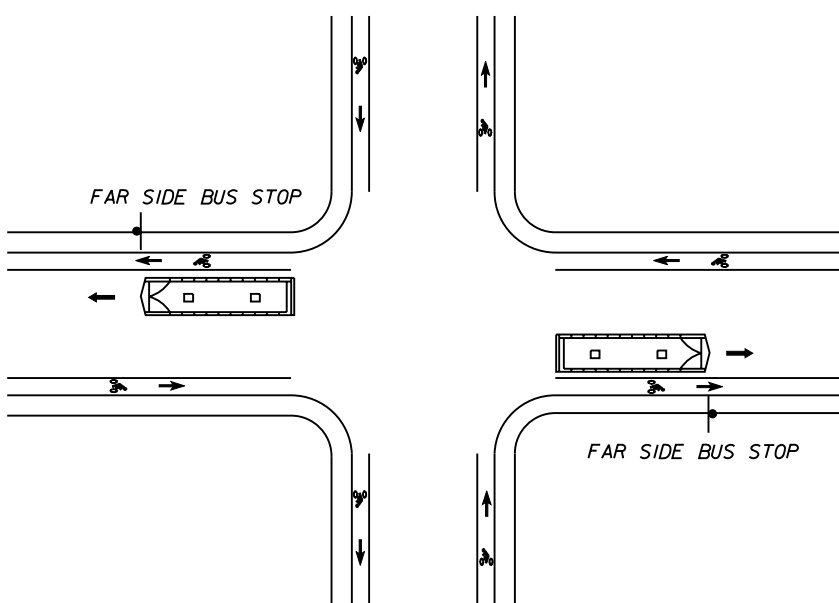
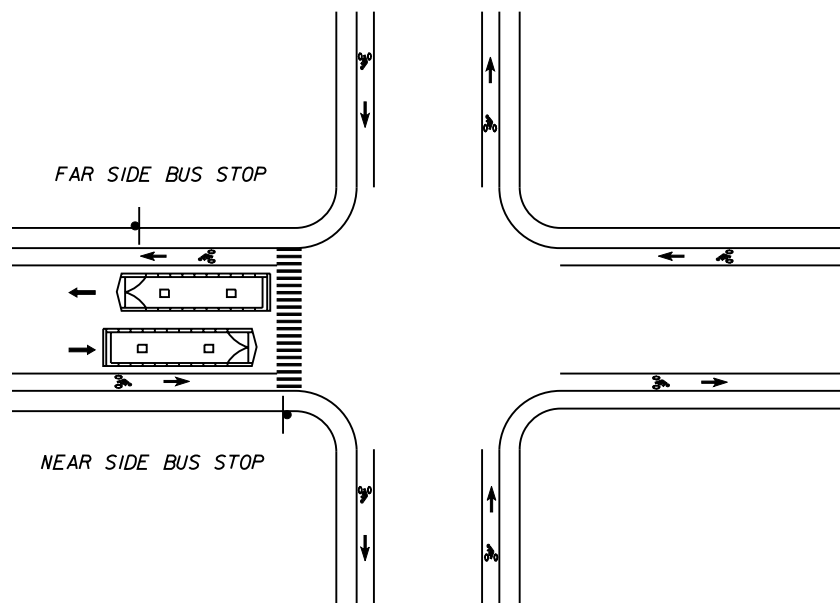
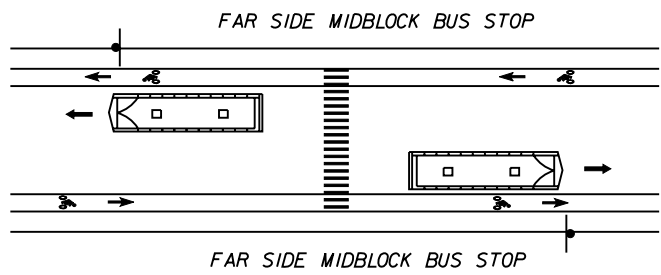
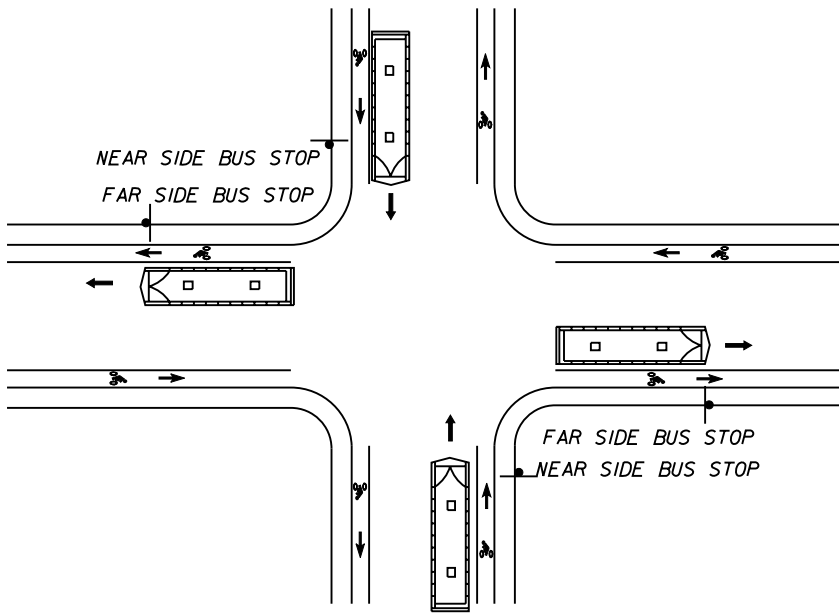
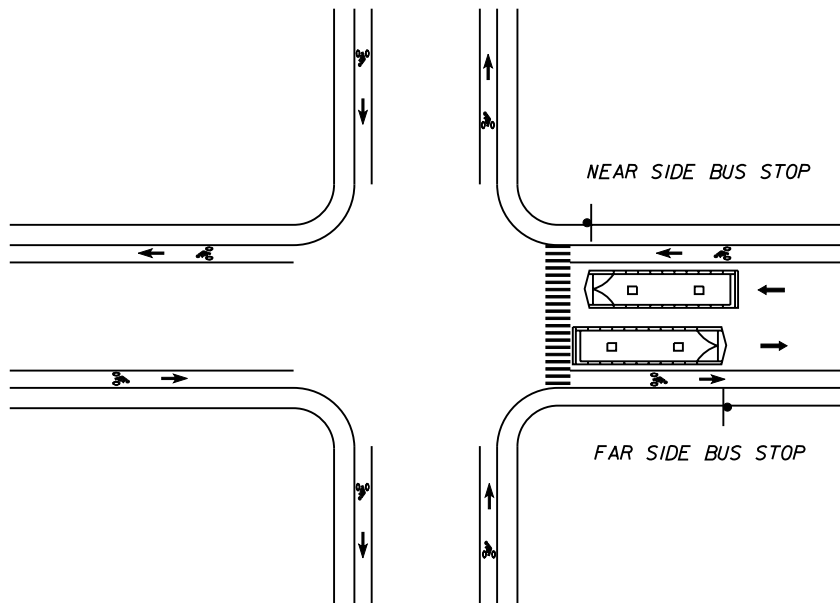
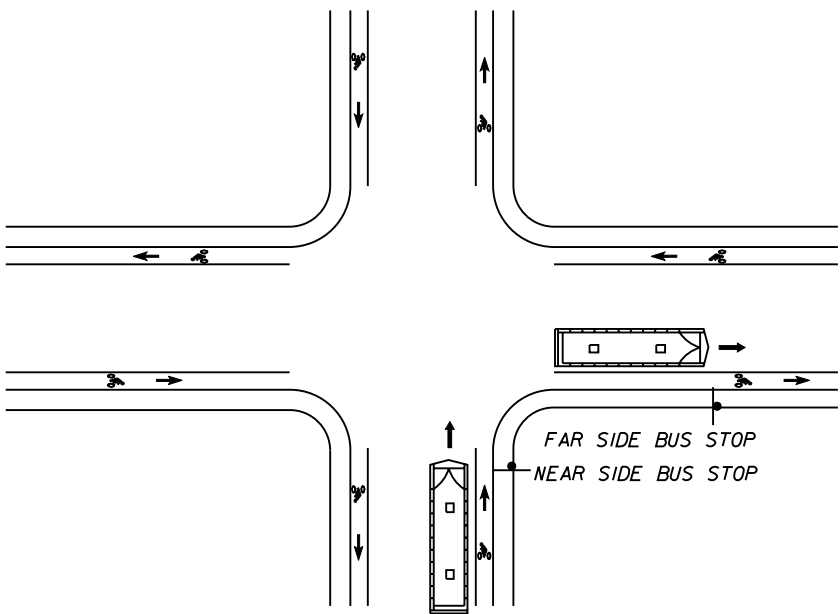


ALTERNATIVE BUS STOP LOCATIONS



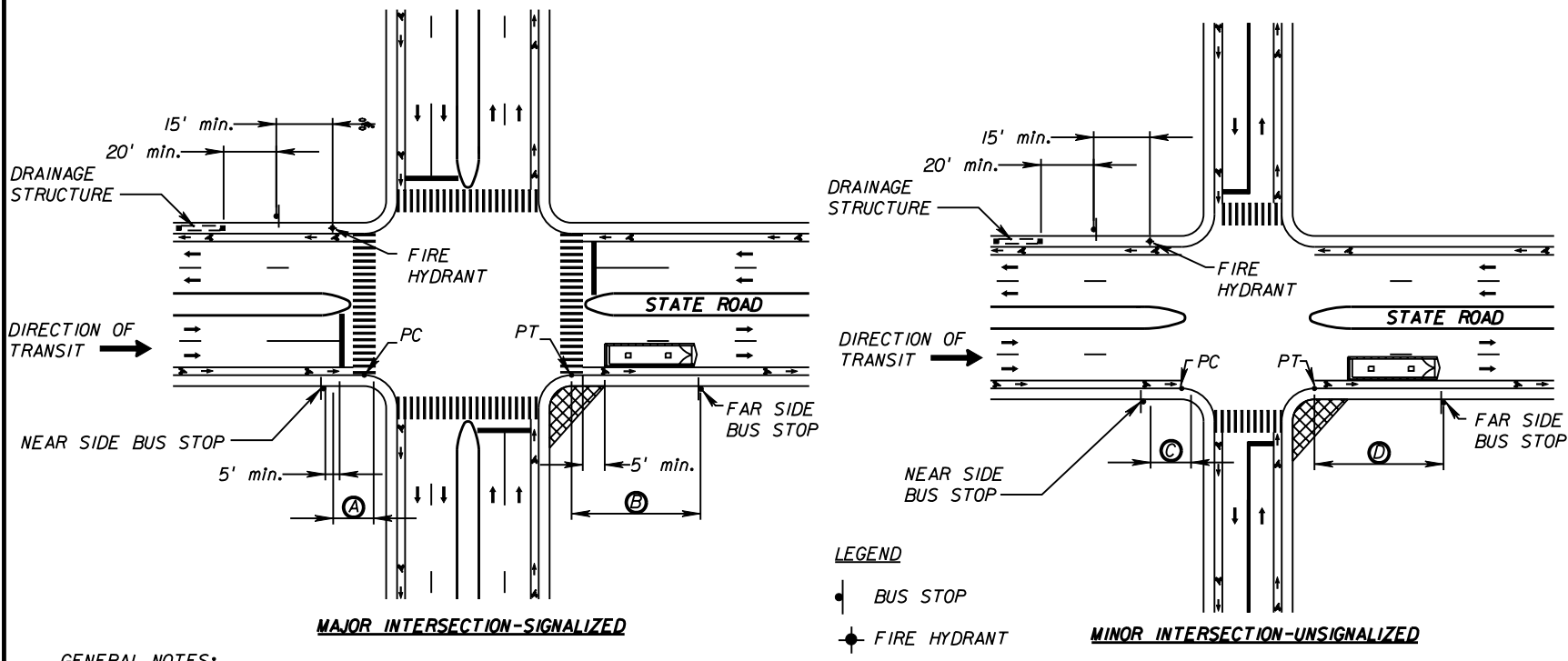
ALTERNATIVE BUS STOP DESIGN TYPES

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES STREETSIDE BUS STOP LOCATIONS & DESIGN TYPES	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		1-1




COMBINATION BUS STOP LOCATIONS

REVISIONS							STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES STREETSIDE COMBINATION BUS STOP LOCATIONS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		1-2
									233151-1-12-02		



GENERAL NOTES:

1. THESE BUS STOP CONFIGURATIONS ARE PROVIDED AS GUIDELINES. ACTUAL BUS STOP PLACEMENT SHOULD TAKE ALL LOCATION FACTORS INTO ACCOUNT AND BE BASED ON ENGINEERING JUDGEMENT FOR SAFETY.
2. ALL BUS STOPS IN URBAN AREAS (CURB & GUTTER AND SIDEWALK) SHALL BE SITUATED SO THAT PASSENGERS BOARD AND ALIGHT AT A LOCATION WHERE FULL HEIGHT CURB & GUTTER IS PRESENT AND NOT IN A DRIVEWAY.
3. ALL BUS STOPS IN URBAN AREAS (CURB & GUTTER AND SIDEWALK) SHALL BE SITUATED TO BE 20' OR MORE AWAY FROM THE EDGE OF A DRAINAGE STRUCTURE, AND 15' OR MORE AWAY FROM A FIRE HYDRANT OR DISABLED PARKING SPACE.
4. WHEN POSSIBLE, PROVIDE BUS STOP AT AN EXISTING ROADWAY LIGHT POLE. A 4' CLEAR TRAVEL PATH MUST BE PROVIDED ON SIDEWALKS AT ALL TIMES IN THE VICINITY OF THE BUS STOP. THE RECOMMENDED MINIMUM ILLUMINATION LEVEL IS 1.0 HORIZONTAL FOOT CANDLE FOR THE ENTIRE BUS STOP AREA. (REFERENCE PLANS PREPARATION MANUAL).
5. FOR A.D.A. LANDING PAD REQUIREMENTS SEE FIGURE 1-5.
6. ALL BUS BAY DRAWINGS REPRESENT A BUS STOP WITH SPACE FOR ONE BUS AT A TIME. IF MORE THAN ONE BUS IS EXPECTED, ADD 40' FOR EACH ADDITIONAL STANDARD BUS AND 60' FOR EACH ADDITIONAL ARTICULATED BUS.
7. DECELERATION/ACCELERATION LANE REQUIREMENTS SHOULD BE CONSIDERED FOR BUS BAY TYPE DESIGNS IF RIGHT OF WAY ALLOWS.
8.  CLEAR AREA

INTERSECTION BUS STOP LOCATION CRITERIA				
BUS STOP VARIABLES	NO TURN LANES IN DIRECTION OF TRANSIT	RIGHT TURN LANE ON NEAR SIDE IN DIRECTION OF TRANSIT	RIGHT TURN LANE ON NEAR SIDE AND AUXILIARY LANE ON FAR SIDE IN DIRECTION OF TRANSIT **	AUXILIARY LANE ON FAR SIDE IN DIRECTION OF TRANSIT ***
DIMENSION A (NEAR SIDE MAJOR INTERSECTION)	NOT RECOMMENDED * UNLESS 2-LANE ROADWAY	NOT RECOMMENDED UNLESS 2-LANE ROADWAY 10' BEFORE ENTRY TAPER FOR TURN BAY 100' IF DROP LANE	NOT RECOMMENDED UNLESS 2-LANE ROADWAY	NOT RECOMMENDED * UNLESS 2-LANE ROADWAY
DIMENSION B (FAR SIDE MAJOR INTERSECTION)	45' FOR A STANDARD BUS (65' FOR AN ARTICULATED BUS)	45' FOR A STANDARD BUS (65' FOR AN ARTICULATED BUS)	110' **	45' FOR A STANDARD BUS (65' FOR AN ARTICULATED BUS) ***
DIMENSION C (NEAR SIDE MINOR INTERSECTION)	12' MIN.	AS CLOSE TO ENTRY TAPER AS FEASIBLE	N/A	N/A
DIMENSION D (FAR SIDE MINOR INTERSECTION)	45' FOR A STANDARD BUS (65' FOR AN ARTICULATED BUS)	45' FOR A STANDARD BUS (65' FOR AN ARTICULATED BUS)	N/A	N/A

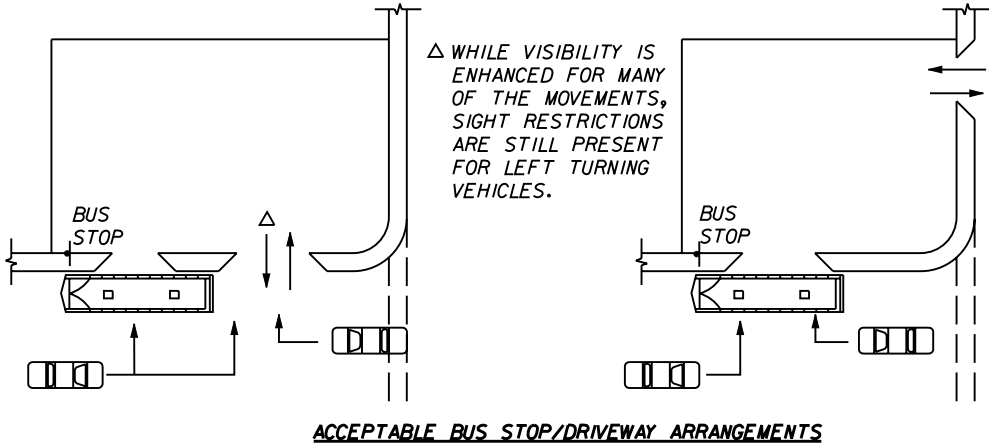
- * IF NECESSARY, 12' MINIMUM DIMENSION IS REQUIRED.
- ** THIS COMBINATION OF BUS BAYS IS REFERRED TO AS A QUEUE BYPASS BUS BAY.
- *** THIS ARRANGEMENT IS REFERRED TO AS AN OPEN BUS BAY.

NOTE: THIS TABLE IS PREPARED AS A GUIDELINE FOR THE LOCATION OF BUS STOPS ALONG A STATE ROAD FACILITY WHERE ON-STREET PARKING DOES NOT EXIST.

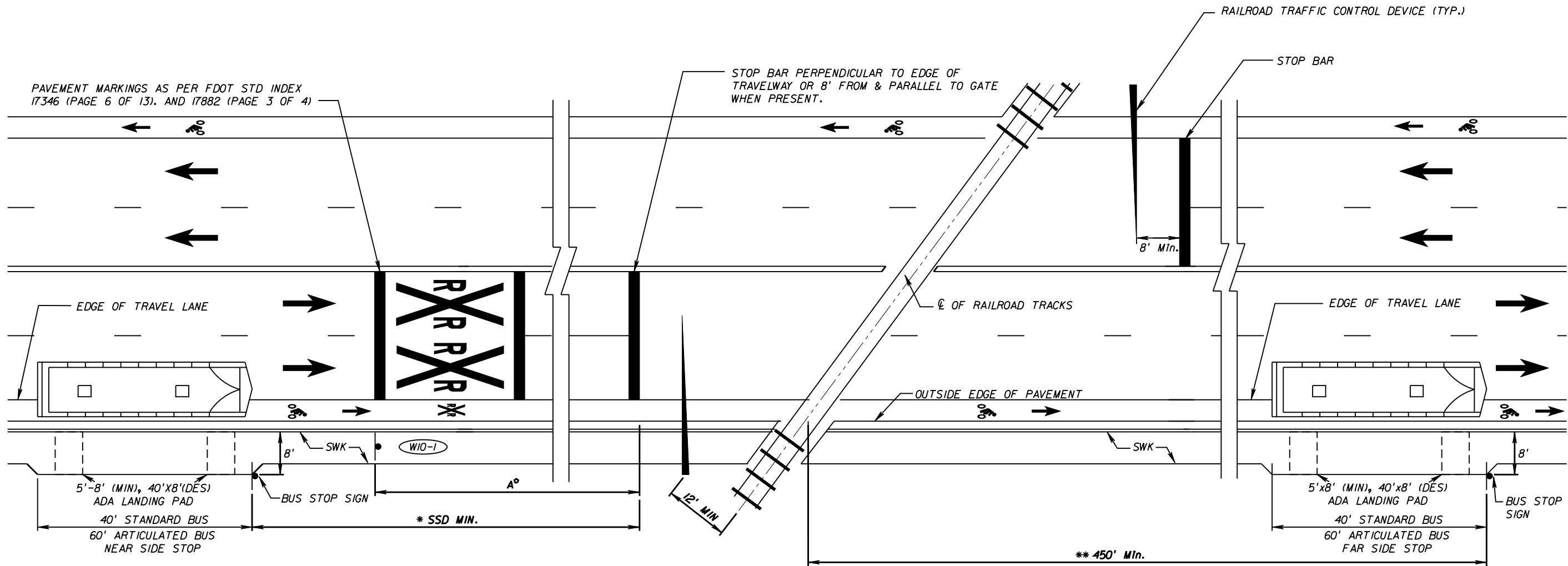
DRIVEWAY BUS STOP LOCATION GUIDELINES:

- AVOID BUS STOPS THAT BLOCK THE DRIVEWAY OF A LOT WITH A SINGLE DRIVEWAY
- BUS STOPS SHOULD NOT BE LOCATED WITHIN THE AREA OF INFLUENCE OF A DRIVEWAY TO AVOID SIGHT DISTANCE AND OTHER CONFLICTS. HOWEVER, IF THE SITUATION CANNOT BE AVOIDED:

1. LOCATE THE STOP AS FAR DOWNSTREAM (FAR SIDE) FROM THE DRIVEWAY AS FEASIBLE.
2. AVOID UPSTREAM (NEAR SIDE) STOPS IN THE TRAVEL LANE. UPSTREAM BAYS ARE ACCEPTABLE.
3. LOCATE THE STOP TO ALLOW APPROPRIATE VISIBILITY FOR VEHICLES ENTERING OR LEAVING THE DEVELOPMENT AND TO MINIMIZE VEHICLE/BUS CONFLICTS.
4. LOCATE THE STOP SO THAT PASSENGERS ARE NOT FORCED TO WAIT FOR A BUS IN THE MIDDLE OF A DRIVEWAY.
5. LOCATE THE STOP SO THAT PATRONS BOARD OR ALIGHT DIRECTLY FROM THE CURB RATHER THAN FROM THE DRIVEWAY.
6. LOCATE THE STOP SO THAT THE FRONT DOOR ADA LANDING PAD IS LOCATED OUTSIDE THE DRIVEWAY.
7. ATTEMPT TO KEEP AT LEAST ONE EXIT AND ENTRANCE DRIVEWAY OPEN FOR VEHICLES ACCESSING THE DEVELOPMENT WHILE A BUS IS LOADING OR UNLOADING PASSENGERS.
8. FOR AN UNACCEPTABLE CONDITION AT A CORNER PARCEL, MOVING THE STOP DOWNSTREAM TO THE NEXT PARCEL SHOULD BE EVALUATED.



REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION RELATIVE TO ACCESS POINTS		FIGURE 1-3
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
								233151-1-12-02	

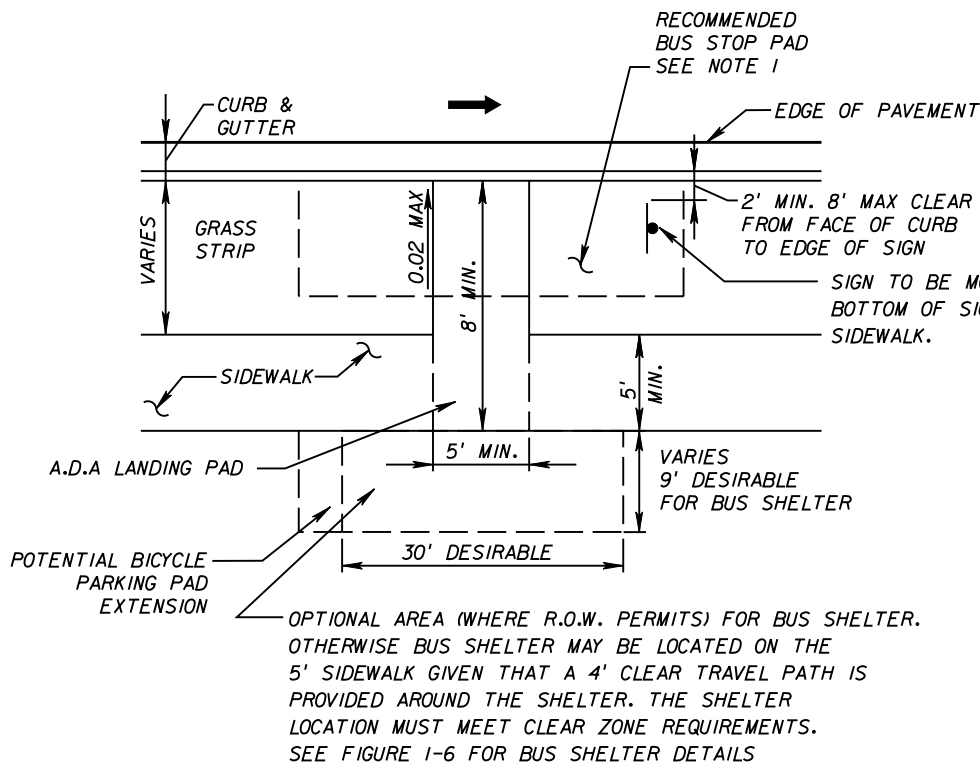


URBAN BUS STOP NEAR AT-GRADE RAILROAD CROSSING

NEAR SIDE BUS STOP PLACEMENT	
DESIGN SPEED (MPH)	* AASHTO STOPPING SIGHT DISTANCE (SSD) (FT)
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730

- NOTES:
- IT IS RECOMMENDED TO PLACE BUS STOPS ON THE NEAR SIDE OF A RAILROAD CROSSING TO AVOID CREATING A QUEUE THAT WOULD CONFLICT WITH THE CROSSING.
 - NEAR SIDE BUS STOPS SHALL BE LOCATED SO THAT RAILROAD WARNING SIGNS ARE NOT OBSTRUCTED BY A STOPPED BUS. SUPPLEMENTAL LEFT SIDE AND ADVANCE W10-1 SIGNS SHALL BE PROVIDED AT ALL NEAR SIDE BUS STOP LOCATIONS.
 - SEE FDOT STD INDEX 17346 AND 17882 FOR RAILROAD MARKING AND SIGN DETAILS NOT SHOWN HERE.
 - FOR NEAR SIDE OR FAR SIDE BUS BAYS, PROVIDE A MINIMUM OF 50 FT TO THE NEAREST RAIL LINE. (PER FLORIDA STATUTE 316.1945(1))
- * MIN VALUE CALCULATED BASED ON PROVIDING APPROPRIATE STOPPING SIGHT DISTANCE TO RAILROAD CROSSING. DIMENSION SHOULD BE VERIFIED BASED ON THE SPECIFIC DESIGN CONDITIONS OF EACH CROSSING.
- ** MIN VALUE CALCULATED BASED ON ACCOMMODATING THE QUEUE THAT WOULD DEVELOP DURING A 60 SECOND PERIOD BUS STOP. DIMENSION SHOULD BE VERIFIED BASED ON THE SPECIFIC DESIGN CONDITIONS, TRAFFIC PROJECTIONS, AND EXPECTED BUS STOP DELAYS AT EACH CROSSING.
- FOR DIMENSION "A" SEE FDOT STD INDEX 17346 OR 17882.

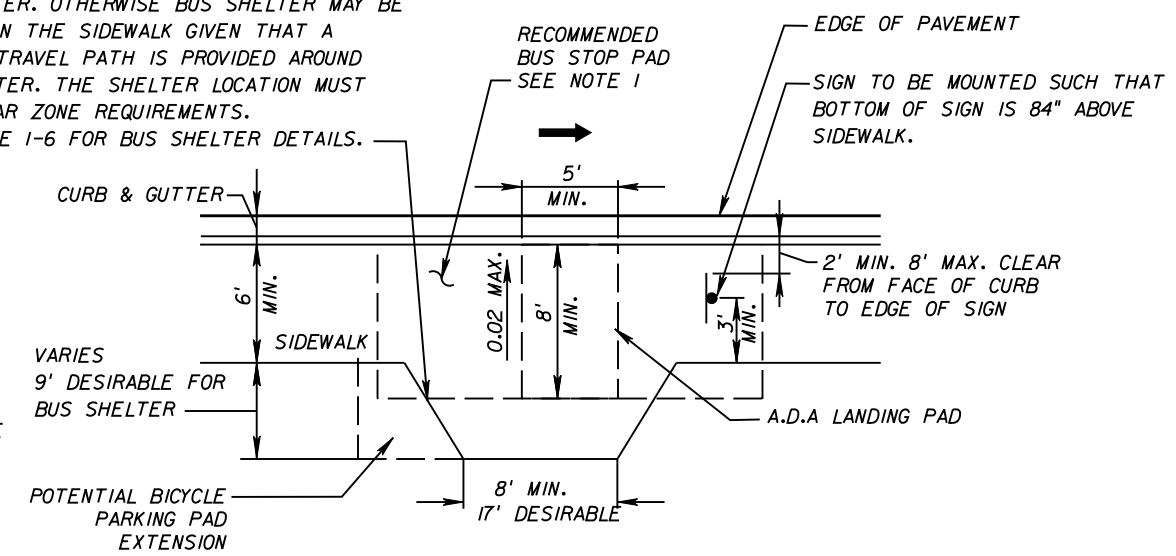
REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION RELATIVE TO RAILROAD CROSSING		FIGURE 1-4
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
								233151-1-12-02	



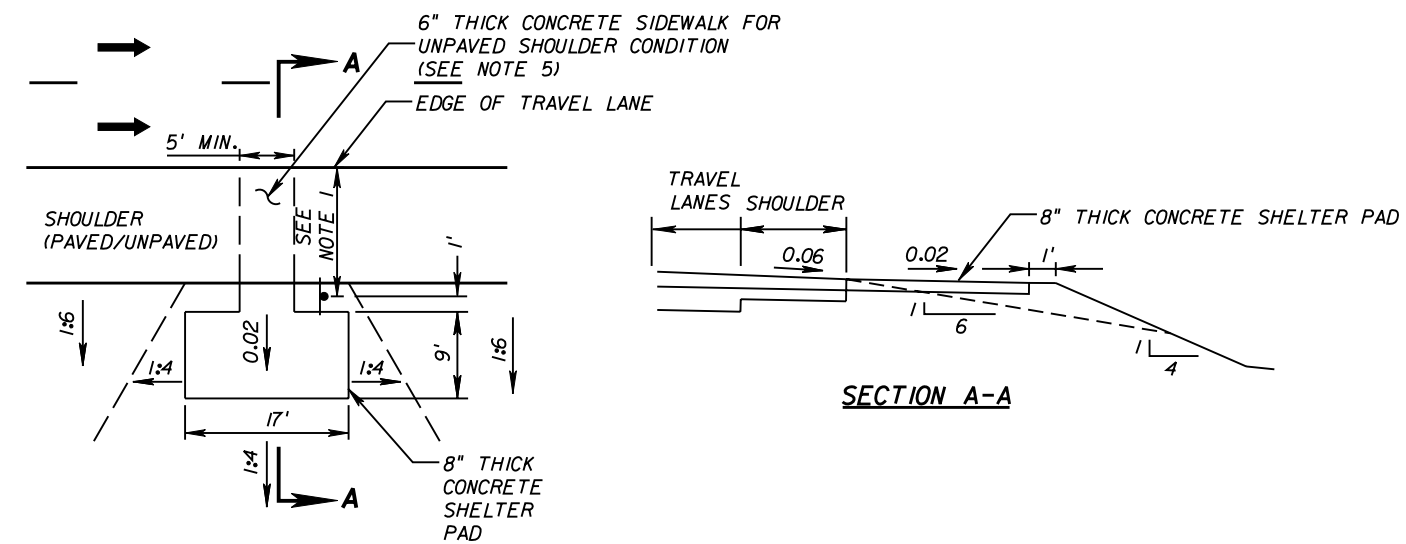
BUS STOP PAD AND SIGNAGE
URBAN/CURB & GUTTER CONDITION WITH GRASS STRIP

- NOTES URBAN CONDITION (WITH / WITHOUT GRASS STRIP):
1. IF PERMITTED BY R.O.W., PROVIDE A CONTINUOUS 8' WIDE CONCRETE PAD ALONG THE ENTIRE LENGTH (40' STANDARD BUS - 60' ARTICULATED BUS) OF THE BUS STOP ADJACENT TO THE CURB & GUTTER. AN ADDITIONAL 50' LENGTH IS RECOMMENDED FOR EACH ADDITIONAL BUS EXPECTED TO SIMULTANEOUSLY STOP AT THE BUS STOP.
 2. A.D.A. LANDING PAD MINIMUM DIMENSIONS ARE TO BE PROVIDED UNLESS R.O.W. DOES NOT ALLOW.
 3. A BICYCLE PARKING AREA SHOULD BE PROVIDED ON THE UPSTREAM SIDE OF THE BUS SHELTER PAD BASED ON COORDINATION WITH THE LOCAL TRANSIT AGENCY.

OPTIONAL AREA (WHERE R.O.W. PERMITS) FOR BUS SHELTER. OTHERWISE BUS SHELTER MAY BE LOCATED ON THE SIDEWALK GIVEN THAT A 4' CLEAR TRAVEL PATH IS PROVIDED AROUND THE SHELTER. THE SHELTER LOCATION MUST MEET CLEAR ZONE REQUIREMENTS. SEE FIGURE 1-6 FOR BUS SHELTER DETAILS.



BUS STOP PAD AND SIGNAGE
URBAN/CURB & GUTTER CONDITION WITHOUT GRASS STRIP

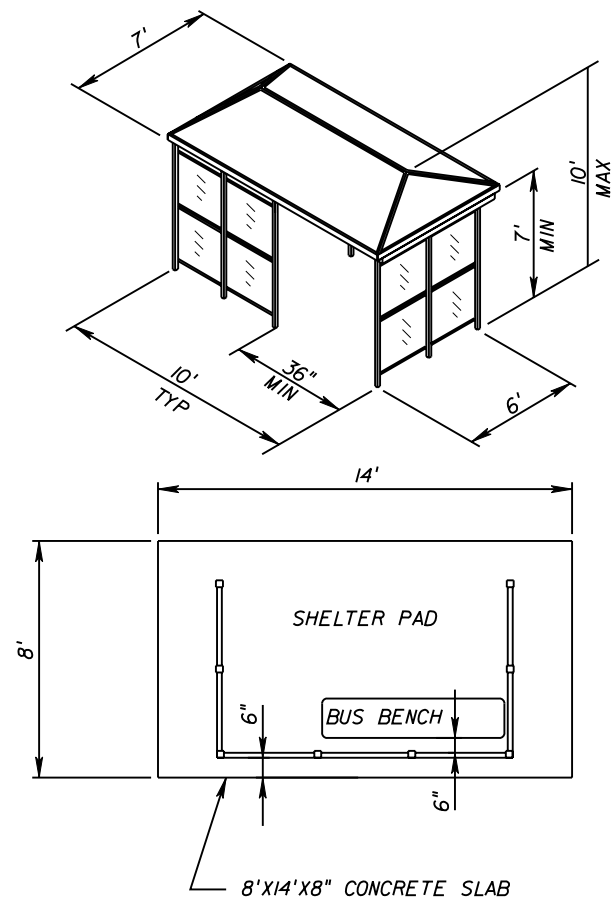


- NOTES RURAL CONDITION:
1. FOR A BUS STOP IN RURAL CONDITIONS, THE BUS STOP SIGN SHOULD BE LOCATED OUTSIDE THE CLEAR ZONE OF THE ROAD; WHERE POSSIBLE IT IS DESIRABLE TO BUILD A CONCRETE PAD FOR A SHELTER.
 2. THE CONCRETE PAD SHOULD BE LOCATED OUTSIDE THE CLEAR ZONE. CONCRETE SIDEWALK WITHIN CLEAR ZONE SHOULD MATCH EMBANKMENT SLOPE (MAX SLOPE 1:12 PROVIDED MAX SLOPE 1:50 FOR DRAINAGE).
 3. SIZE OF THE BUS SHELTER PAD IS ADJUSTABLE DEPENDING ON LOCAL CONDITIONS. COORDINATION IS REQUIRED WITH THE LOCAL TRANSIT AGENCY.
 4. SLOPES ARE REPRESENTATIVE AND VARY WITH LOCATION. ADJUST DESIGN TO LOCAL CONDITIONS.
 5. REFER TO DRAWINGS 9A AND 9B FOR RURAL STOP SPECIFIC DETAILS.

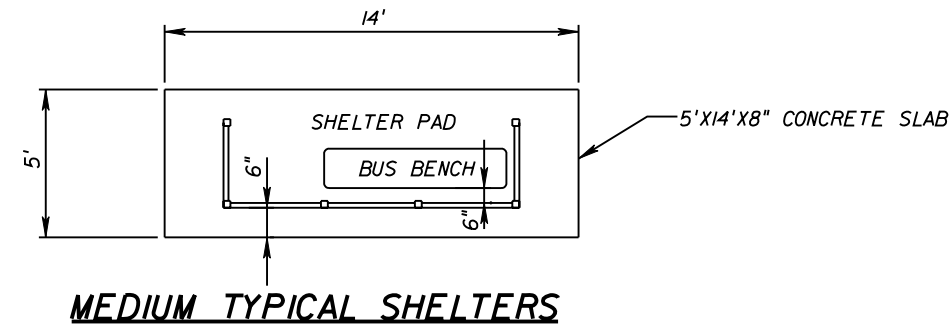
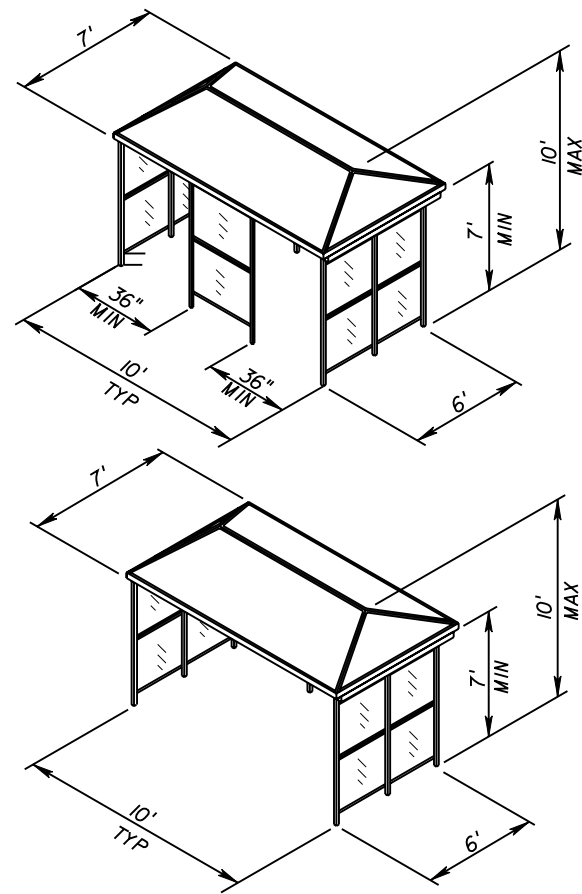
BUS STOP PAD AND SIGNAGE
RURAL/SHOULDER CONDITION

FOR MINIMUM WIDTH OF CLEAR ZONE, REFER TO THE LATEST EDITION OF THE FDOT PLANS PREPARATION MANUAL

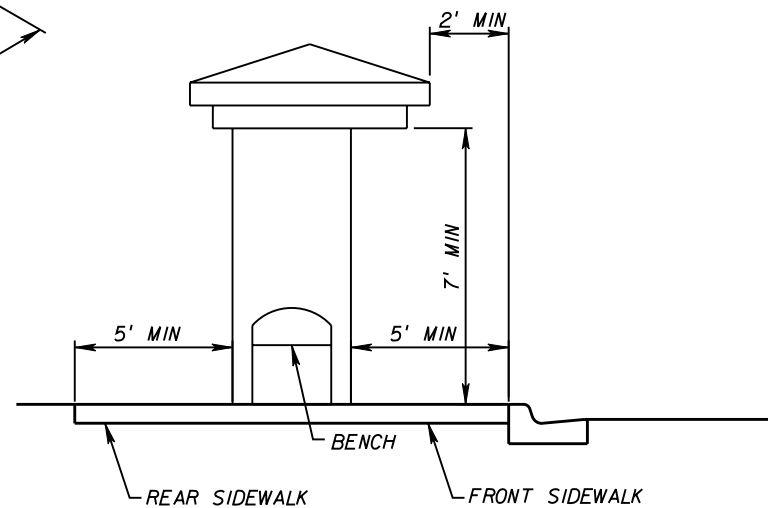
REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES CURBSIDE LANDING PADS AND SIGNAGE	FIGURE 1-5
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		



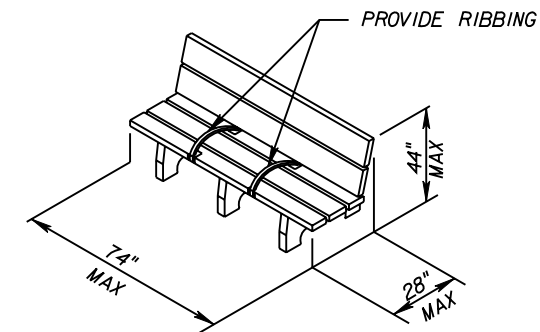
LARGE TYPICAL SHELTERS



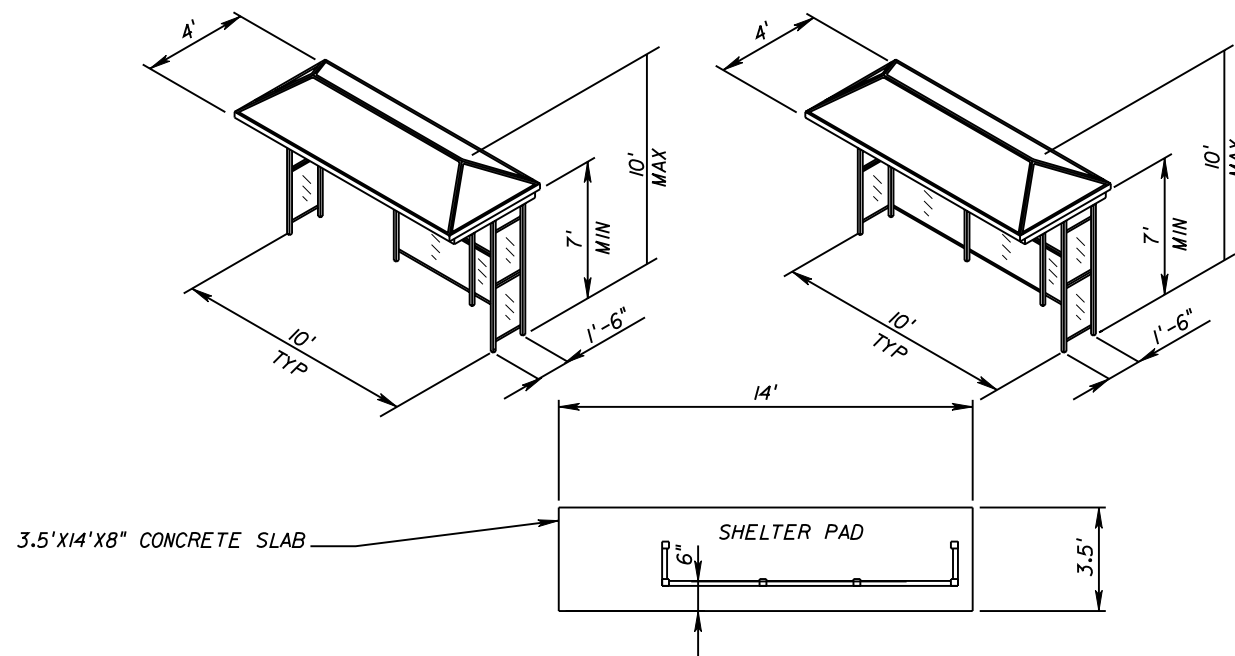
MEDIUM TYPICAL SHELTERS



**MINIMUM CLEARANCES FOR SHELTERS
URBAN CONDITION**



BENCH DIMENSIONS

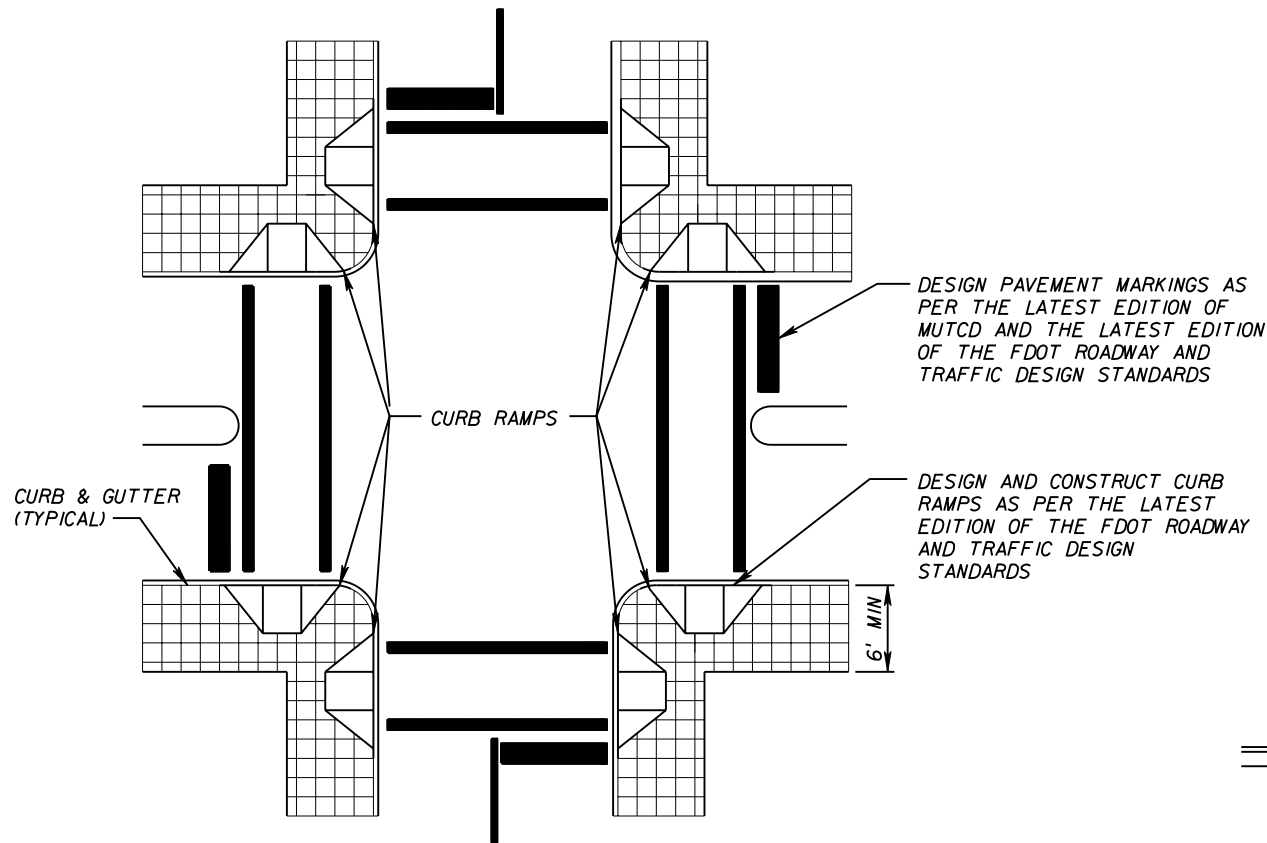


SMALL TYPICAL SHELTERS

BUS SHELTER NOTES:

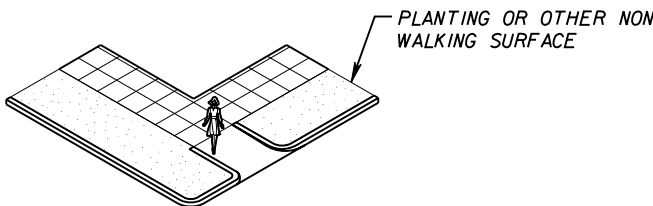
1. BUS SHELTERS ARE PROHIBITED IN MEDIANS.
2. BUS SHELTERS SHALL BE LOCATED A MINIMUM OF 12 FT FROM THE INTERSECTION POINT OF CURVE/TANGENT.
3. BUS SHELTERS SHALL NOT BE LOCATED WITHIN 15 FT OF A FIRE HYDRANT OR DISABLED PARKING SPACE.
4. BICYCLE RACKS SHALL BE CONSIDERED AS PART OF THE SHELTER BASED ON COORDINATION WITH THE TRANSIT AGENCY.
5. A CLEAR AREA OF 2 FT MINIMUM SHOULD BE PROVIDED BEHIND SHELTER FOR MAINTENANCE.
6. BICYCLE RACKS SHALL BE LOCATED SO AS NOT TO BLOCK THE VIEW OF WAITING PASSENGERS.
7. BUS SHELTERS SHALL BE LOCATED AT LEAST 15 FT (DESIRABLE) AND 7 FT (MINIMUM) FROM THE NEAREST UTILITY POLE.
8. STRUCTURAL DESIGN TO BE AS PER ALL APPLICABLE LOCAL CODES.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES CURBSIDE BUS SHELTER DETAILS	FIGURE 1-6
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		



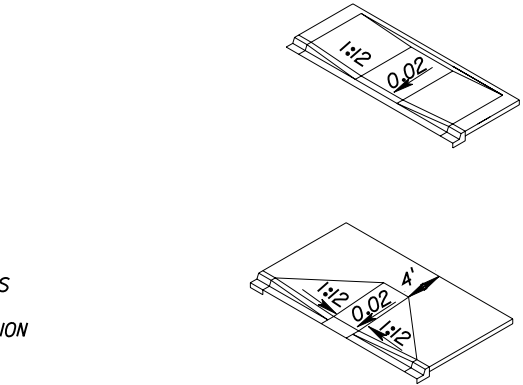
**TYPICAL URBAN INTERSECTION
(DESIRABLE RAMPS)**

NOTE: CURB RAMPS ARE TO BE COMPLETELY CONTAINED INSIDE THE CROSSWALKS.



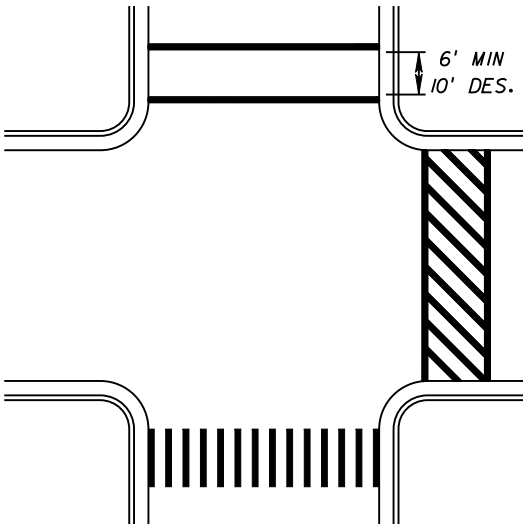
CURB RAMP / PLANTING STRIP COMBINATION

WHERE THE CURB RAMP IS COMPLETELY CONTAINED WITHIN A PLANTING STRIP OR OTHER NON-WALKING SURFACE, SO THAT PEDESTRIANS WOULD NOT NORMALLY CROSS THE SIDES, THE CURB RAMP SIDES CAN HAVE STEEP SIDES INCLUDING VERTICAL RETURNED CURBS.



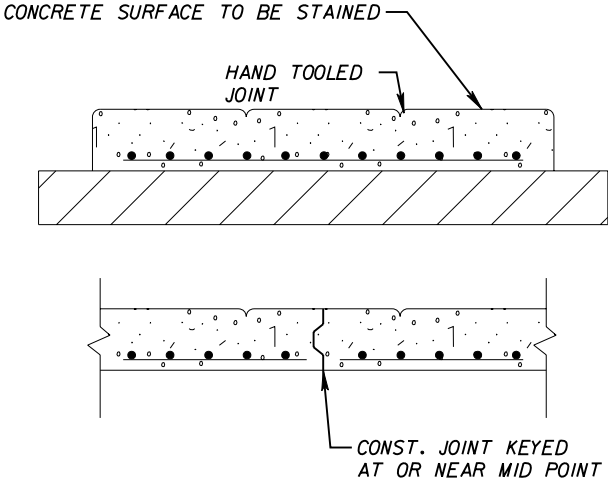
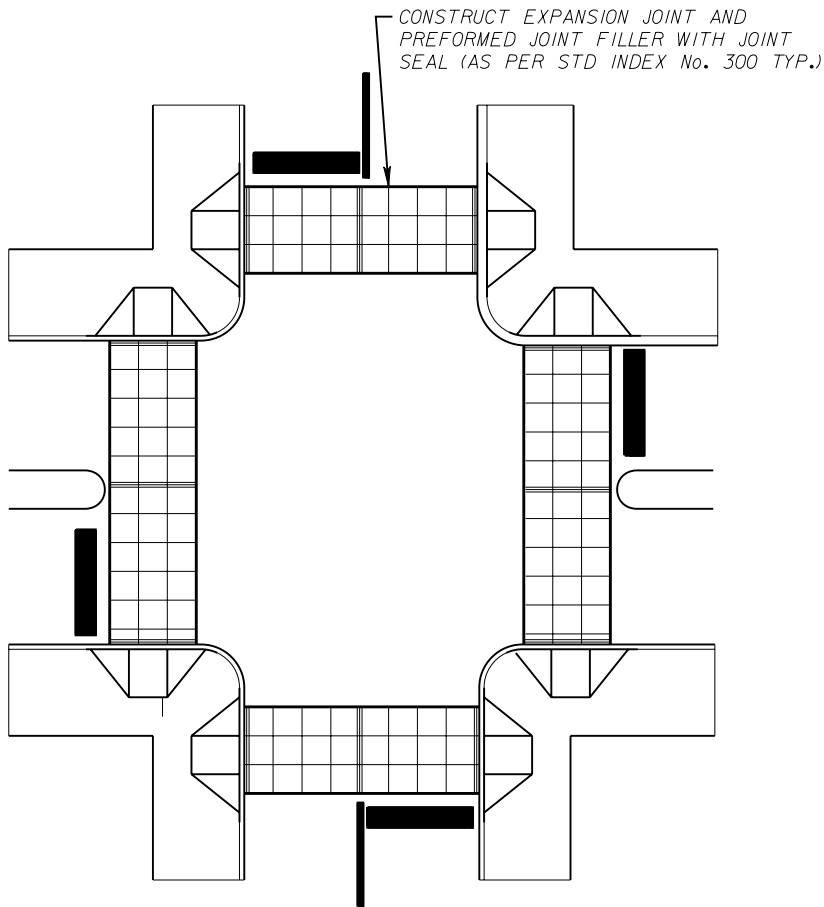
TYPICAL MID-BLOCK CURB RAMPS

FOR CURB RAMP DETAILS, REFER TO THE LATEST EDITION OF THE ROADWAY AND TRAFFIC DESIGN STANDARDS, INDEX 304.



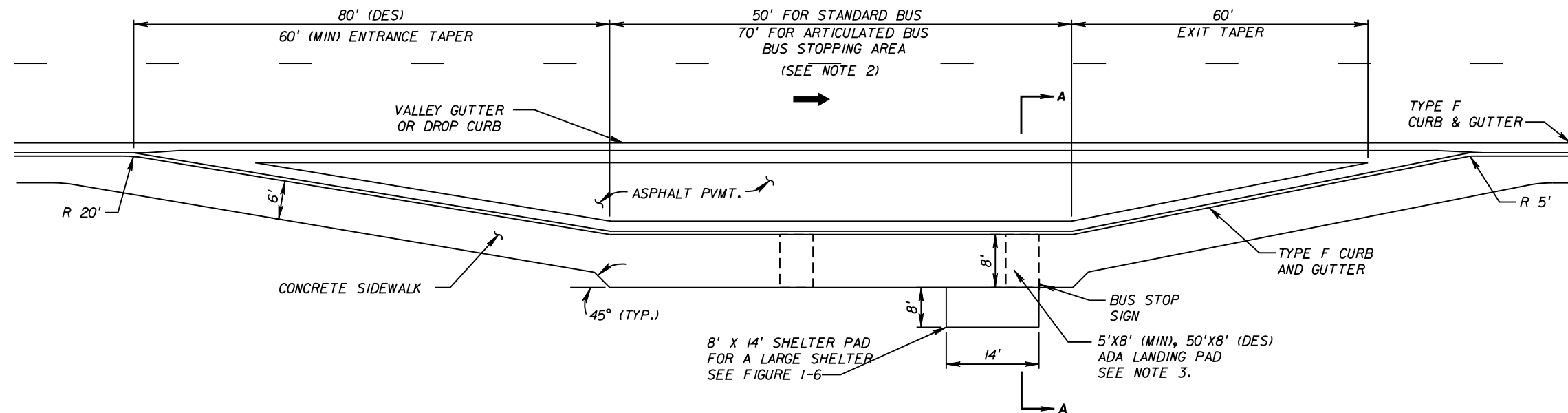
**ALTERNATIVE CROSSWALK
PAVEMENT MARKINGS**

- NOTES:
1. CURB RAMPS SHOULD BE INSTALLED EVERYWHERE THERE IS A CROSSWALK, MARKED OR UNMARKED.
 2. CURB RAMPS MUST NOT INTERFERE WITH THE FREE ACCESS TO THE BUS STOP. CURB RAMPS MAY NOT BE INSTALLED AT BUS STOPPING LOCATIONS. INSTEAD, AN ADA LANDING PAD MUST BE INSTALLED FOLLOWING ALL RELEVANT GUIDELINES, SEE FIGURE 1-5.
 3. SIDEWALKS SHOULD BE CONSTRUCTED ALONG BOTH SIDES OF ARTERIAL ROADWAYS THAT ARE NOT PROVIDED WITH SHOULDERS, EVEN THOUGH PEDESTRIAN TRAFFIC MAY BE LIGHT.

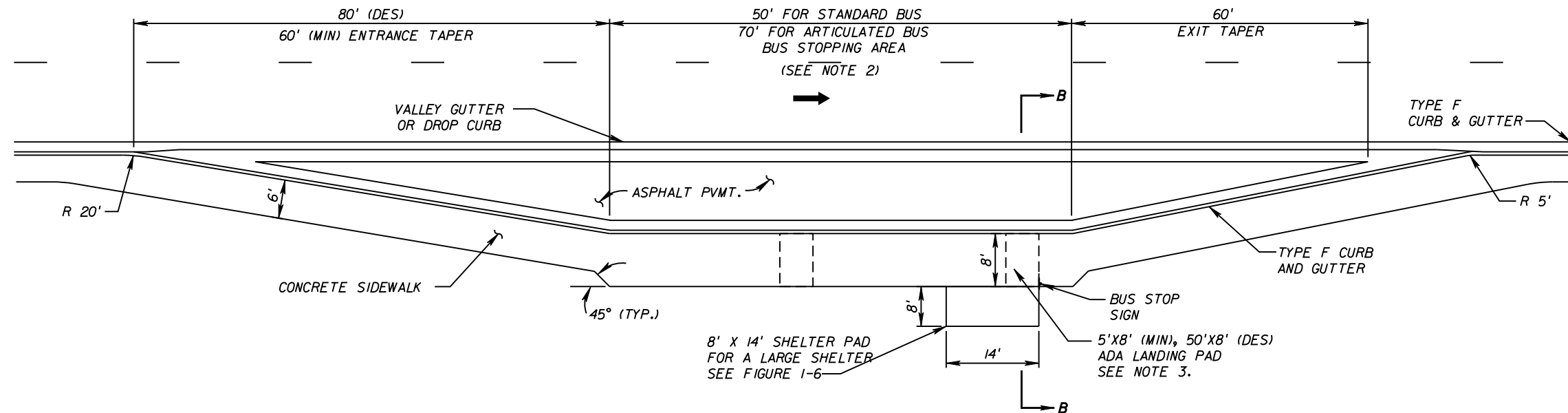


CONCRETE CROSSWALK TYPICAL SECTION

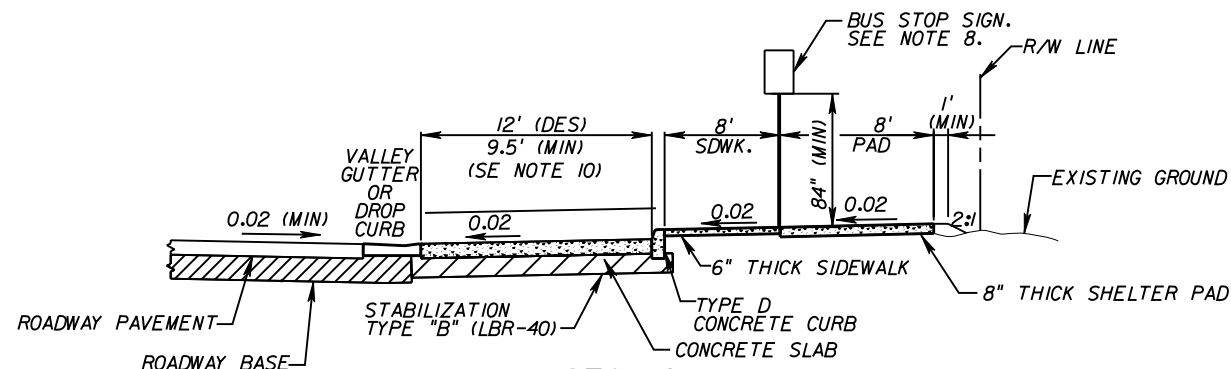
REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITIES GUIDELINES CURB RAMPS AND CONCRETE CROSSWALK		FIGURE 1-7
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
								233151-1-12-02	



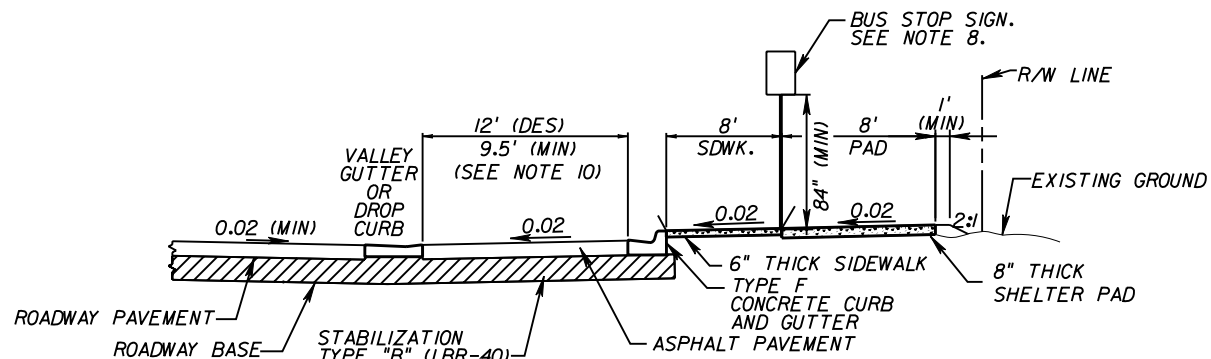
PLAN CONCRETE SLAB OPTION



PLAN ASPHALT PAVEMENT OPTION



SECTION A-A
TYPICAL BUS BAY
URBAN/CURB & GUTTER CONDITION
WITH CONCRETE PAVEMENT
N.T.S.

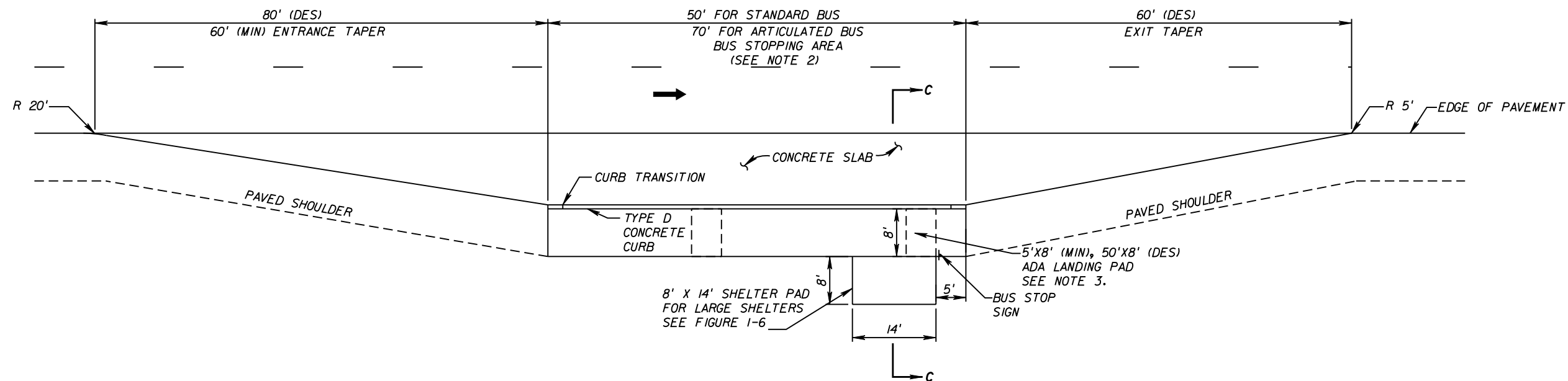


SECTION B-B
TYPICAL BUS BAY
URBAN/CURB & GUTTER CONDITION
WITH ASPHALT PAVEMENT
N.T.S.

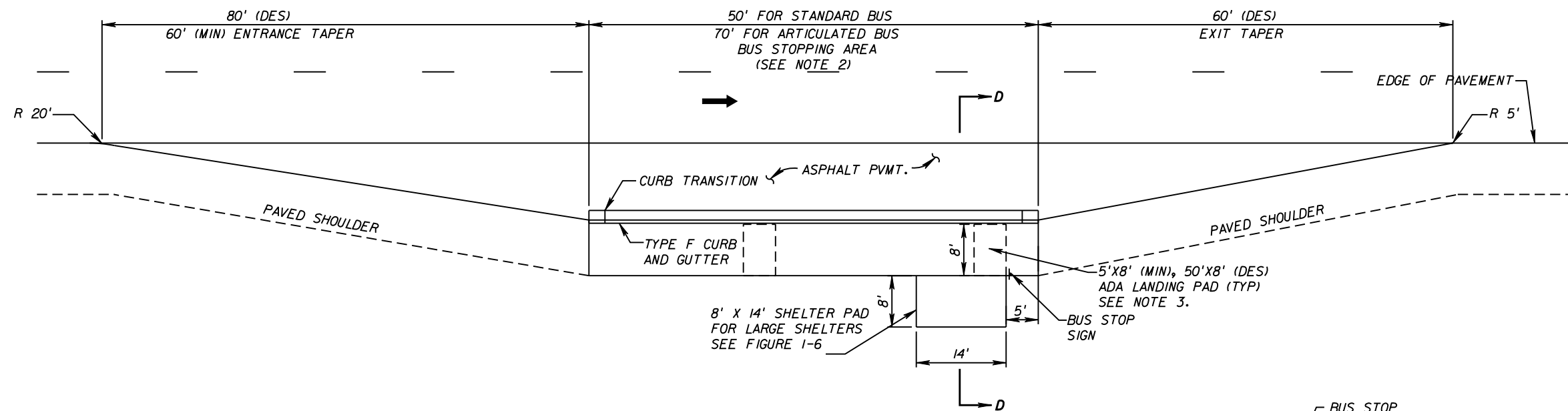
NOTES:

1. ALL BUS BAYS LOCATED IN URBANIZED AREAS SHOULD BE DESIGNED TO ACCOMMODATE AT LEAST TWO BUSES (100' 2 STANDARD BUSES AND 120' 1 STANDARD AND 1 ARTICULATED BUS.)
2. DIMENSIONS SHOWN ARE FOR ONE BUS. INCREASE LENGTH OF BUS BAY BY 50' FOR EACH 40-FOOT BUS AND 70' FOR EACH 60-FOOT ARTICULATED BUS EXPECTED TO BE AT THE STOP SIMULTANEOUSLY.
3. WHEN NO BUS SHELTER IS USED, EXTEND THE SIDEWALK TO PROVIDE AN A.D.A. LANDING PAD WITH A MINIMUM CLEAR LENGTH OF 8' AND A MINIMUM CLEAR WIDTH OF 5'. A 50' WIDE AND 8' LONG PAD IS DESIRABLE.
4. FOR CURB & GUTTER TRANSITION DETAILS, REFER TO LATEST VERSION OF FDOT STANDARD INDEXES 300.
5. FOR SHELTER AND SHELTER PAD DETAILS, REFER TO FIGURE 1-6.
6. ALL CONCRETE JOINTS SHALL BE AS PER THE LATEST VERSION OF THE FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS, INDEX 305.
7. A MID-BLOCK CROSSWALK CAN BE USED IN LOCATIONS WHERE THERE IS A MAJOR TRANSIT ORIENTED ACTIVITY CENTER OR THE DISTANCE TO THE NEXT INTERSECTION IS GREATER THAN 300 FEET. SIGNALIZATION MAY BE PROVIDED AS PER THE MUTCD.
8. REFER TO PAGE 29 OF THE "GUIDELINES FOR THE LOCATION AND DESIGN OF BUS STOPS", TCRP REPORT 19, WASHINGTON D.C. 1996, FOR SPECIAL CONDITIONS AND DIMENSIONS OF BUS BAYS.
9. BUS STOP SIGN PANEL MUST BE LOCATED SUCH THAT A MINIMUM CLEARANCE OF 36" IS PROVIDED ON THE SIDEWALK.
10. DRAINAGE STRUCTURES ARE NOT TO BE LOCATED WITHIN THE BUS BAY.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES CLOSED BUS BAY LAYOUT URBAN/CURB & GUTTER	FIGURE 1-8
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		



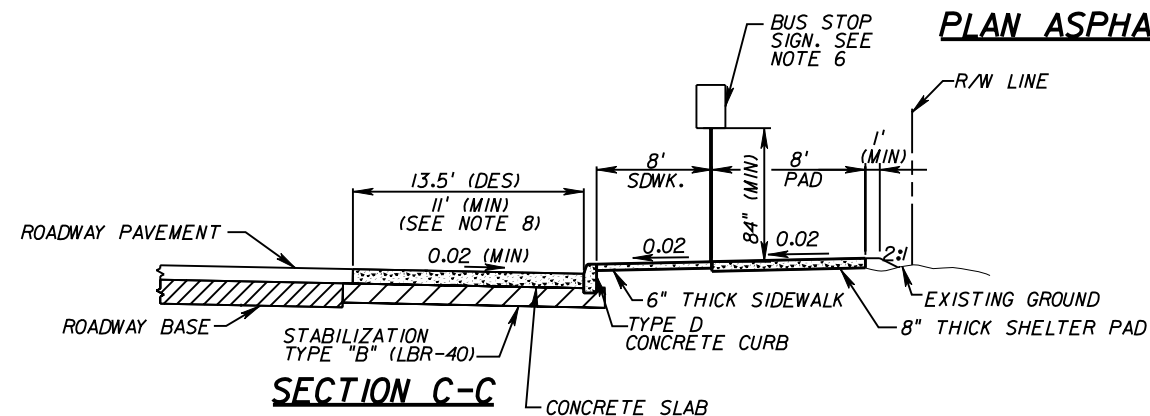
PLAN CONCRETE SLAB OPTION



PLAN ASPHALT PAVEMENT OPTION

NOTES:

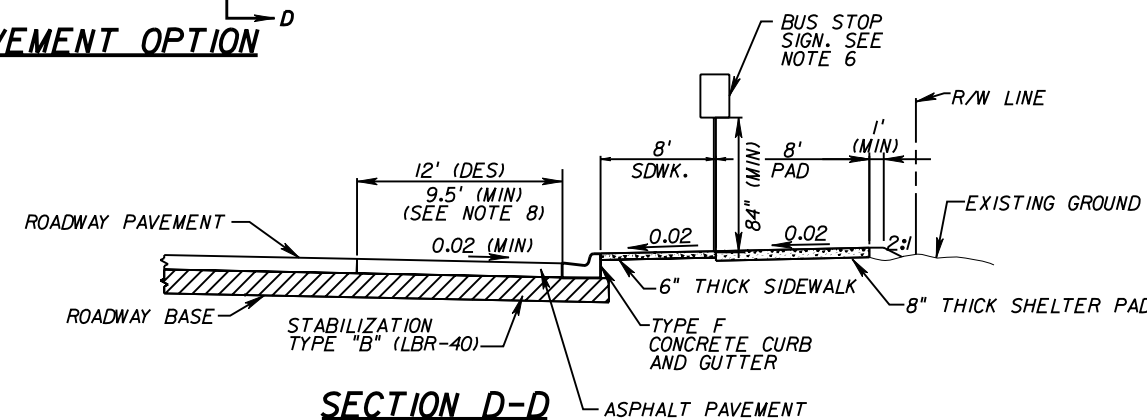
1. ALL BUS BAYS LOCATED IN URBANIZED AREAS SHOULD BE DESIGNED TO ACCOMMODATE AT LEAST TWO BUSES (100' STANDARD BUS AND 120' ARTICULATED BUS.)
2. DIMENSION SHOWN IS FOR ONE BUS. INCREASE LENGTH OF BUS BAY BY 50' FOR EACH 40-FOOT BUS AND 70' FOR EACH 60-FOOT ARTICULATED BUS EXPECTED TO BE AT THE STOP SIMULTANEOUSLY.
3. WHEN NO BUS SHELTER IS USED, EXTEND THE SIDEWALK TO PROVIDE AN A.D.A. LANDING PAD WITH A MINIMUM CLEAR LENGTH OF 8' AND A MINIMUM CLEAR WIDTH OF 5'. A 50' WIDE AND 8' LONG PAD IS DESIRABLE.
4. FOR CURB & GUTTER TRANSITION DETAILS, REFER TO LATEST VERSION OF FDOT STANDARD INDEX 300.
5. FOR SHELTER AND SHELTER PAD DETAILS, REFER TO FIGURE 1-6.
6. ALL CONCRETE JOINTS SHALL BE AS PER THE LATEST VERSION OF FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS, INDEX 305.
7. BUS STOP SIGN PANEL MUST BE LOCATED SUCH THAT A MINIMUM CLEARANCE OF 36" IS PROVIDED ON THE SIDEWALK.
8. DRAINAGE STRUCTURES ARE NOT TO BE LOCATED WITHIN THE BUS BAY.
9. BUS BAY SIDEWALK SHOULD BE CONNECTED TO EXISTING SDWK. OR ACCESSIBLE TO SHOULDER.



SECTION C-C

**TYPICAL BUS BAY
RURAL/SHOULDER CONDITION
WITH CONCRETE PAVEMENT**

N.T.S.



SECTION D-D

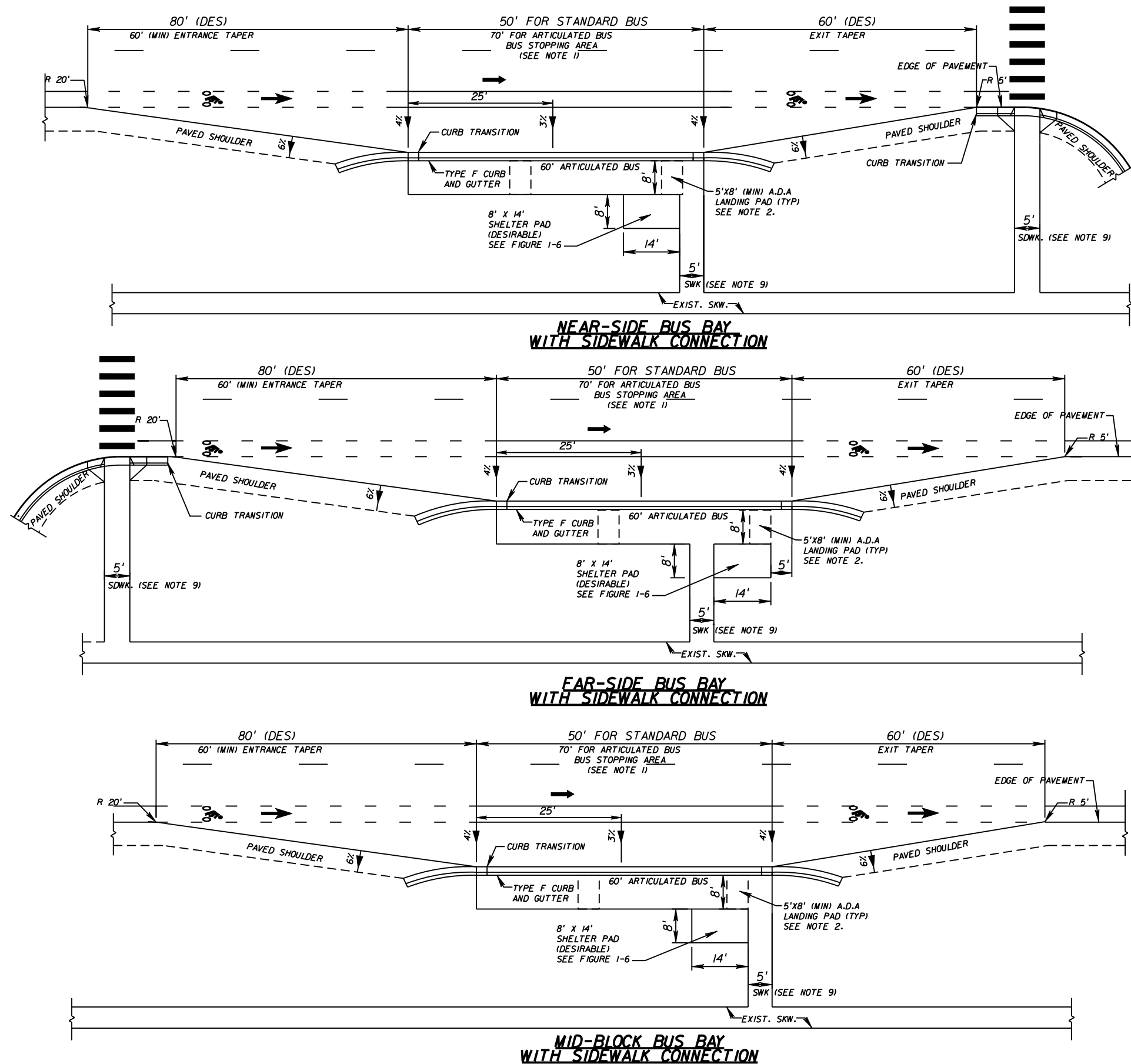
**TYPICAL BUS BAY
RURAL/SHOULDER CONDITION
WITH ASPHALT PAVEMENT**

N.T.S.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
		233151-1-12-02

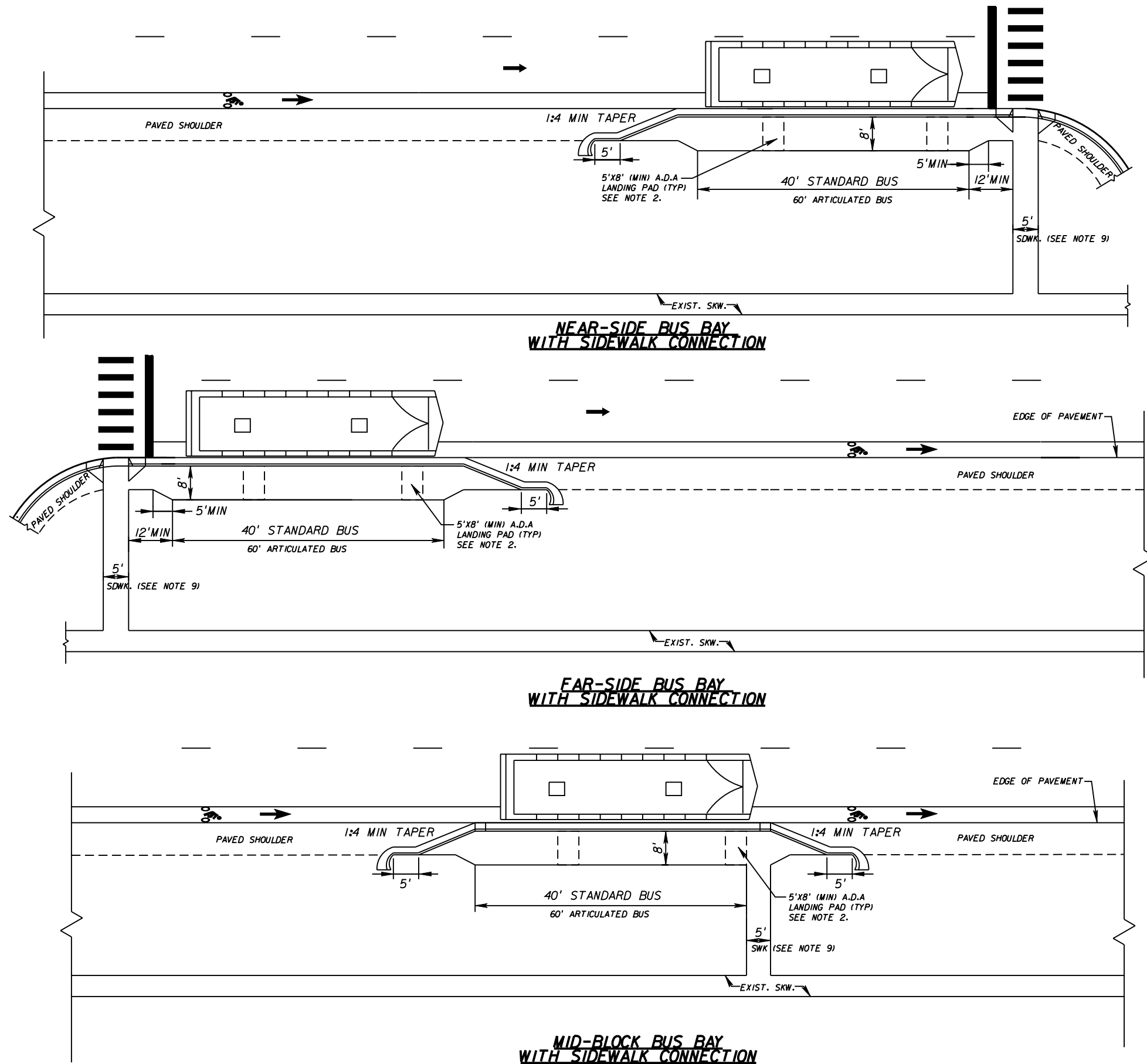
TRANSIT FACILITIES GUIDELINES CLOSED BUS BAY LAYOUT RURAL/SHOULDER		FIGURE
		1-9



NOTES:

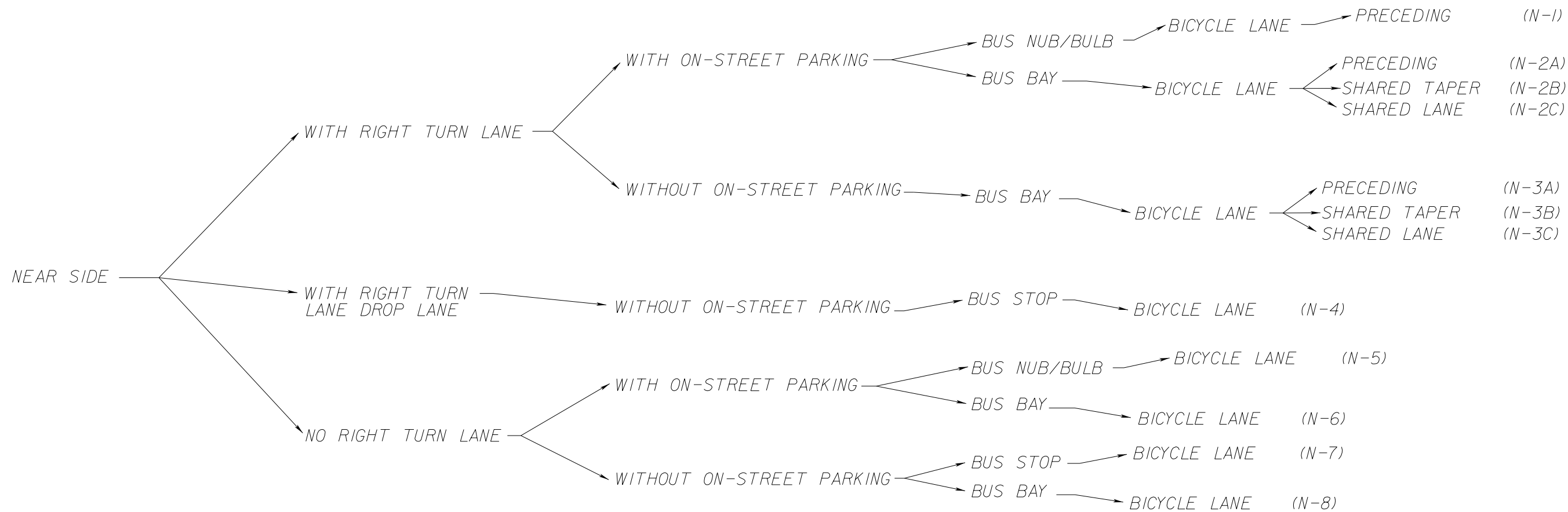
1. DIMENSION SHOWN IS FOR ONE BUS. INCREASE LENGTH OF BUS BAY BY 50' FOR EACH 40-FOOT BUS AND 70' FOR EACH 60-FOOT ARTICULATED BUS EXPECTED TO BE AT THE STOP SIMULTANEOUSLY.
2. WHEN NO BUS SHELTER IS USED, EXTEND THE SIDEWALK TO PROVIDE AN A.D.A. LANDING PAD WITH A MINIMUM CLEAR LENGTH OF 8' AND A MINIMUM CLEAR WIDTH OF 5'.
3. FOR CURB & GUTTER TRANSITION DETAILS, REFER TO LATEST VERSION OF FDOT STANDARD INDEX 300.
4. FOR SHELTER AND SHELTER PAD DETAILS, REFER TO FIGURE 1-6.
5. BUS STOP SIGN PANEL MUST BE LOCATED SUCH THAT A MINIMUM CLEARANCE OF 36" IS PROVIDED ON THE SIDEWALK.
6. DRAINAGE STRUCTURES ARE NOT TO BE LOCATED WITHIN THE BUS BAY.
7. BUS BAY SIDEWALK SHOULD BE CONNECTED TO EXISTING SDWK. OR ACCESSIBLE TO SHOULDER.
8. FOR CROSS-SECTION DETAIL REFER TO SECTION 1-9, SECTION D-D.
9. HANDRAIL TO BE PROVIDED IF A SLOPE BEGINS CLOSER THAN 2 FEET FROM THE SIDEWALK.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES BUS BAY LAYOUT WITH SIDEWALK CONNECTION	FIGURE 1-9A
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		



- NOTES:
1. DIMENSION SHOWN IS FOR ONE BUS. INCREASE LENGTH OF BUS BAY BY 50' FOR EACH 40-FOOT BUS AND 70' FOR EACH 60-FOOT ARTICULATED BUS EXPECTED TO BE AT THE STOP SIMULTANEOUSLY.
 2. WHEN NO BUS SHELTER IS USED, EXTEND THE SIDEWALK TO PROVIDE AN A.D.A. LANDING PAD WITH A MINIMUM CLEAR LENGTH OF 8' AND A MINIMUM CLEAR WIDTH OF 5'.
 3. FOR CURB & GUTTER TRANSITION DETAILS, REFER TO LATEST VERSION OF FDOT STANDARD INDEX 300.
 4. FOR SHELTER AND SHELTER PAD DETAILS, REFER TO FIGURE 1-6.
 5. BUS STOP SIGN PANEL MUST BE LOCATED SUCH THAT A MINIMUM CLEARANCE OF 36" IS PROVIDED ON THE SIDEWALK.
 6. DRAINAGE STRUCTURES ARE NOT TO BE LOCATED WITHIN THE BUS BAY.
 7. CONNECTING SIDEWALK SHOULD BE CONNECTED TO EXISTING SDWK. OR ACCESSIBLE TO SHOULDER.
 8. FOR CROSS-SECTION DETAIL REFER TO SECTION 1-9, SECTION D-D.
 9. HANDRAIL TO BE PROVIDED IF A SLOPE BEGINS CLOSER THAN 2 FEET FROM THE SIDEWALK.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES LAYOUT WITH SIDEWALK CONNECTION	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		1-9B

[illegible]

RIGHT TURN LANE DESIGN LENGTH		
DESIGN SPEED (MPH)	* L _i (FT)	
	RIGHT TURN VALUE	THROUGH LANE VALUE
35	95'+QRT	20'+QT
40	105'+QRT	30'+QT
45	135'+QRT	35'+QT
50	190'+QRT	55'+QT

NOTE: THIS TABLE APPLIES TO ALL NEAR SIDE AND FAR SIDE
BUS FACILITIES IN COMBINATION WITH RIGHT TURN LANES.

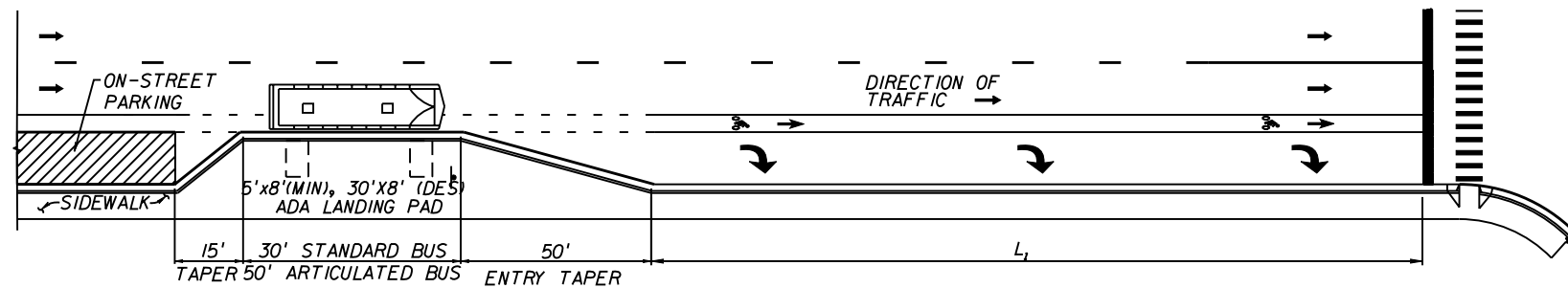
SOURCE: FDOT STANDARD INDEX 301

* L_i = UTILIZE LARGER OF TWO VALUES FOR NEAR SIDE STOPS AND
RIGHT TURN VALUE FOR FAR SIDE STOPS.
QRT= QUEUE STORAGE VALUE FOR THE RIGHT TURN MOVEMENT (FT).
QT= QUEUE STORAGE VALUE FOR THE THROUGH MOVEMENT (FT).

- NOTES FOR QUEUE STORAGE VALUES: (QRT OR QT)
- 1. UTILIZE A 90% SUCCESS RATE VALUE FOR ALL NON-FIHS FACILITIES AND A 95% SUCCESS RATE FOR ALL FIHS FACILITIES.
ALL QUEUE VALUES ARE TO BE OBTAINED FROM THE PEAK HOUR FOR THE DESIGN YEAR, AND SHALL BE BASED ON THE
ADJUSTED MAXIMUM QUEUE REACH (AMQR).
 - 2. WHEN POSSIBLE AND DESIRABLE, PROVIDE MORE STORAGE WHERE THE PROJECTED VALUES APPEAR "LIGHT".
 - 3. UTILIZE A VALUE OF 25FT AVERAGE VEHICLE DISTANCE UP TO A VALUE OF 2% TRUCKS. FOR GREATER TRUCK PERCENTAGES,
INCREASE THE AVERAGE VEHICLE DISTANCE BY 2 TO 3FT FOR EVERY 5% INCREASE IN TRUCK PERCENTAGE.
 - 4. A FORMAL QUEUE STUDY SHOULD BE PERFORMED AT EACH LOCATION. AT LOCATIONS WHERE A SPECIFIC QUEUE STUDY DOES NOT
EXIST, UTILIZE A MINIMUM QUEUE STORAGE VALUE OF 100FT IN URBAN/SUBURBAN AREAS AND 50FT IN RURAL AREAS.
 - 5. THE QUEUE LENGTH IS TO BE MEASURED FROM THE RADIAL POINT OR, WHEN A STOP BAR IS REQUIRED, FROM THE STOP BAR.

REVISIONS							STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES TURN LANE REQUIREMENTS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
									233151-1-12-02		1-11

N-1



- TYPICAL APPLICATION:**
- URBAN AREA WHERE PARKING IS CRITICAL.
 - AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
 - ON STREET PARALLEL PARKING.
 - RIGHT TURN LANE REQUIRED.

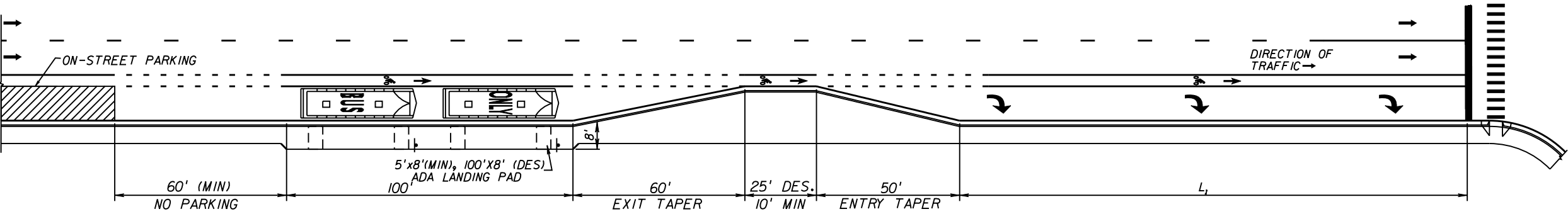
- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.

- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

NEAR SIDE NUB/BULB WITH ON STREET PARKING PRECEDING RIGHT TURN LANE

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITY GUIDELINES NEAR SIDE BUS STOPS		FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
								233151-1-12-02	1-12

N-2A



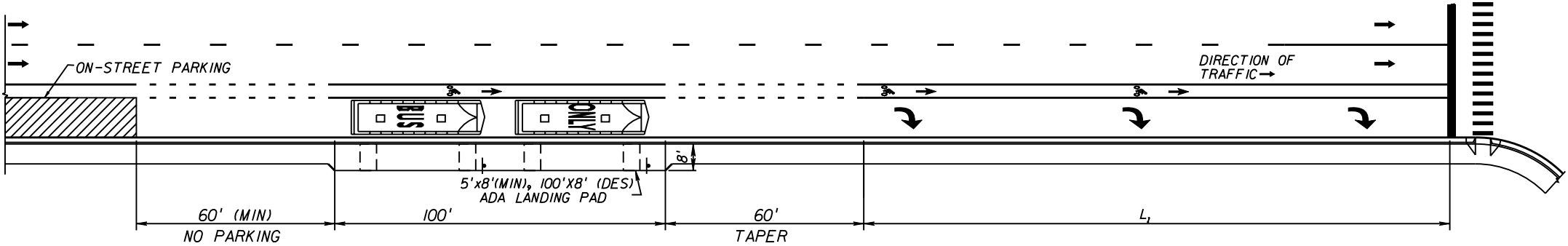
- TYPICAL APPLICATION:**
- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
 - ON STREET PARALLEL PARKING.
 - RIGHT TURN LANE REQUIRED.

- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
 - MOST DESIRABLE DESIGN IF VIABLE.

- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
 - 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

NEAR SIDE BUS BAY WITH ON STREET PARKING PRECEDING RIGHT TURN LANE

N-2B



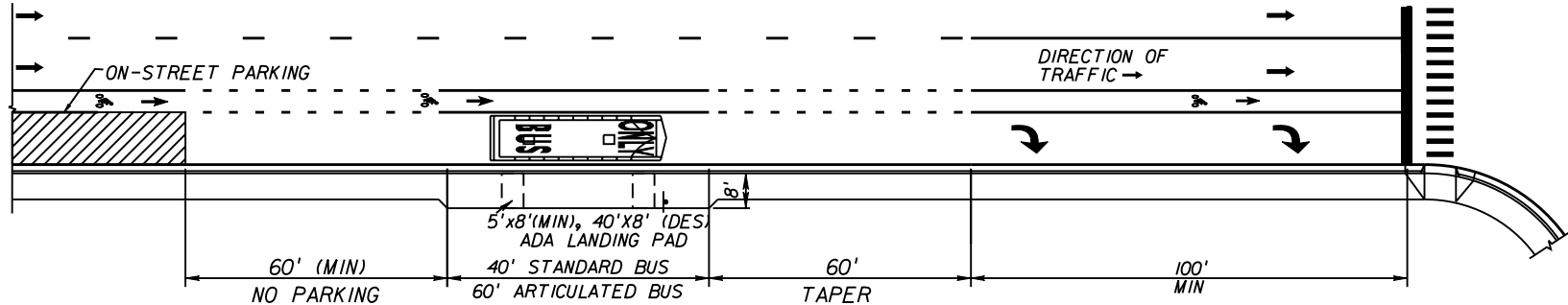
- TYPICAL APPLICATION:**
- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
 - ON STREET PARALLEL PARKING.
 - RIGHT TURN LANE REQUIRED.

- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
 - SECOND MOST DESIRABLE DESIGN IF VIABLE.

- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
 - 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

NEAR SIDE BUS BAY WITH ON STREET PARKING PRECEDING RIGHT TURN LANE WITH SHARED TAPER

N-2C



- TYPICAL APPLICATION:**
- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
 - ON STREET PARALLEL PARKING.
 - RIGHT TURN LANE REQUIRED.

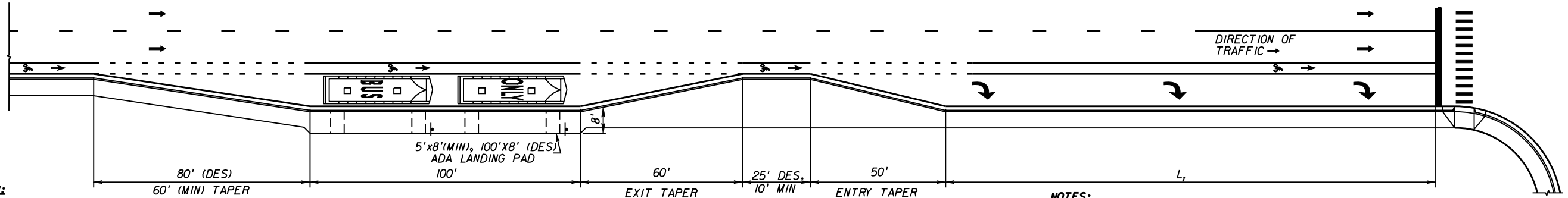
- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
 - MINIMUM DESIGN FOR CONSTRAINED SITES.

- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 2.) SUCCEEDING QUEUE BYPASS TO BE CONSIDERED.
 - 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

NEAR SIDE BUS BAY WITH ON STREET PARKING SHARED WITH RIGHT TURN LANE

REVISIONS							STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES NEAR SIDE BUS BAYS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		1-13
									233151-1-12-02		

N-3A



TYPICAL APPLICATION:

- RIGHT TURN LANE REQUIRED.
- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

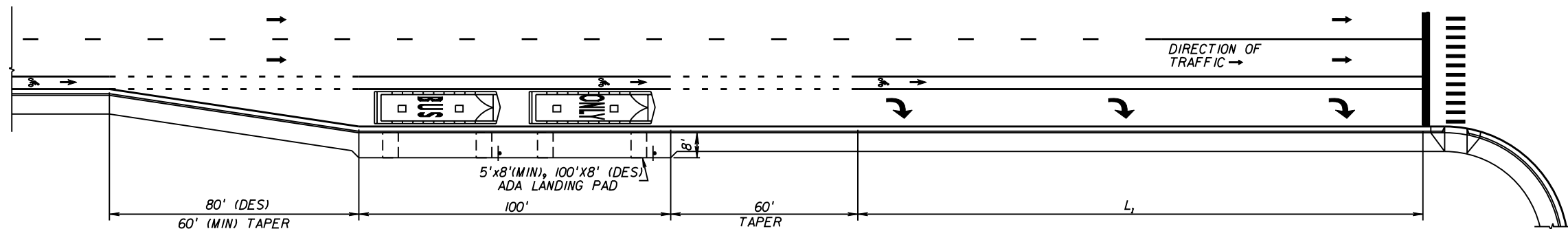
- ARTERIAL DESIGN SPEED ≤ 45 MPH.
- MOST DESIRABLE DESIGN IF VIABLE.

**NEAR SIDE BUS BAY
PRECEDING RIGHT TURN LANE**

NOTES:

- 1.) FOR BUS BAY DETAILS SEE FIGURE 1-8 & 1-9.
- 2.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

N-3B



TYPICAL APPLICATION:

- RIGHT TURN LANE REQUIRED.
- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

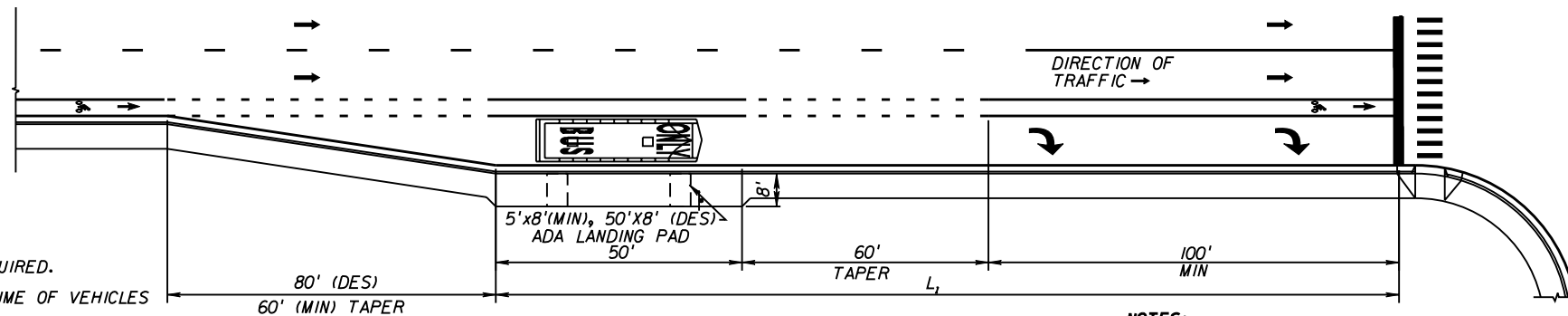
- ARTERIAL DESIGN SPEED ≤ 45 MPH.
- SECOND MOST DESIRABLE DESIGN IF VIABLE.

**NEAR SIDE OPEN BUS BAY PRECEDING
RIGHT TURN LANE WITH SHARED TAPER**

NOTES:

- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

N-3C



TYPICAL APPLICATION:

- RIGHT TURN LANE REQUIRED.
- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.
- MINIMUM DESIGN FOR CONSTRAINED SITES.

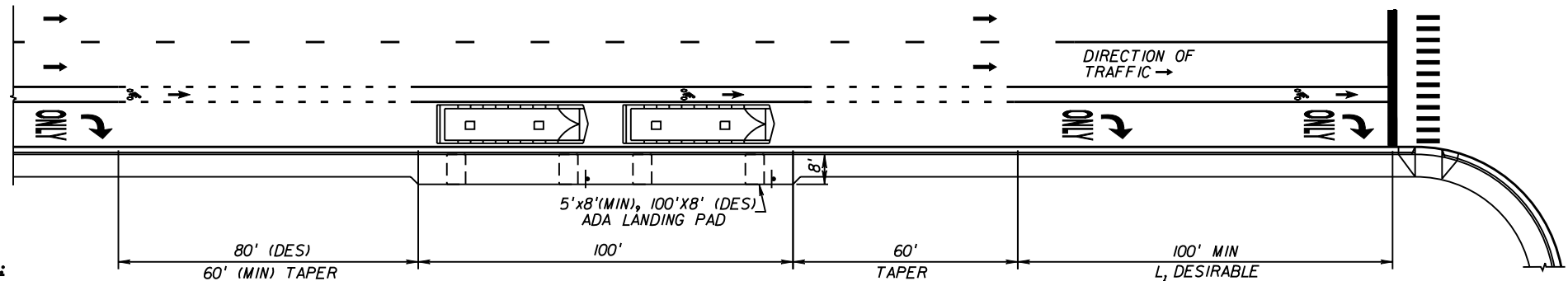
**NEAR SIDE OPEN BUS BAY
SHARED WITH RIGHT TURN LANE**

NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) SUCCEEDING QUEUE BYPASS TO BE CONSIDERED.
- 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES NEAR SIDE BUS BAYS	FIGURE 1-14
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

N-4



TYPICAL APPLICATION:

- RIGHT TURN LANE DROP LANE.

CONDITIONS:

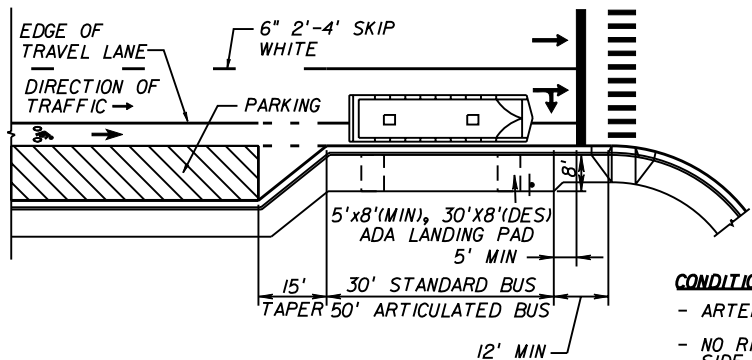
- ARTERIAL DESIGN SPEED ≤ 40 MPH.

**NEAR SIDE BUS BAY WITH
PRECEDING LANE DROP RIGHT TURN LANE**

NOTES:

- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 2.) SUCCEEDING QUEUE BYPASS TO BE CONSIDERED.
- 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

N-5



TYPICAL APPLICATION:

- URBAN AREA WHERE PARKING IS CRITICAL.
- AREAS WITH HIGH VOLUME OF PEDESTRIANS ON SIDEWALK SUCH AS CENTRAL BUSINESS DISTRICTS.
- ON STREET PARALLEL PARKING.
- NO RIGHT TURN LANE

**NEAR SIDE NUB/BULB
WITH ON-STREET PARKING**

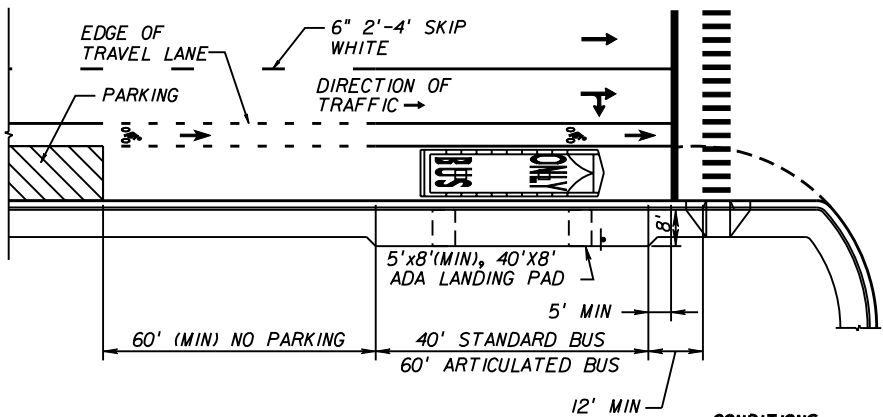
CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 40 MPH.
- NO RIGHT TURN BAY ON NEAR SIDE OF INTERSECTION.

NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

N-6



TYPICAL APPLICATION:

- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
- NO RIGHT TURN LANE
- ON STREET PARALLEL PARKING.

**NEAR SIDE BUS BAY
WITH ON-STREET PARKING**

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 40 MPH.

NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES NEAR SIDE BUS BAYS/STOPS	FIGURE 1-15
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

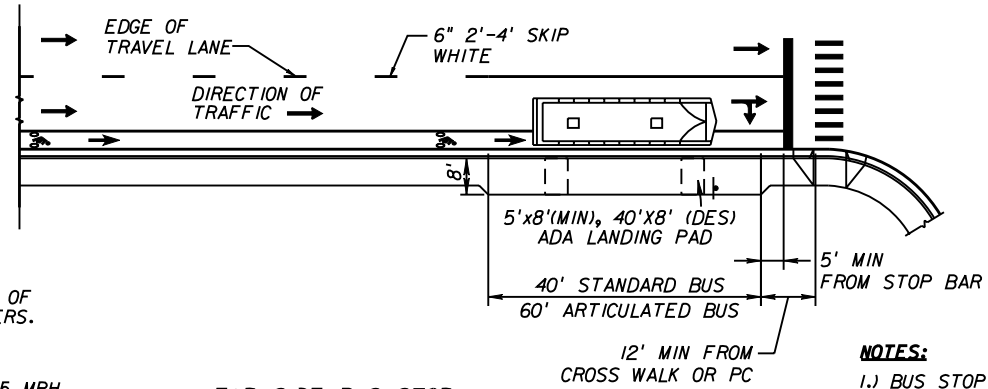
N-7

TYPICAL APPLICATION:

- NO RIGHT TURN LANE.
- AREAS WITH LOWER VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.



NEAR SIDE BUS STOP

NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

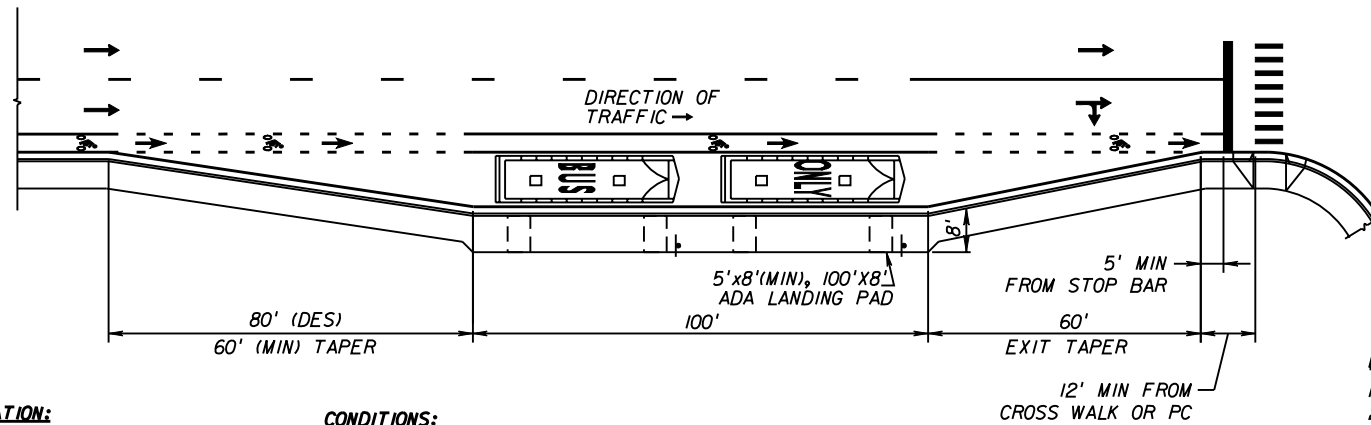
N-8

TYPICAL APPLICATION:

- NO RIGHT TURN LANE.
- AREAS WITH HIGHER VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.

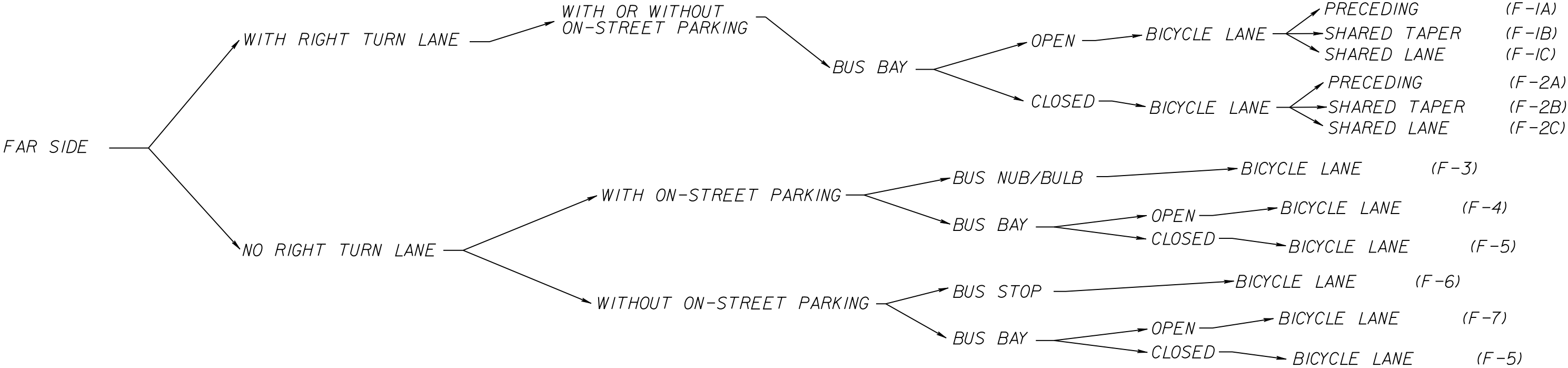


NEAR SIDE BUS BAY

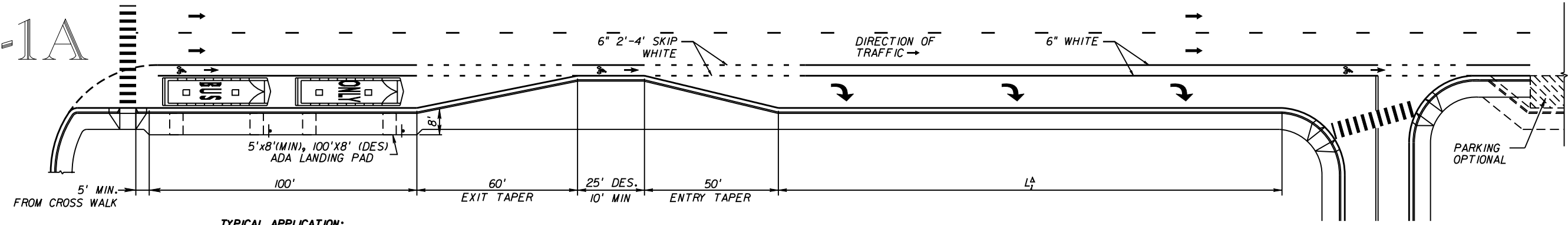
NOTES:

- 1.) FOR BUS BAY DETAILS SEE FIGURE I-8 & I-9.
- 2.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITY GUIDELINES NEAR SIDE BUS BAYS/STOPS		FIGURE I-16
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
								233151-1-12-02	



F-1A



TYPICAL APPLICATION:

- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
- RIGHT TURN BAY AT NEAR SIDE AND FAR SIDE OF INTERSECTION.

FAR SIDE OPEN BUS BAY PRECEDING RIGHT TURN LANE

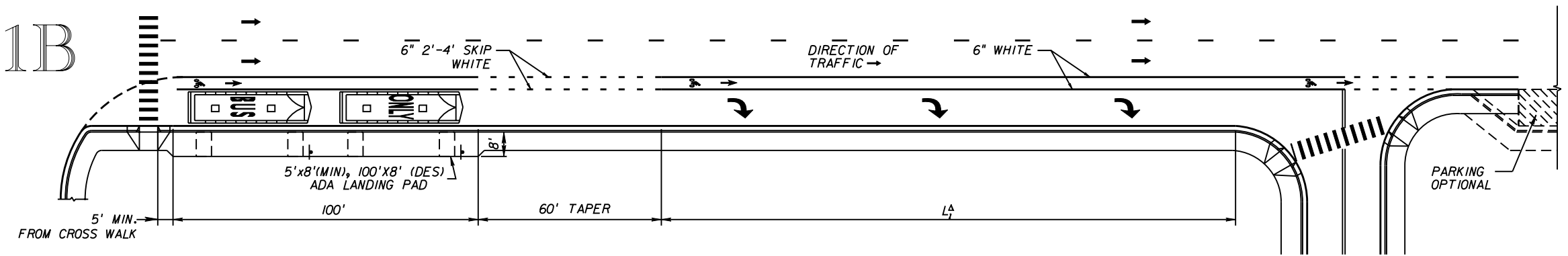
CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.
- OPEN BUS BAY DESIGN RECOMMENDED FOR 4 LANE OR LESS ROADWAY.
- MOST DESIRABLE DESIGN IF VIABLE.

NOTES:

- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

F-1B



TYPICAL APPLICATION:

- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
- RIGHT TURN BAY AT NEAR SIDE AND FAR SIDE OF INTERSECTION.

FAR SIDE OPEN BUS BAY PRECEDING RIGHT TURN LANE WITH SHARED TAPER

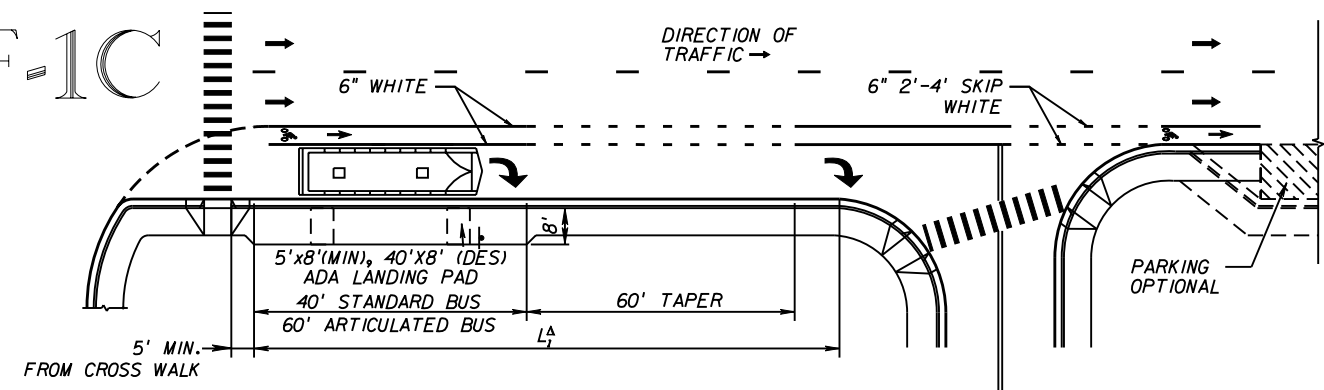
CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.
- OPEN BUS BAY DESIGN RECOMMENDED FOR 4 LANE OR LESS ROADWAY.
- SECOND MOST DESIRABLE DESIGN IF VIABLE.

NOTES:

- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

F-1C



TYPICAL APPLICATION:

- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
- RIGHT TURN BAY AT NEAR SIDE AND FAR SIDE OF INTERSECTION.

FAR SIDE OPEN BUS BAY SHARED WITH RIGHT TURN LANE

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.
- OPEN BUS BAY DESIGN RECOMMENDED FOR 4 LANE OR LESS ROADWAY.
- MINIMUM DESIGN FOR CONSTRAINED SITES.

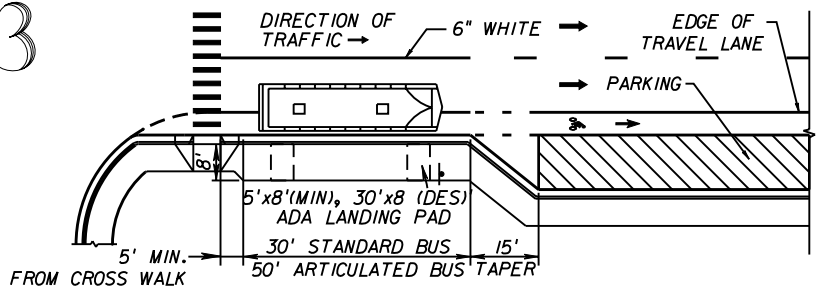
NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

Δ - L_s DIMENSION IS BASED ON A STOP CONDITION. THE VALUE CAN BE REDUCED BASED ON THE RETURN RADIUS DESIGN SPEED.

REVISIONS							STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES FAR SIDE BUS BAYS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		1-19
									233151-1-12-02		

F-3



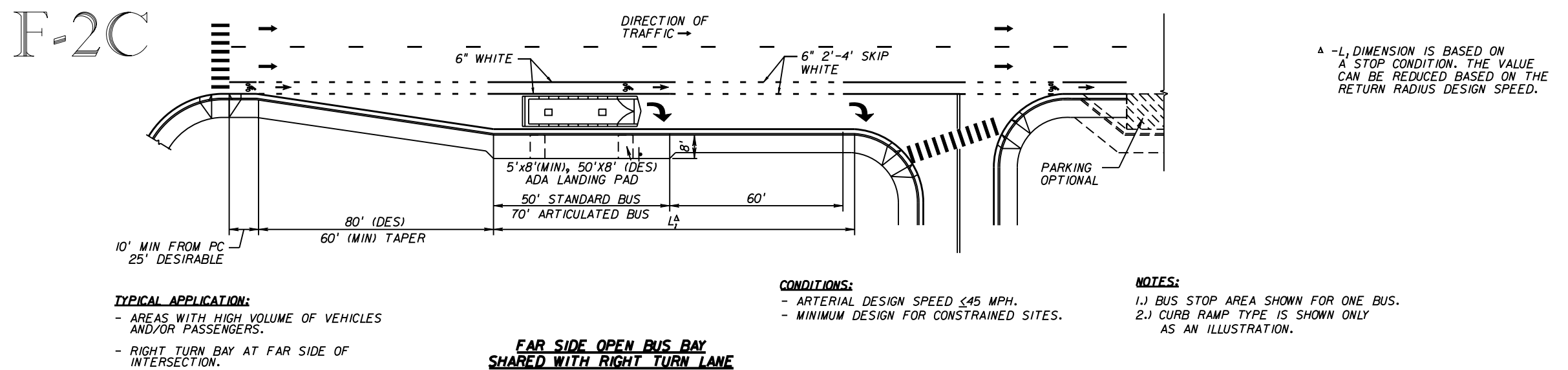
- TYPICAL APPLICATION:**
- URBAN AREA WHERE PARKING IS CRITICAL.
 - AREAS WITH HIGH VOLUME OF PEDESTRIANS ON SIDEWALK.
 - ON-STREET PARALLEL PARKING.

**FAR SIDE NUB/BULB
WITH ON-STREET PARKING**

- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

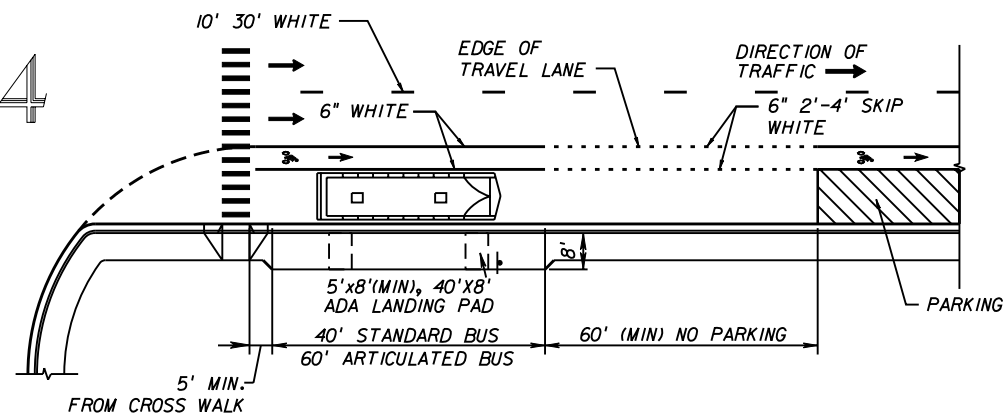
Δ -L, DIMENSION IS BASED ON A STOP CONDITION. THE VALUE CAN BE REDUCED BASED ON THE RETURN RADIUS DESIGN SPEED.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITY GUIDELINES FAR SIDE BUS STOPS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION			
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID
								233151-1-12-02



REVISIONS							STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES FAR SIDE BUS BAYS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		1-20
									233151-1-12-02		

F-4



TYPICAL APPLICATION:

- AREAS WITH HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.
- RIGHT TURN BAY AT NEAR SIDE OF INTERSECTION, AND NO FAR SIDE RIGHT TURN LANE.
- ON STREET PARALLEL PARKING.

CONDITIONS:

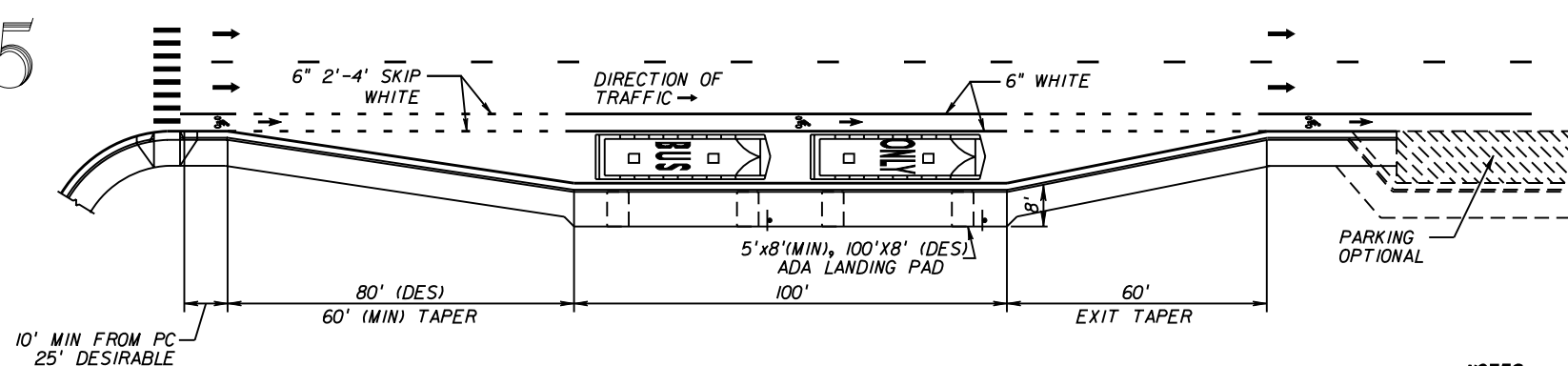
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
- OPEN BUS BAY DESIGN RECOMMENDED FOR 4 LANE OR LESS DIVIDED ROADWAYS.

NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

**FAR SIDE OPEN BUS BAY
WITH ON STREET PARKING**

F-5



TYPICAL APPLICATION:

- NO FAR SIDE RIGHT TURN LANE.
- AREAS WITH HIGHER VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.

NOTES:

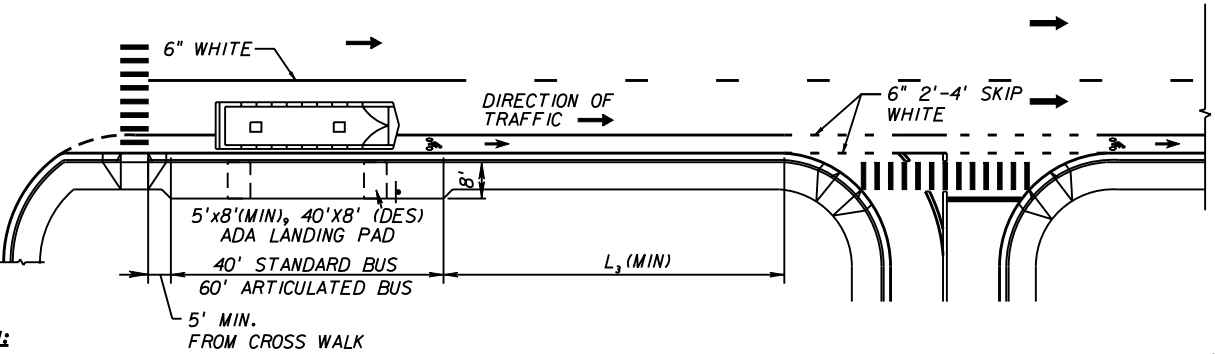
- 1.) FOR BUS BAY DETAILS SEE FIGURE 1-8 & 1-9.
- 2.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

FAR SIDE CLOSED BUS BAY

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES FAR SIDE BUS BAYS	FIGURE 1-21
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

F-6

FAR SIDE BUS STOP PLACEMENT	
DESIGN SPEED (MPH)	L ₃
35	75'
40	75'
45	100'
50	135'



TYPICAL APPLICATION:

- NO FAR SIDE RIGHT TURN LANE.
- AREAS WITH LOWER VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

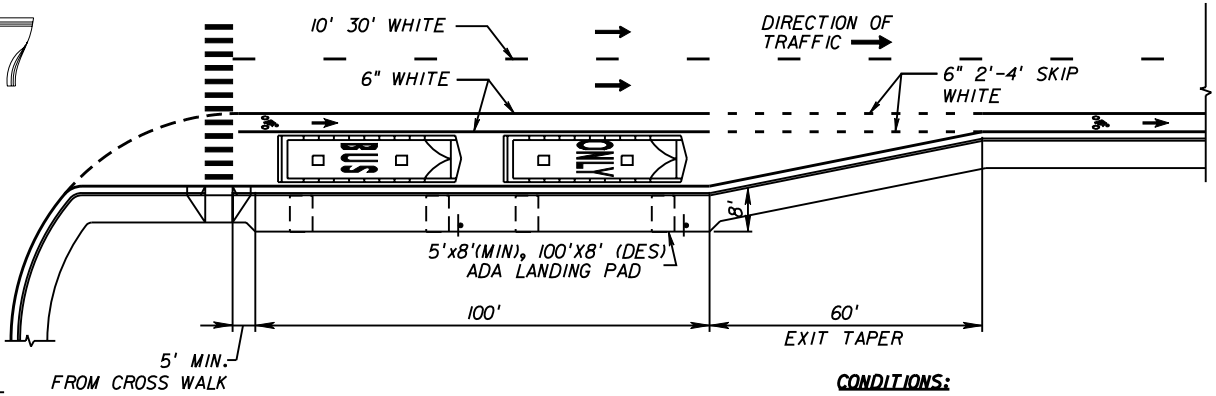
- ARTERIAL DESIGN SPEED ≤45 MPH.

NOTES:

- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

**FAR SIDE BUS STOP
WITHOUT RIGHT TURN LANE**

F-7



TYPICAL APPLICATION:

- RIGHT TURN BAY AT NEAR SIDE OF INTERSECTION AND NO RIGHT TURN LANE AT FAR SIDE OF INTERSECTION.
- AREAS WITH HIGHER VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

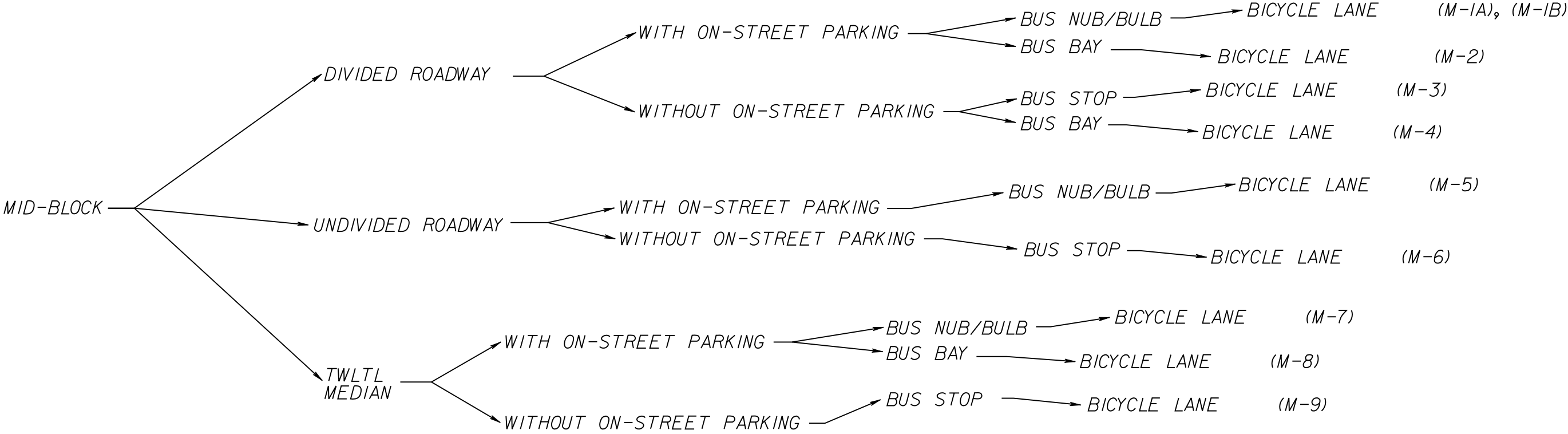
- ARTERIAL DESIGN SPEED ≤45 MPH.
- OPEN BUS BAY DESIGN RECOMMENDED FOR 4 LANE OR LESS DIVIDED ROADWAYS.

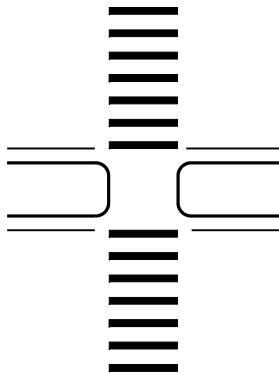
NOTES:

- 1.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 2.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

FAR SIDE OPEN BUS BAY

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITY GUIDELINES FAR SIDE BUS BAYS/STOPS		FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID	1-22
								233151-1-12-02	





MEDIAN OPTION 1
(STRAIGHT MEDIAN WITH
STRAIGHT CROSSWALK)

NOTE: FOR 3 OR MORE LANE ROADWAY SECTIONS MIDBLOCK
CROSSINGS MUST BE SIGNALIZED AND APPROVED
BY FDOT'S TRAFFIC OPERATIONS DEPARTMENT.

CROSSWALK CLEAR ZONE REQUIREMENTS							
		DIMENSION DL (FT)					
DESIGN SPEED (MPH)	**S.S.D. (FT)	MEDIAN/SIDEWALK WIDTH					
		2'	4'	6'	8'	10'	≥ 12'
30	200	100	135	150	160	165	170
35	250	125	165	190	200	210	215
40	300	150	200	225	240	250	260
45	350	175	235	265	280	290	300

** S.S.D. - STOPPING SIGHT DISTANCE

MID-BLOCK CROSSING NOTES:

1. USE THE SAME PARAMETERS FOR ROADWAYS WITH MORE THAN FOUR LANES.

2. INSTALL ADVANCE WARNING SIGNS AS PER THE MUTCD AND FDOT STANDARDS TO WARN MOTORISTS OF ONCOMING CROSSWALK.

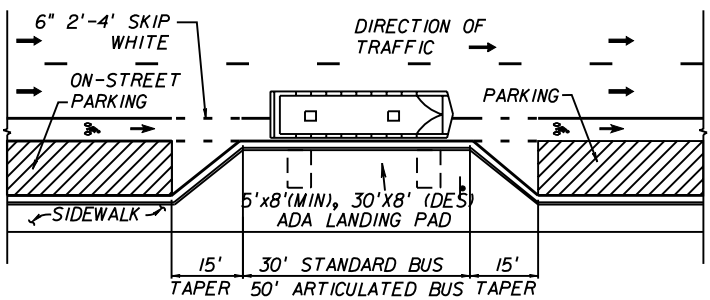
3. CLEAR AREA SHOULD BE FREE OF ALL FIXED OBJECTS SUCH AS LIGHT/UTILITY POLES, SIGNAL EQUIPMENT, TREES, VEGETATION, STREET FURNITURE, ETC. THAT WOULD OBSTRUCT THE VIEW OF PEDESTRIANS. CROSSING WARNING SIGNS ARE EXCLUDED FROM THE CLEAR AREA REQUIREMENTS.
4. REFER TO FDOT INDEX 17346 OF THE LATEST EDITION OF THE FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS FOR TRAFFIC SIGN AND CROSSING SIGNAL LOCATION.

5. PARKING IS PROHIBITED FOR 100' IN ADVANCE OF THE CROSSWALK.

6. MEDIAN SHOULD BE DEPRESSED AT CROSSING LOCATION TO PROVIDE EVEN WALKING SURFACE RATHER THAN PEDESTRIAN RAMPS.

REVISIONS							STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	TRANSIT FACILITY GUIDELINES MID-BLOCK BUS DETAILS		FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
										1-24

M-1A



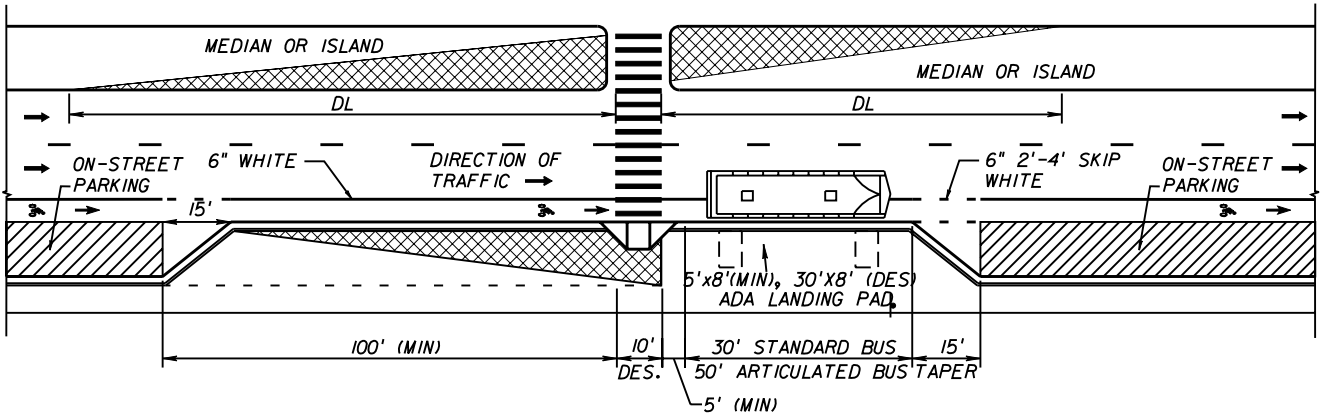
- TYPICAL APPLICATION:**
- AREAS WITH HIGH VOLUME OF PEDESTRIANS ON SIDEWALK SUCH AS CENTRAL BUSINESS DISTRICTS.
 - MID-BLOCK BUS STOP NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
 - ON-STREET PARALLEL PARKING.

- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
 - ON STREET PARKING PROVIDED.

- NOTES:**
- 1.) PEDESTRIAN RAMP AND CROSSWALK (WITH OPTIONAL PEDESTRIAN SIGNAL) CAN BE PROVIDED IF NO CONFLICT IS CREATED WITH A.D.A. LANDING PADS.
 - 2.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.

**MID-BLOCK NUB/BULB WITH ON-STREET PARKING
(NO MID-BLOCK CROSSWALK)**



M-1B



- TYPICAL APPLICATION:**
- AREAS WITH HIGH VOLUME OF PEDESTRIANS ON SIDEWALK SUCH AS CENTRAL BUSINESS DISTRICTS.
 - MID-BLOCK BUS STOP NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
 - ON-STREET PARALLEL PARKING.

- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 40 MPH.
 - ON STREET PARKING PROVIDED.

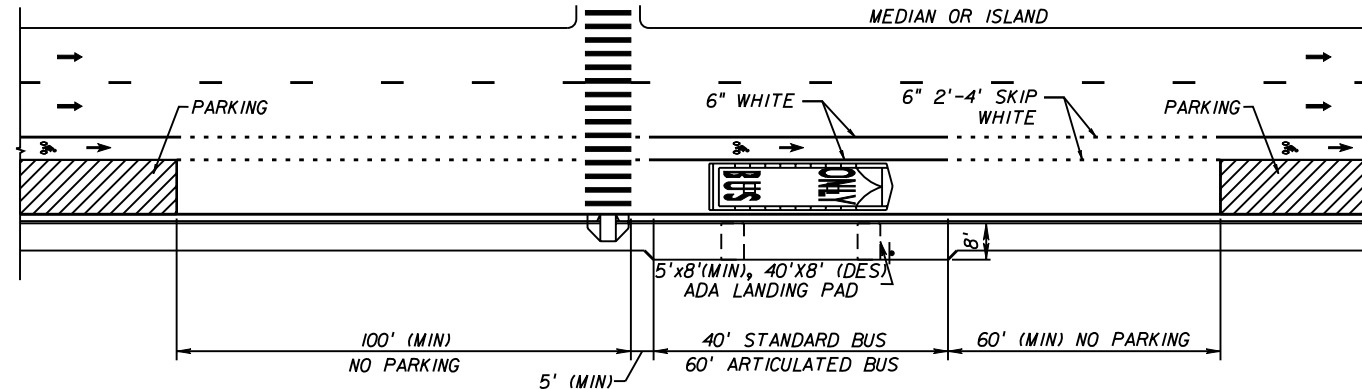
- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 2.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
 - 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

-  PARKING AREA
-  CLEAR AREA
(SEE FIGURE 1-24 FOR DETAILS)

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

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES MID-BLOCK BUS STOPS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		1-25

M-2



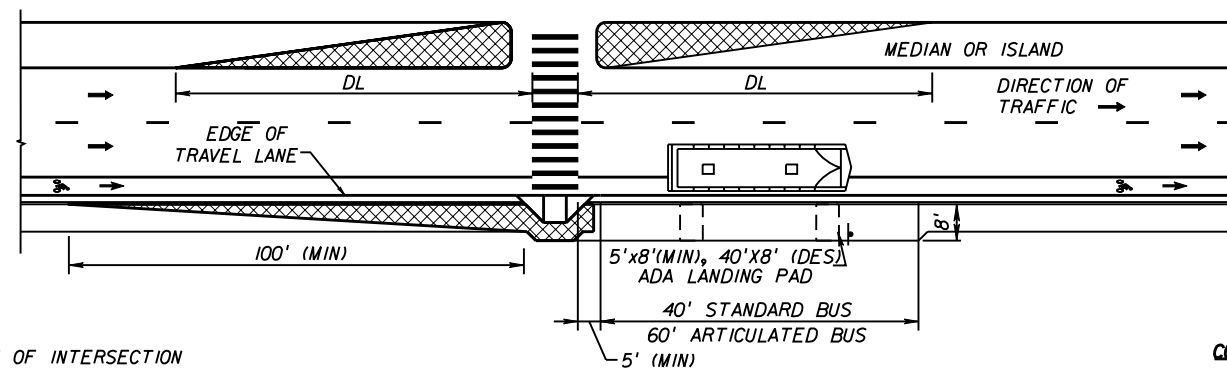
- TYPICAL APPLICATION:**
- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
 - MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
 - LOW VOLUME OF PEDESTRIANS ON SIDEWALK AND STREET PARKING EXISTS. WHEN PEDESTRIAN VOLUME IS HIGH, NUB ALTERNATIVE IS PREFERABLE.

- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 45 MPH.

- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 2.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
 - 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

**MID-BLOCK BUS BAY ON A DIVIDED
ROADWAY WITH ON-STREET PARKING
(NO NUB ALTERNATIVE)**

M-3



 CLEAR AREA
(SEE FIGURE I-24 FOR DETAILS)

- TYPICAL APPLICATION:**
- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
 - MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
 - LOW VOLUME OF PEDESTRIANS ON SIDEWALK AND LOW VOLUME OF VEHICLES.

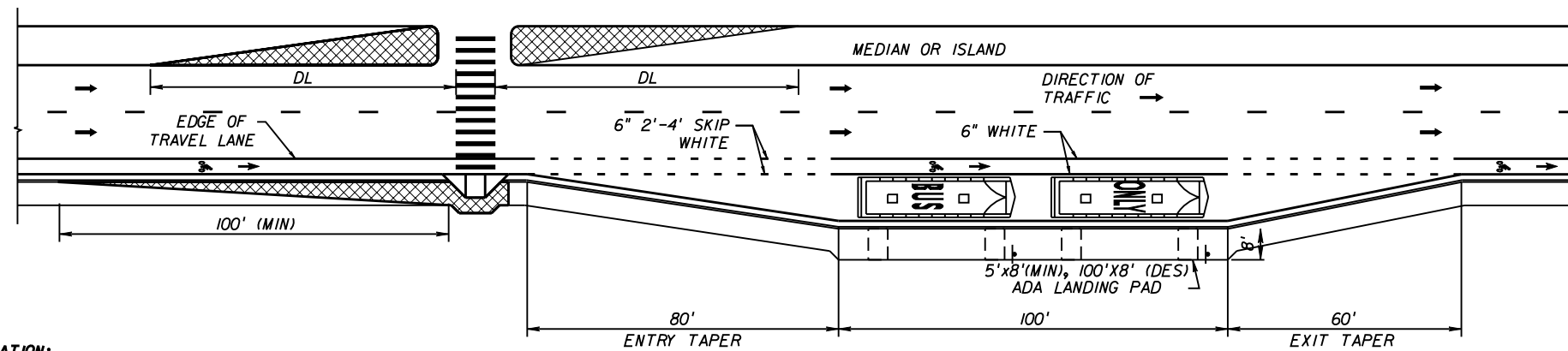
- CONDITIONS:**
- ARTERIAL DESIGN SPEED ≤ 45 MPH.

- NOTES:**
- 1.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 2.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
 - 3.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

**MID-BLOCK BUS STOP ON A DIVIDED
ROADWAY WITHOUT ON-STREET PARKING**

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES MID-BLOCK BUS BAYS/STOPS	FIGURE I-26
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

M-4



TYPICAL APPLICATION:

- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
- MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
- AREA OF HIGH VOLUME OF VEHICLES AND/OR PASSENGERS.

CONDITIONS:

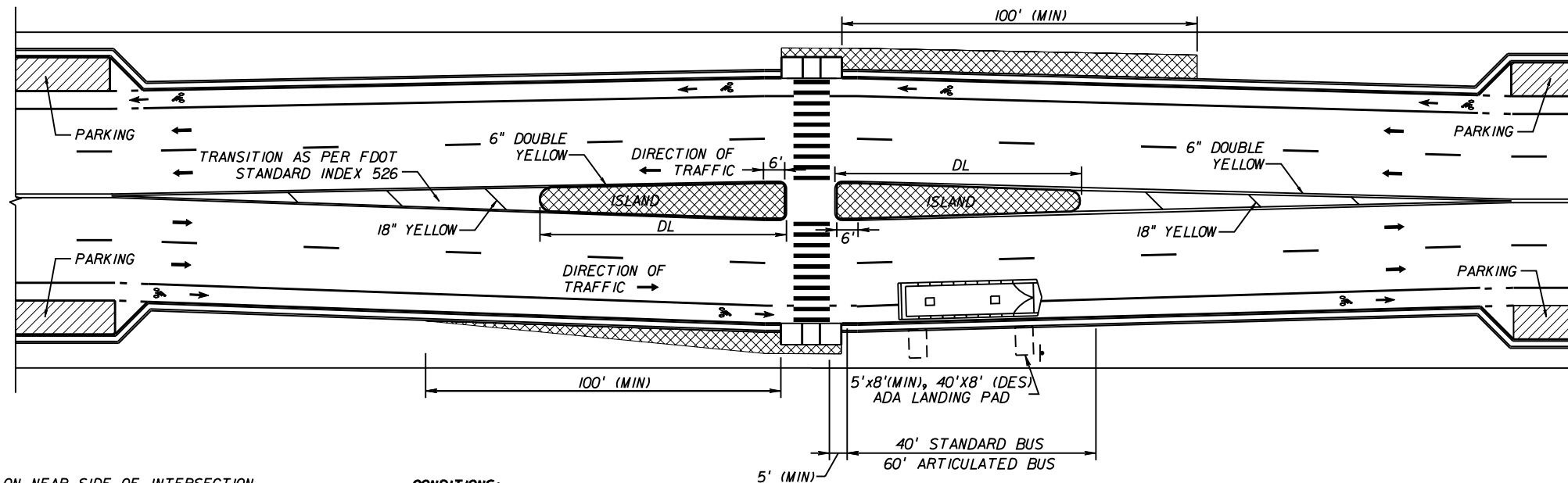
- ARTERIAL DESIGN SPEED ≤ 45 MPH.

NOTES:

- 1.) FOR BUS BAY DETAILS SEE FIGURE I-8 & I-9.
- 2.) BUS STOP AREA SHOWN FOR TWO BUSES.
- 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
- 4.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

MID-BLOCK BUS BAY ON A DIVIDED ROADWAY WITHOUT ON-STREET PARKING

M-5



TYPICAL APPLICATION:

- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
- MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
- LOW VOLUME OF PEDESTRIANS ON SIDEWALK, LOW VOLUME OF VEHICLES AND STREET PARKING EXISTS.

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.

NOTES:

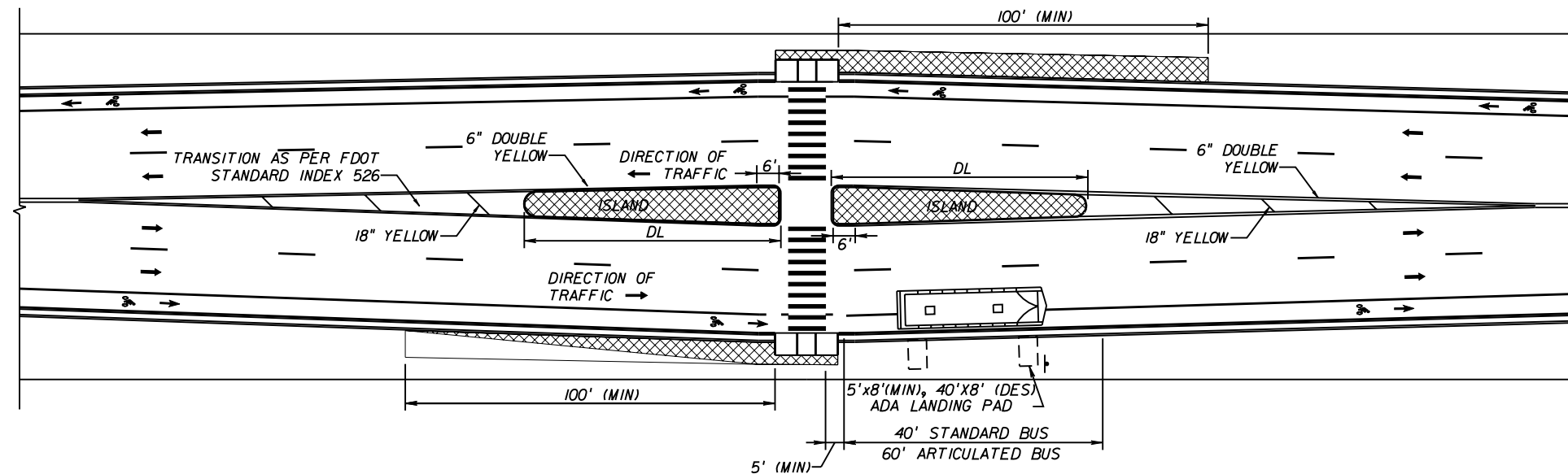
- 1.) INSTALLATION OF MEDIAN ISLAND TO BE PROPERLY COORDINATED WITH ADJACENT PROPERTY ACCESS REQUIREMENTS (DRIVEWAYS AND SIDE STREETS).
- 2.) BUS STOP AREA SHOWN FOR ONE BUS.
- 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
- 4.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

- PARKING AREA
- CLEAR AREA (SEE FIGURE I-24 FOR DETAILS)

MID-BLOCK BUS STOP ON AN UNDIVIDED ROADWAY WITH ON-STREET PARKING

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES MID-BLOCK BUS BAYS/STOPS	FIGURE I-27
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

M-6



TYPICAL APPLICATION:

- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
- MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
- LOW VOLUME OF PEDESTRIANS ON SIDEWALK AND LOW VOLUME OF VEHICLES.

CONDITIONS:

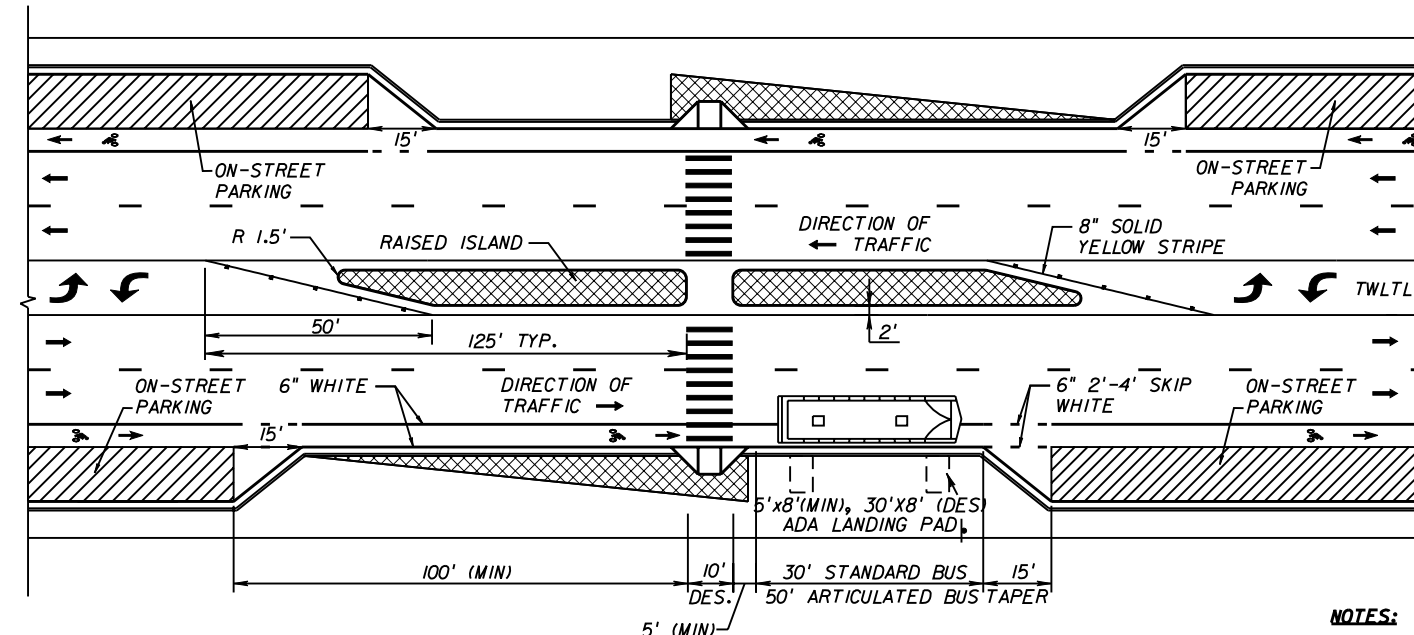
- ARTERIAL DESIGN SPEED ≤ 45 MPH.

MID-BLOCK BUS STOP ON AN UNDIVIDED ROADWAY WITHOUT ON-STREET PARKING

NOTES:

- 1.) INSTALLATION OF MEDIAN ISLAND TO BE PROPERLY COORDINATED WITH ADJACENT PROPERTY ACCESS REQUIREMENTS (DRIVEWAYS AND SIDE STREETS).
- 2.) BUS STOP AREA SHOWN FOR ONE BUS.
- 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
- 4.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

M-7



TYPICAL APPLICATION:

- AREAS WITH HIGH VOLUME OF PEDESTRIANS ON SIDEWALK SUCH AS CENTRAL BUSINESS DISTRICTS.
- MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
- ON-STREET PARALLEL PARKING.

CONDITIONS:

- ARTERIAL DESIGN SPEED ≤ 45 MPH.

MID-BLOCK BUS STOP WITH TWO-WAY-LEFT-TURN-LANE MEDIAN AND ON-STREET PARKING

- PARKING AREA
- CLEAR AREA (SEE FIGURE 1-24 FOR DETAILS)

NOTES:

- 1.) INSTALLATION OF MEDIAN ISLAND TO BE PROPERLY COORDINATED WITH ADJACENT PROPERTY ACCESS REQUIREMENTS (DRIVEWAYS AND SIDE STREETS).
- 2.) BUS STOP AREA SHOWN FOR ONE BUS.
- 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
- 4.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

REVISIONS						STATE OF FLORIDA			TRANSIT FACILITY GUIDELINES MID-BLOCK BUS STOPS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DEPARTMENT OF TRANSPORTATION				1-28
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

Diagram illustrating the plan view of a transit station layout, showing a raised island, ADA landing pad, and various dimensions.

Key Features and Dimensions:

- RAISED ISLAND:** Dimensions include $R\ 1.5'$, $50'$, and $125'$ TYP.
- ADA LANDING PAD:** Dimensions include $5' \times 8'$ (MIN), $40' \times 8'$ (DES), and $60'$ ARTICULATED BUS.
- Dimensions:**
 - $100'$ (MIN) NO PARKING
 - $40'$ STANDARD BUS
 - $60'$ (MIN) NO PARKING
 - $5'$ (MIN)
 - $6'$ WHITE
 - $6'$ 2'-4' SKIP WHITE
 - $8"$ SOLID YELLOW STRIPE
 - $2'$
 - $8'$
- Other Labels:**
 - DIRECTION OF TRAFFIC
 - TWTLT
 - * $10'$ MIN FOR 30 MPH DESIGN SPEED OR LESS

- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
- MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
- LOW VOLUME OF PEDESTRIANS ON SIDEWALK AND STREET PARKING EXISTS. WHEN PEDESTRIAN VOLUME IS HIGH, NUB ALTERNATIVE IS PREFERABLE.
- ON STREET PARALLEL PARKING.

- ARTERIAL DESIGN SPEED ≤ 45 MPH.

**MID-BLOCK BUS BAY WITH TWO-WAY-LEFT-TURN-LANE
MEDIAN AND ON-STREET PARKING**

- 1.) INSTALLATION OF MEDIAN ISLAND TO BE PROPERLY COORDINATED WITH ADJACENT PROPERTY ACCESS REQUIREMENTS (DRIVEWAYS AND SIDE STREETS).
- 2.) BUS STOP AREA SHOWN FOR ONE BUS.
- 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
- 4.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

Diagram illustrating the layout of a transit stop, showing a cross-section view of the road and the stop area.

Key Features and Dimensions:

- RAISED ISLAND:** A cross-hatched area separating the bus lanes. Dimensions include a width of 100' (MIN) and a length of 125' TYP. The island has a radius of $R\ 1.5'$ at its ends.
- 8" SOLID YELLOW STRIPE:** A stripe marking the edge of the raised island.
- 50' and 125' TYP.:** Dimensions indicating the length of the island sections.
- DIRECTION OF TRAFFIC:** Indicated by arrows showing traffic flow from left to right.
- 5' (MIN):** A dimension indicating the width of the area between the island and the bus lanes.
- 100' (MIN):** A dimension indicating the length of the bus lane area.
- 5'x8'(MIN), 40'x8' (DES) ADA LANDING PAD:** A rectangular area for wheelchair access.
- 40' STANDARD BUS:** A dimension indicating the length of a standard bus.
- 60' ARTICULATED BUS:** A dimension indicating the length of an articulated bus.
- TWLT:** A dimension indicating the width of the travel lane.



NOTES:

- 1.) INSTALL

- RIGHT TURN BAY EXISTS ON NEAR SIDE OF INTERSECTION AND FAR SIDE BUS STOP CAN NOT BE PROVIDED.
- MID-BLOCK CROSSING NEEDED TO ACCESS A TRANSIT DEMAND GENERATOR.
- LOW VOLUME OF PEDESTRIANS ON SIDEWALK AND LOW VOLUME OF VEHICLES.

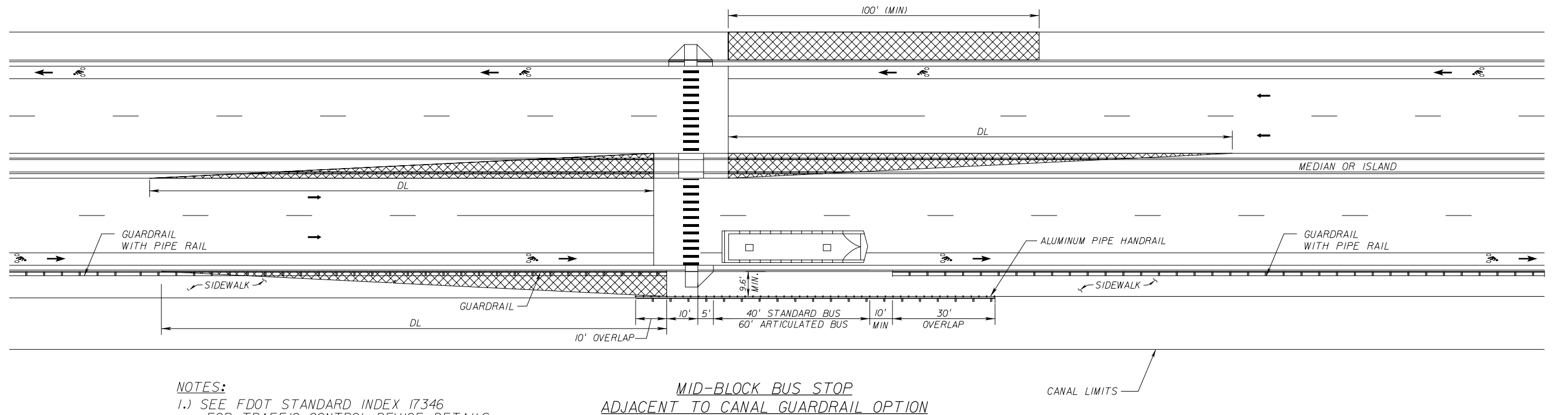
- ARTERIAL DESIGN SPEED ≤ 45 MPH.


MID-BLOCK BUS STOP WITH TWO-WAY-LEFT-TURN-LANE
MEDIAN WITHOUT ON-STREET PARKING

-  *PARKING AREA*
 *CLEAR AREA*
(SEE FIGURE I-24 FOR DETAILS)

- 1.) INSTALLATION OF MEDIAN ISLAND TO BE PROPERLY COORDINATED WITH ADJACENT PROPERTY ACCESS REQUIREMENTS (DRIVEWAYS AND SIDE STREETS).
- 2.) BUS STOP AREA SHOWN FOR ONE BUS.
- 3.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
- 4.) CURB RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITY GUIDELINES MID-BLOCK BUS BAYS/STOPS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		1-29
								233151-1-12-02		



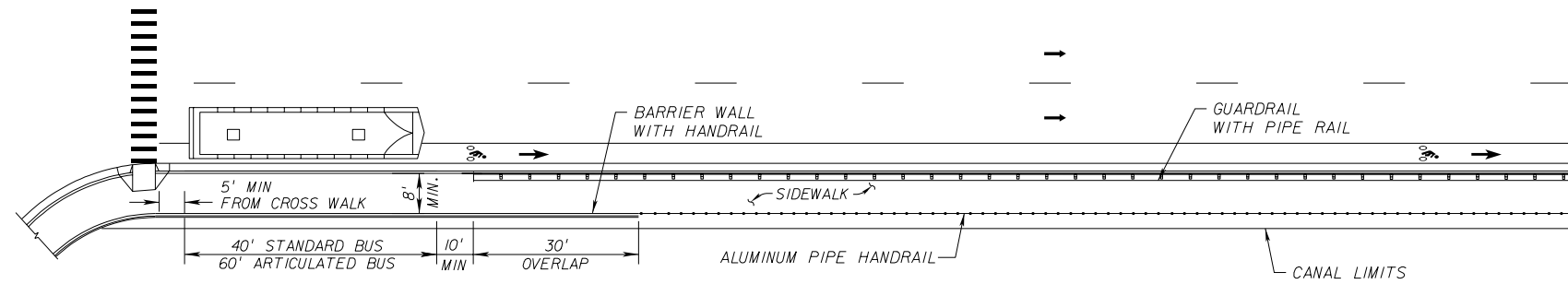
-  CLEAR AREA
(SEE FIGURE 1-24 FOR DETAILS)

R E V I S I O N S					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

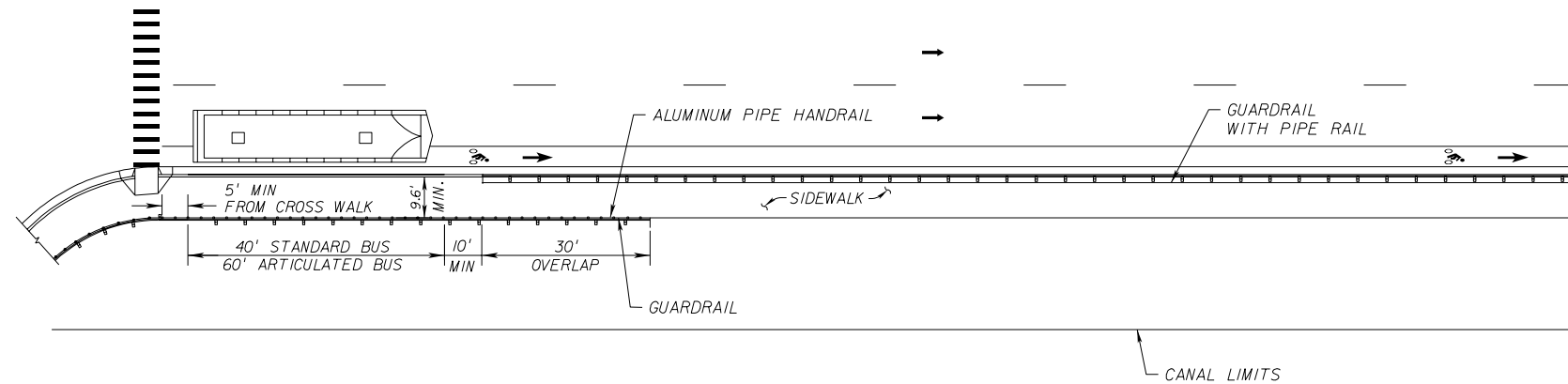
<p align="center">STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION</p>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
		233151-1-12-02

*TRANSIT FACILITIES GUIDELINES
BUS STOP LOCATION
ADJACENT TO CANAL*

FIGURE
1-30



FAR SIDE BUS STOP ADJACENT
TO CANAL BARRIER WALL OPTION



FAR SIDE BUS STOP
ADJACENT TO CANAL GUARDRAIL OPTION

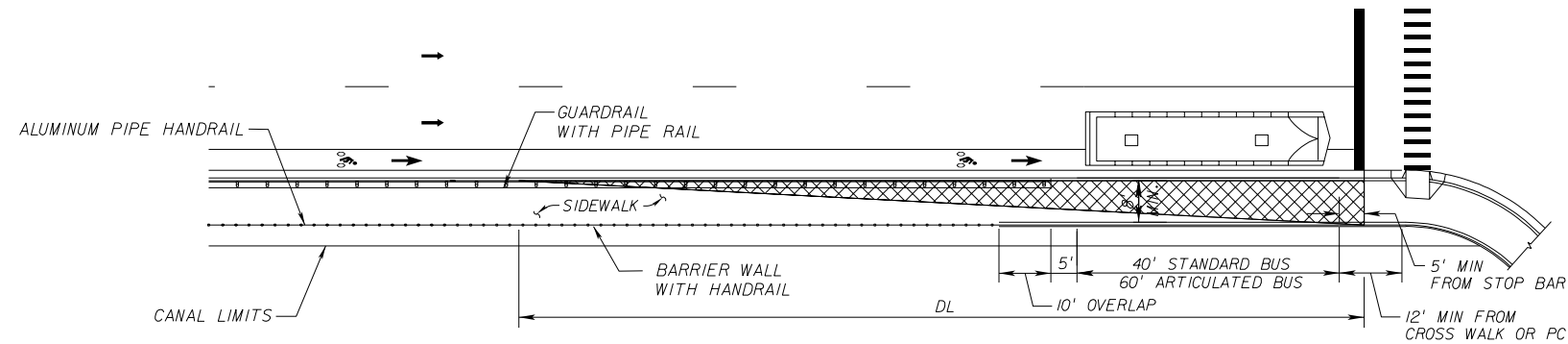
NOTES:

- 1.) SEE FDOT STANDARD INDEX 17346 FOR TRAFFIC CONTROL DEVICE DETAILS.
- 2.) SEE FDOT STANDARD INDEXES FOR DETAILS ON GUARDRAIL AND BARRIER WALL.
- 3.) BUS STOP AREA SHOWN FOR ONE BUS.
- 4.) CURB CUT RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

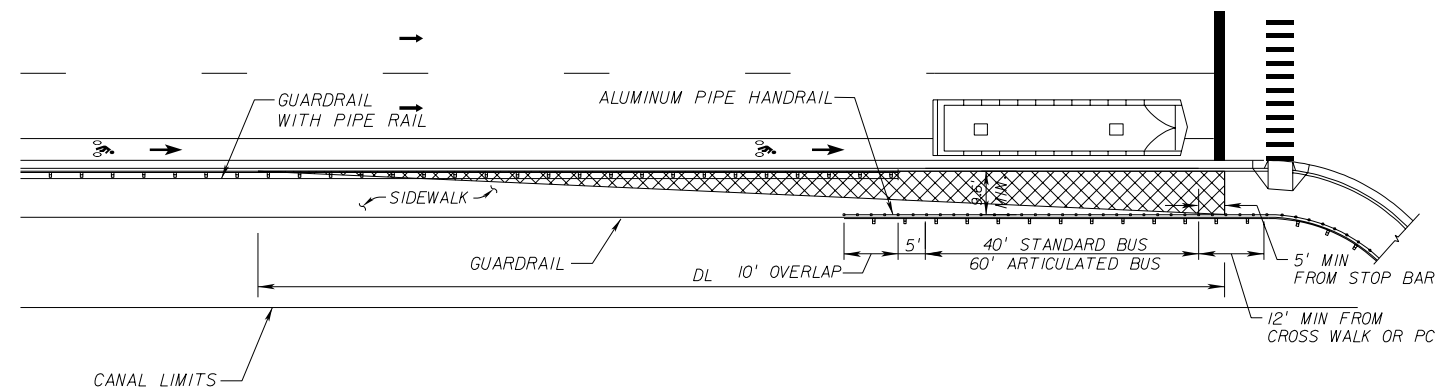
FDOT PREFERRED

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION ADJACENT TO CANAL	FIGURE 1-31
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		


\$DATE\$ \$TIME\$ \$FILE\$



NEAR SIDE BUS STOP ADJACENT
TO CANAL BARRIER WALL OPTION



NEAR SIDE BUS STOP
ADJACENT TO CANAL GUARDRAIL OPTION

 CLEAR AREA
(SEE FIGURE I-24 FOR DETAILS)

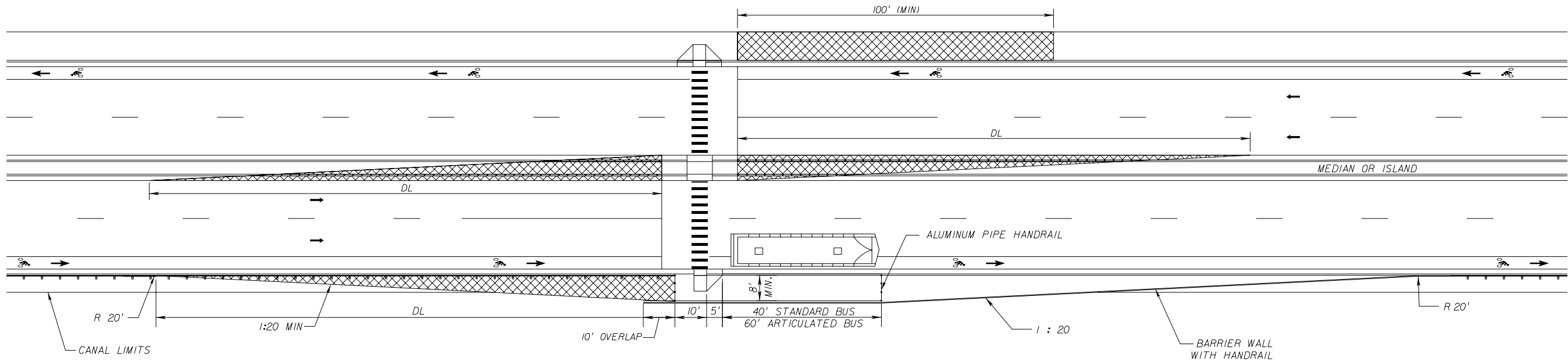
NOTES:

- 1.) SEE FDOT STANDARD INDEX 17346 FOR TRAFFIC CONTROL DEVICE DETAILS.
- 2.) SEE FDOT STANDARD INDEXES FOR DETAILS ON GUARDRAIL AND BARRIER WALL.
- 3.) BUS STOP AREA SHOWN FOR ONE BUS.
- 4.) CURB CUT RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

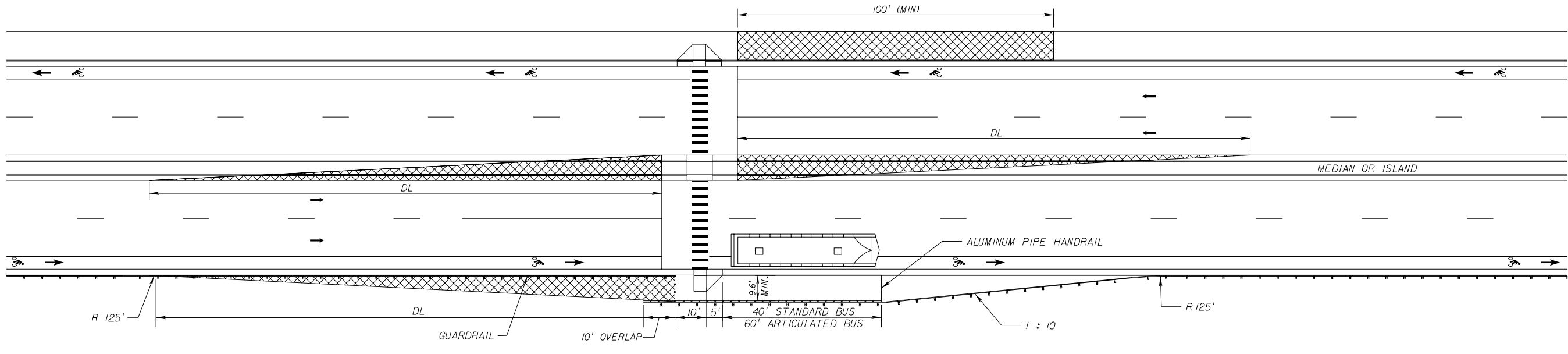
FDOT PREFERRED

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION ADJACENT TO CANAL	FIGURE I-32
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

\$DATE\$ \$TIME\$ \$FILE\$



MID-BLOCK ISOLATED BUS STOP
ADJACENT TO CANAL BARRIER WALL OPTION



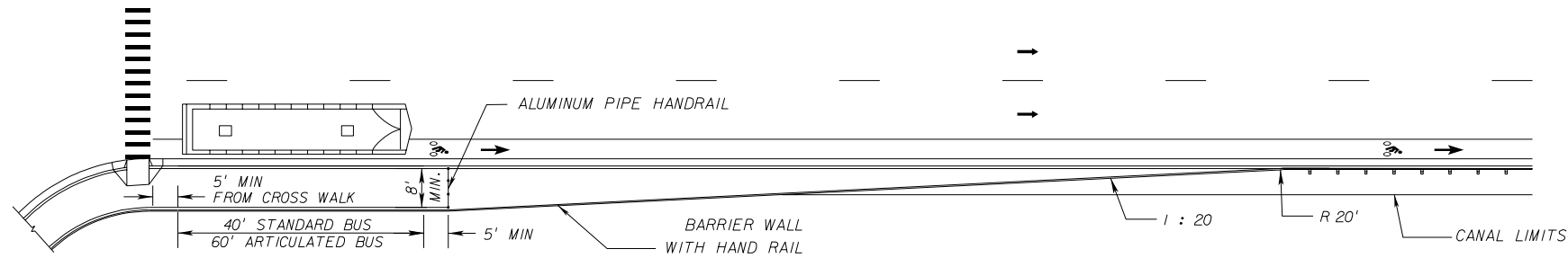
MID-BLOCK ISOLATED BUS STOP
ADJACENT TO CANAL GUARDRAIL OPTION

- NOTES:
- 1.) SEE FDOT STANDARD INDEX 17346 FOR TRAFFIC CONTROL DEVICE DETAILS.
 - 2.) SEE FDOT STANDARD INDEXES FOR DETAILS ON GUARDRAIL AND BARRIER WALL.
 - 3.) BUS STOP AREA SHOWN FOR ONE BUS.
 - 4.) SEE "MID-BLOCK CROSSING" SECTION OF THE GUIDELINES FOR FURTHER DETAILS.
 - 5.) CURB CUT RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

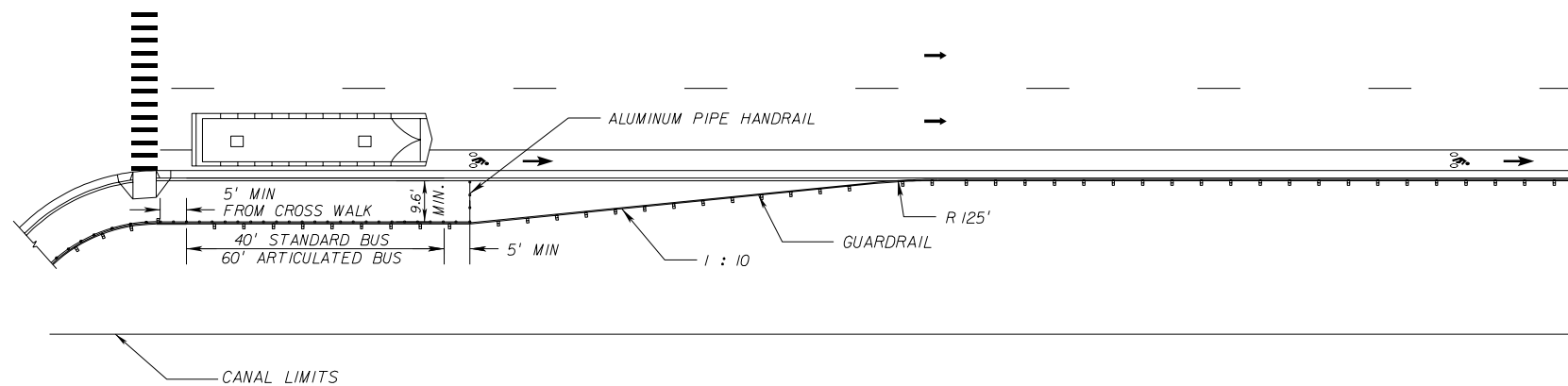
CLEAR AREA
(SEE FIGURE 1-24 FOR DETAILS)

FDOT PREFERRED

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION ADJACENT TO CANAL	FIGURE 1-33
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		



FAR SIDE ISOLATED BUS STOP
ADJACENT TO CANAL BARRIER WALL OPTION



FAR SIDE ISOLATED BUS STOP
ADJACENT TO CANAL GUARDRAIL OPTION

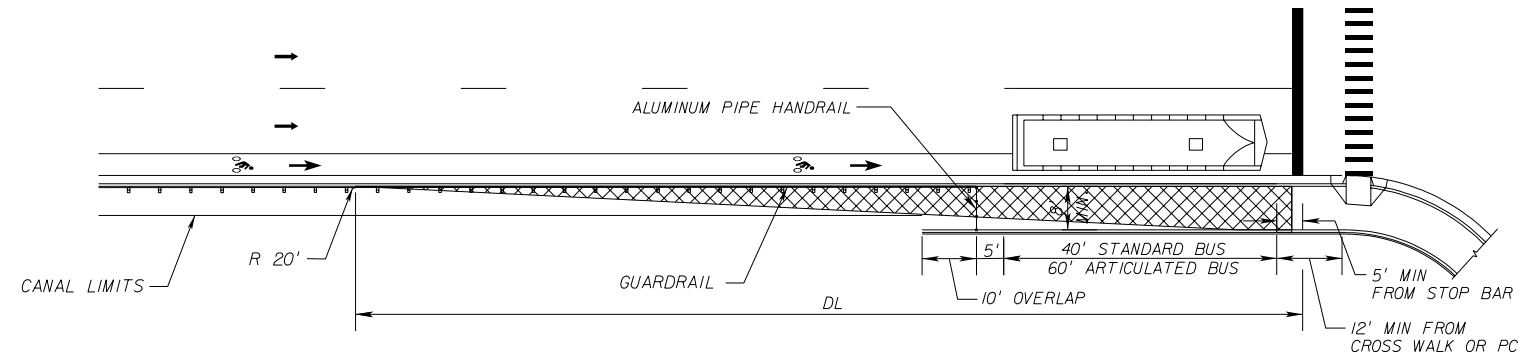
NOTES:

- 1.) SEE FDOT STANDARD INDEX 17346 FOR TRAFFIC CONTROL DEVICE DETAILS.
- 2.) SEE FDOT STANDARD INDEXES FOR DETAILS ON GUARDRAIL AND BARRIER WALL.
- 3.) BUS STOP AREA SHOWN FOR ONE BUS.
- 4.) CURB CUT RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

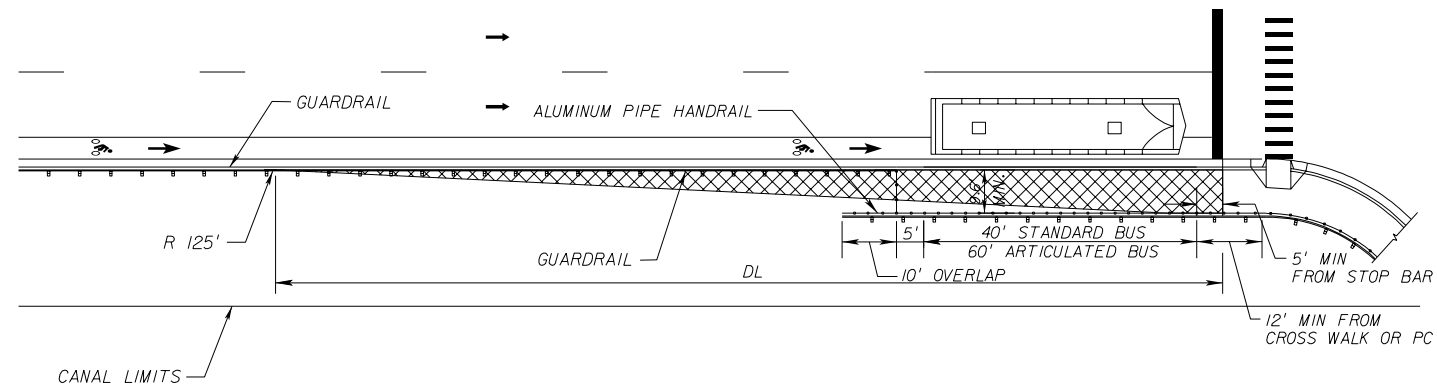
FDOT PREFERRED

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION ADJACENT TO CANAL	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		1-34


\$DATE\$ \$TIME\$ \$FILE\$



NEAR SIDE ISOLATED BUS STOP
ADJACENT TO CANAL BARRIER WALL OPTION



NEAR SIDE ISOLATED BUS STOP
ADJACENT TO CANAL GUARDRAIL OPTION

 CLEAR AREA
(SEE FIGURE 1-24 FOR DETAILS)

NOTES:

- 1.) SEE FDOT STANDARD INDEX 17346 FOR TRAFFIC CONTROL DEVICE DETAILS.
- 2.) SEE FDOT STANDARD INDEXES FOR DETAILS ON GUARDRAIL AND BARRIER WALL.
- 3.) BUS STOP AREA SHOWN FOR ONE BUS.
- 4.) CURB CUT RAMP TYPE IS SHOWN ONLY AS AN ILLUSTRATION.

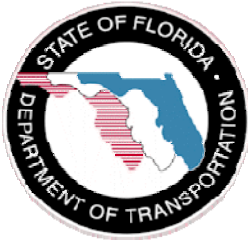
FDOT PREFERRED

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES BUS STOP LOCATION ADJACENT TO CANAL	FIGURE 1-35
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		

\$DATE\$ \$TIME\$ \$FILE\$

APPENDIX II

MULTIMODAL SCOPING FORM TRANSIT CHARACTERISTICS SUMMARY PROCESS



**Florida Department of
Transportation
District 4
Office of Modal Development**

**Multimodal Scoping Form
Transit Characteristic Summaries**

Project Manager _____
FM No. _____
Project Name _____
Date _____

Note: This represents the Multimodal Scoping Form Transit Characteristic Summary Process as of November 2007. Please check with D4 Office of Modal Development for any updates.

Table of Contents

Introduction	1
Process Overview.....	1
Potential Projects.....	1
Review Process	2
Introduction	2
Review Forms.....	2
Agency Contacts.....	2
 Exhibits	
A. Process	
Quarterly Summary of Potential Projects	
Agency Coordination	
Field Survey	
B. Review Forms	
C. Agency Contacts	

Introduction

Process Overview

To be proactive in the achievement of its multi-modal goals, the Department has determined that the development of design plans for reconstruction, rehabilitation and resurfacing (3R) and capacity projects within District 4 should recognize existing transit characteristics and needs within the project limits during the initial development of design plans. The Department has developed a Long Form Transit Characteristics Summary (Long Form Summary) Process for the collection of data required to identify the transit characteristics and needs. It is anticipated that the consultant(s) selected by FDOT to design the planned improvement will prepare the Long Form Summary.

In order to quickly assess transit characteristics and identify any potential concerns or opportunities within a given project corridor, a Multimodal Scoping Form Transit Characteristics Summary (Scoping Form Summary) Process was developed. The Scoping Form process captures those elements of the Long Form necessary to accurately assess the level of effort to be assigned to transit within the project scope. The Scoping Form Summary will be provided to the FDOT Project Manager to assist in a complete recognition of transit issues during the design of planned improvements.

The following handbook includes FDOT and transit agency contact information, outlines the overall transit inventory process for data collection, and provides standardized field inventory sheets which should be completed for each roadway project. The field inventory sheets identify the data necessary to prepare a Scoping Form Summary for programmed 3R and capacity improvement projects.

If you have any questions or comments regarding the District 4 Multimodal Scoping Form Transit Characteristics Summary Process, please direct them to:

District Modal Development Mobility Coordinator
Florida Department of Transportation
3400 West Commercial Boulevard
Fort Lauderdale, FL 33309-3421

Phone (954) 777 – 4490
Fax (954) 677 – 7892

Potential Projects

The proposed system will identify projects from the adopted work plan so that the scoping form can be provided to the project manager in advance of the scoping meeting.

Review Process

Introduction

The process for the development of a Multimodal Scoping Form Transit Characteristics Summary is outlined on three flowcharts:

- ❑ Prepare Quarterly Summary of Potential Projects
- ❑ Agency Coordination
- ❑ Field Survey

Review Forms

The data required to describe the existing conditions and future plans for transit within a project corridor that may affect fixed route transit service within the project limits are identified.

The *Project Summary* form will be completed prior to field review interview. The completed form will be sent to the transit agency contact accompanied by an Agency Contact Form Letter. The *Project Summary* outlines the known information about transit service within the corridor. This form is completed prior to the field inventory with any known stop information.

The *Agency Contact Record* form allows the maintenance of a record of the information gathered during phone interviews with the applicable transit agency and FDOT representatives. An *Agency Contact Record* form should be completed for each person contacted.

The *Transit Stop Field Review* identifies the characteristics at each stop. This information will be used to identify if improvements should be considered. Blank copies of the *Transit Stop Field Review* for each stop in the project corridor will be compiled into a Field Review Packet.

A *Project Corridor Summary Sheet* will be created to summarize the above information for each stop within the project corridor.

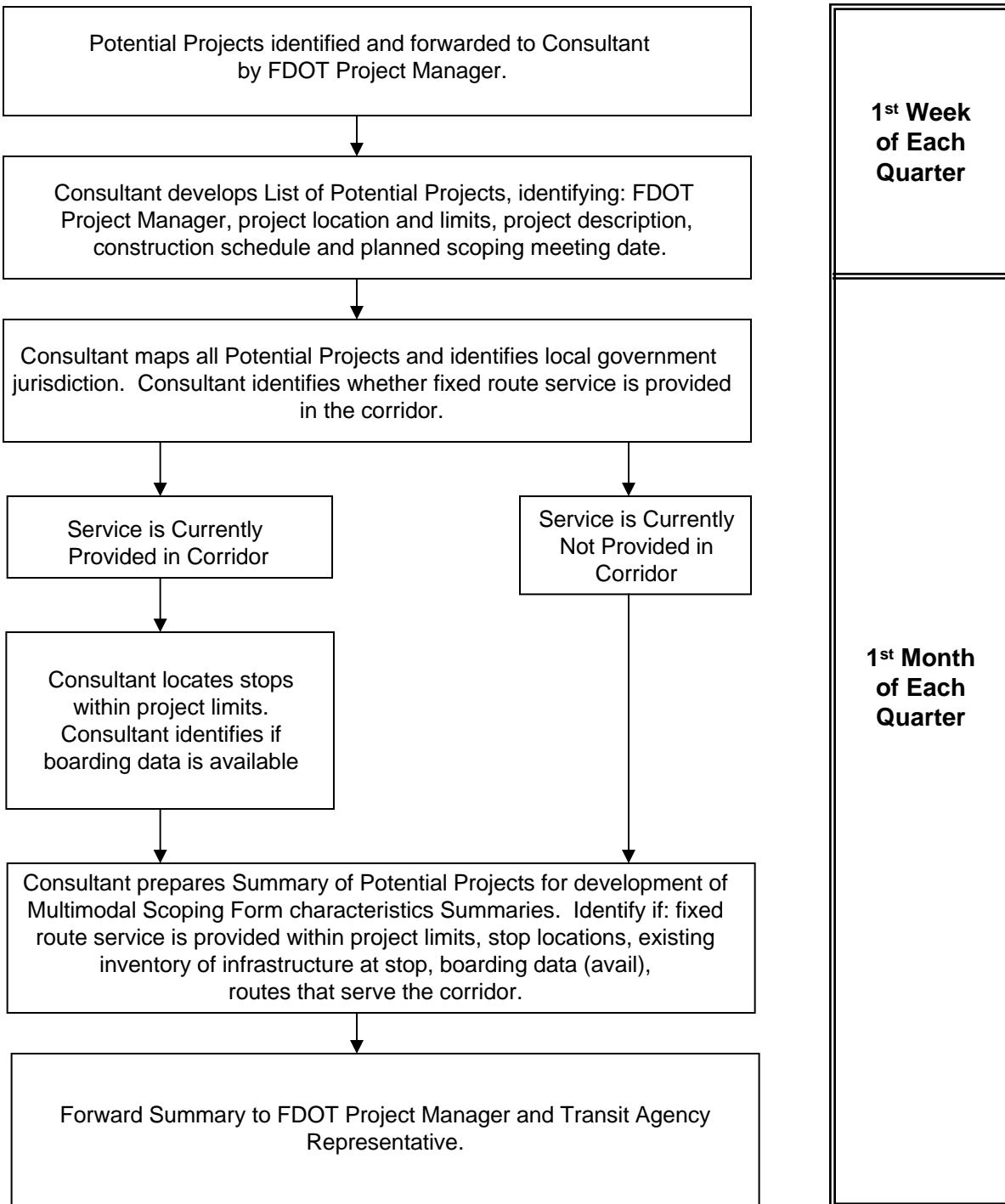
Agency Contacts

The development of the Scoping Form Process includes the recognition of existing conditions within the project limits and plans for changes to existing transit service/physical characteristics. The applicable transit agency and FDOT representatives will be contacted to provide information on planned transit projects and known concerns within the project limits. Contact names for the FDOT representative and each county transit agency are provided.

Exhibit A. Process

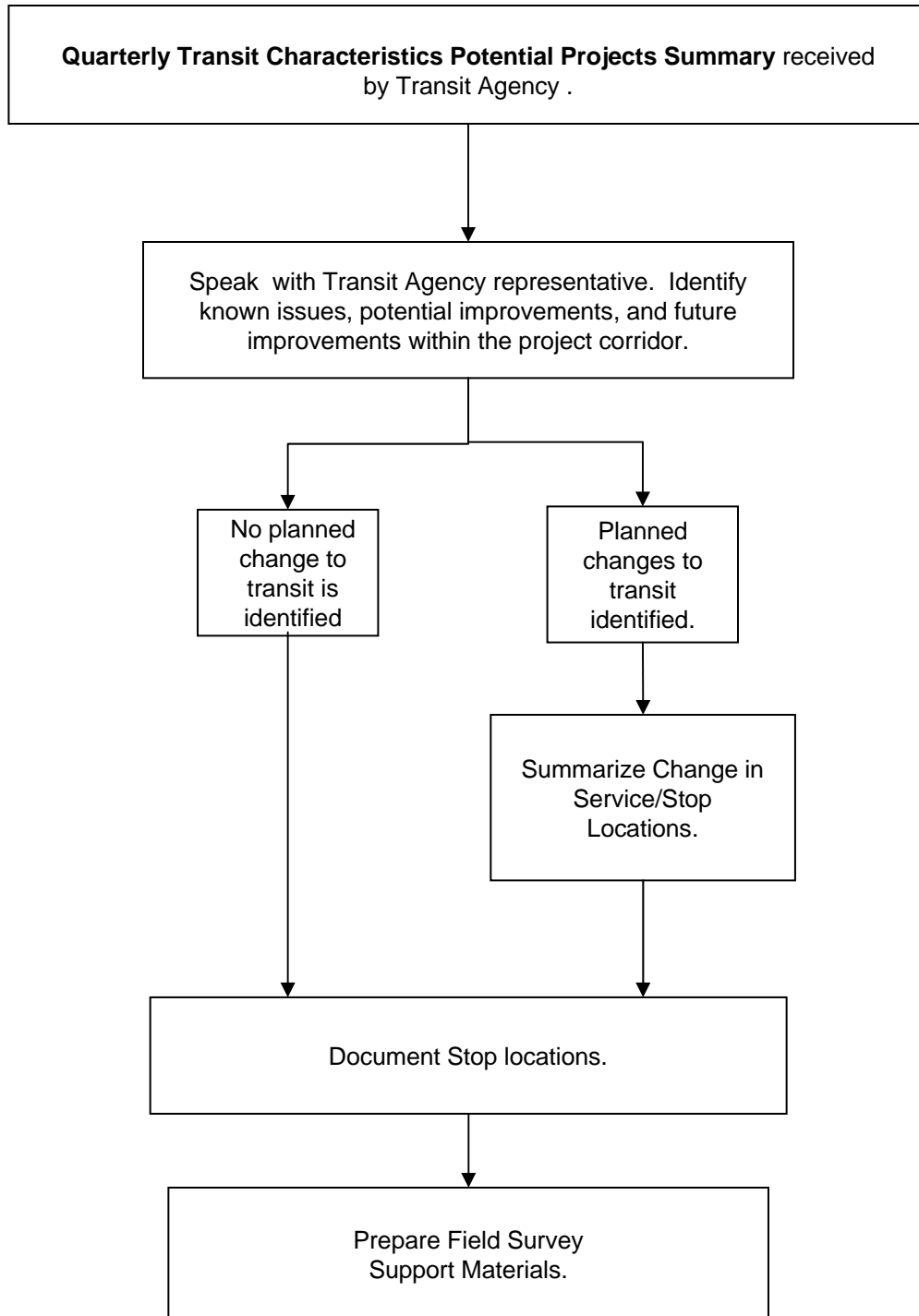
**District 4 Office of Modal Development
Transit Characteristics Summaries
Multimodal Scoping Form**

Prepare Quarterly Summary of Potential Projects



**District 4 Office of Modal Development
Transit Characteristics Summaries
Multimodal Scoping Form**

Agency Coordination



**District 4 Office of Modal Development
Transit Characteristics Summaries
Multimodal Scoping Form**

Field Survey

Prepare Project Base Map

Locate existing stops and known stop data: Stop ID and routes, Boarding data, existing infrastructure and sidewalks.
Locate planned changes to stop locations/stop type.



Perform Multimodal Scoping Form Field Survey of Corridor

Stop Location:	Near Side Far Side Mid-Block - < 600 ft > 600 ft	Paved Pad at Stop:	Y/N
		Sidewalk:	Y/N
Bus Bay:	Entry Taper Stop Area Exit Taper N/A	Paved Access between Curb and Stop:	Y/N



Compile Data and Create Project Summary Sheet

Summary sheet will include schematic map of project corridor and summarize existing data, field inventory data and comments from FDOT and Transit Agency representatives.

Exhibit B. Review Forms

Project #	_____	Description	_____
Facility	_____	Length (mi)	_____
Limits:	_____	to	_____

[illegible]

Florida Department of Transportation District 4
Multimodal Scoping Form Characteristics Summary
Transit Stop Field Review

Corridor Attributes - General Conditions of the Overall Corridor

Posted Speed			
# of through Lanes (both directions)			
Median Type	Restrictive	Non-Restrictive	None
Left Turn Lanes	No	Yes	
Paved Shoulder	No	Yes	
Bike Lane	No	Yes - Striped	No - Not Striped
Outside Lane Width	Narrow	Typical	Wide Specify _____
Pavement Condition	Undesirable	Typical	Desirable
Sidewalk	No	Yes	
Sidewalk/Roadway Separation	Adjacent	Typical	Wide
Sidewalk/Roadway Protective Barrier	No	Yes	
Obstacle to bus stops	No	Yes	



Project No.: _____ **County:** _____
Facility Name: _____
From: _____ **To:** _____

PURPOSE

This Multimodal Scoping Form is intended to supply project corridor related information, in the form of guidance and recommendations, to Design Project managers early in the Design process, so that project scopes can incorporate multimodal issues.

Successful integration of this information into the project scope will help to:

- Minimize the number of multimodal deficiencies identified at the Constructability Design Review Phase;
- Create transportation facilities that address community needs and expectations; and
- Complete a network of sidewalks and bicycle lanes on all state roadways by reducing existing gaps.

The Form does not replace design interaction with local agencies, as needed, throughout the design process.

The Form may also be used by local governments and transit agencies to consider coordination with the FDOT project manager. Such coordination early in the development of the project leads to more successful cooperation and partnering opportunities.

OFFICE OF MODAL DEVELOPMENT

Contact: Jeff Weidner 954-777-4670

1. Comment
2. Comment
3. Comment
4. Comment

LOCAL TRANSIT AGENCY

	Yes	No	
Is there transit service along the project corridor?	<input type="checkbox"/>	<input type="checkbox"/>	<i>If yes, see transit stop inventory</i>

Transit Agency:

Contact:

1. What projects, improvements, or services does your agency have planned or programmed along the project corridor?
2. What recent changes to transit service/infrastructure have occurred in the project corridor?
3. What drainage or safety issues exist that affect transit operations in the project corridor?
4. What special populations are served by transit within the project corridor? How does this affect FDOT's project?
5. What additional requests does your agency have for transit facilities within the project limits?
6. What additional information does your agency have that should be considered by FDOT?
7. What funding does your agency have available to combine with this project to accommodate special populations or fund additional requests?

BIKE / PEDESTRIAN COORDINATOR

County:

Contact:

1. What Bicycle/Greenway plans are applicable to the corridor?



2. What safety issues or facility needs are you aware of in the project corridor?
3. What additional information does your agency have that should be considered by FDOT?

COUNTY SCHOOL BOARD

County:

Contact:

1. What hazardous walking conditions has your agency identified within the project limits? Please indicate if there is no assessment or if it is outdated.

LOCAL GOVERNMENT

Local Gov't:

Contact:

1. What development/redevelopment plans are you aware of that may affect the project corridor?
2. What goals, objectives, and policies in the comprehensive plan directly relate to the project corridor?
3. What projects are committed to be funded within the Capital Improvements Program that may pertain to the project corridor?
4. Other than the County transit service, what locally or privately operated shuttle or transit services exist or are planned within the project corridor?
5. What are the accessibility needs of the project corridor in terms of network connectivity, access management, and conformance with the Americans With Disabilities Act (ADA)?

RAILROAD

Yes No

- | | | | |
|---|--------------------------|--------------------------|---|
| Is there a railroad within 500 ft.? | <input type="checkbox"/> | <input type="checkbox"/> | If yes, answer next 2 questions |
| Roadway project crosses railroad track(s)? | <input type="checkbox"/> | <input type="checkbox"/> | If yes, crossing must meet standards of traffic control devices and FDOT must maintain the crossing surface during construction |
| Will a flagger be needed during construction? | <input type="checkbox"/> | <input type="checkbox"/> | If yes, contact the Office of Modal Development (OMD) Rail Coordinator for assistance |

District Railroad Coordinator

Contact: Hector Hartman 954-777-4401

1. Are there any concerns at this railroad crossing?
2. What improvements are needed at this time at this railroad crossing?

AVIATION

Yes No

- | | | | |
|---|--------------------------|--------------------------|---|
| Any airport runway within 20,000 ft.? | <input type="checkbox"/> | <input type="checkbox"/> | If yes, reference the PPM Table 2.10.5 RE: FAA Notification Requirements for further criteria |
| Any equipment or construction more than 200 feet in height? (to be completed by FDOT Design PM) | <input type="checkbox"/> | <input type="checkbox"/> | If yes, must notify the FAA, submit FAA Form 7460-1 to the Southwest Regional Office |

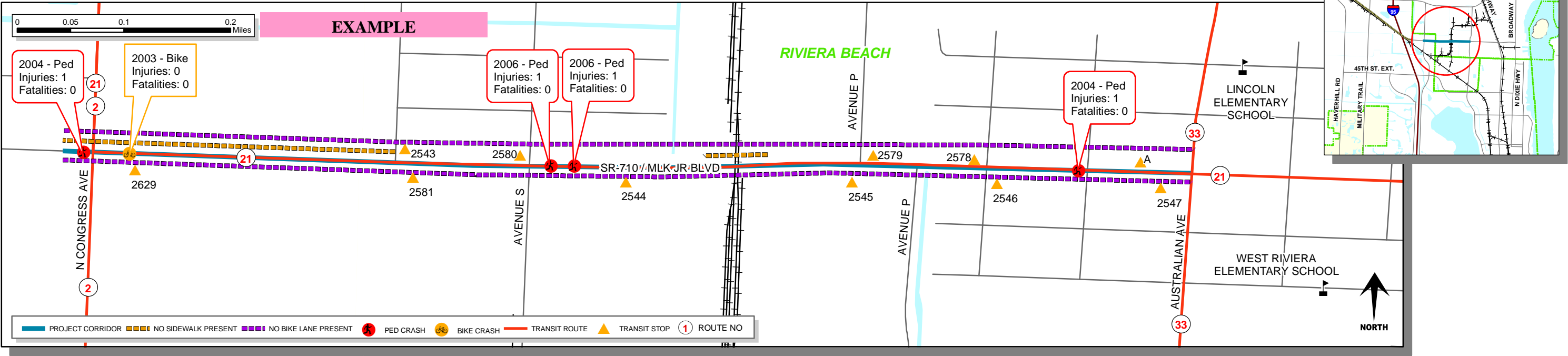
FDOT District 4, Aviation Consultant

Contact: Dan Afghani 954-777-4404

1. Are there any aviation concerns within the project limits?
2. Does your agency have any additional information that should be considered by FDOT?



Project No.: _____ County: _____
 Facility Name: _____
 From: _____ To: _____

[illegible]

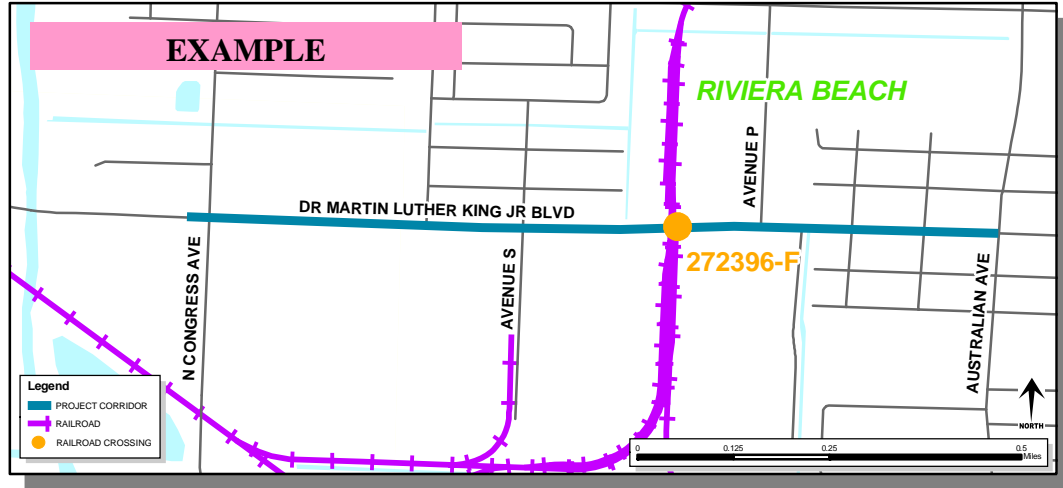
Monday – Friday Peak Holidays	B=Bench, S=Shelter, L=Light, T=Trash	Y=Yes; N=No
2. Mid-Block – Distance from nearest intersection (ft.)		
3. A small survey of peak period boardings were expanded to estimate average daily boardings. (PALM TRAN ONLY)		
4. Paved stop		
5. Pavement between stop and curb		
6. Deficient infrastructure identified only for those stops meeting the Quality of Service (QOS) standards developed by FDOT under the 2003 Transit Infrastructure Inventory		
7. Shelter is recommended at stops with an average boarding of 25 passengers or more (per 2000 Highway Capacity Manual)		
8. ADA Compliant – Stop equipped with a minimum 8' by 5' wide sidewalk/landing pad		



Florida Department of Transportation, District 4
Multimodal Scoping Form
Railroad Crossing Summary Sheet



Project No.: _____ County: _____
Facility Name: _____
From: _____ To: _____



CROSSING INVENTORY INFORMATION

Crossing Number	
Railroad	
Railroad Milepost	
Total Trains	
Typical Speed Range Over Crossing	Min: XXXX Max: XXX
Maximum Time Table Speed (mph)	
No. of Tracks	
Signs	Crossbucks Advanced Warning Pavement Markings
Train Activated Devices	Gate Mast Mounted FL Cantilevered FL Highway Traffic Signals
Track equipped with train signals?	

Crash Data Summary

Crossing Number	
Date	From To
Total number of incidents/accidents reported	
Position	Drove around or through gate Stopped and then proceeded Did not stop (Moving over crossing) Stopped on crossing Other (Specify)
Severity	Fatalities Injuries Property Damage Only

Safety Index Number

Note: Ranges from 1 to 99 – a higher safety number indicates a safer crossing

Exhibit C. Agency Contacts

Florida Department of Transportation District 4 Scoping Form Transit Characteristics Summary

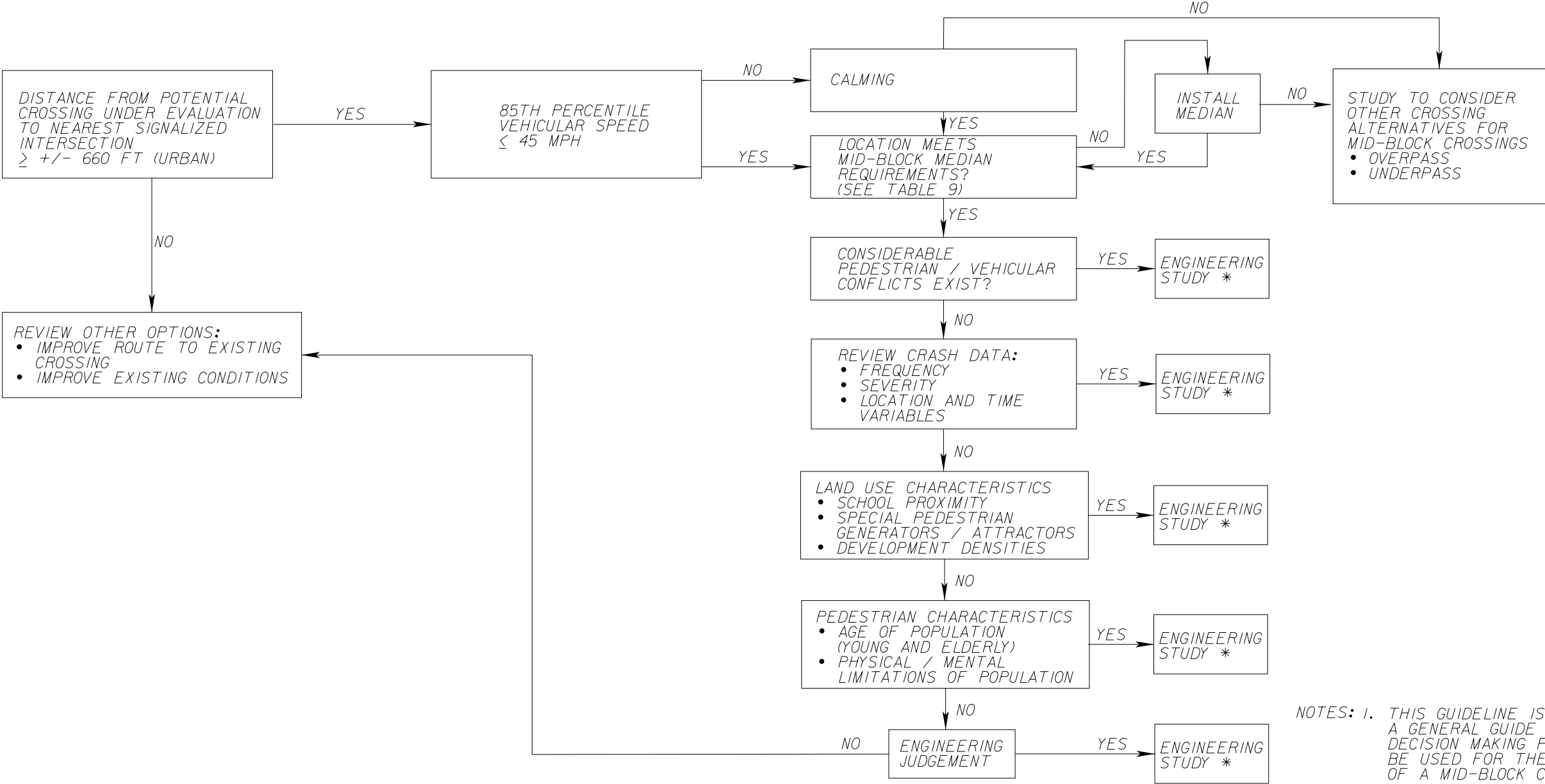
Agency Contacts

Agency	Primary Contact	Secondary Contact	Address
FDOT District 4 Office of Modal Development	Jeff Weidner, District Mobility Manager 954-777-2288 jeff.weidner@dot.state.fl.us		3400 West Commercial Blvd Ft Lauderdale, FL 33309-3421
FDOT Railroad	Hector Hartmann	Hector.Hartmann@dot.state.fl.us	954-777-4401
FDOT Aviation	Becky Mainardi Aviation and Rail Section Leader	Rebecca.Mainardi@dot.state.fl.us	954-777-4404 M-T 3:30 to 8:30 pm
Broward County Transit (BCT)	Arethia Douglas Project Manager II 954-357-8375 adouglas@broward.org	David Daniels 954 357-8351 dadaniels@broward.org	3201 West Copans Rd Pompano Beach, FL 33069
Palm Beach County Transit (Palm Tran)	Jeannie Taylor 561-841-4221 jdtaylor@co.palm-beach.fl.us	Gerald Gawaldo, Planner 561 841-4246 ggawaldo@co.palm-beach.fl.us	3201 Electronics Way West Palm Beach, FL 33407
Martin County Transit - Council on Aging	Roger Eckert, Director of Transportation 772-320-3040 reckert@coamc.org	Jerry Bryan Senior Transportation Planner 772-320-3047	1835 S.E. Airport Rd Stuart, FL 34966 1071 East 10th Street P.O. Box 3029 Stuart, FL 34965
St. Lucie Community Transit	Marianne Arbore 772-345-8228		1505 Orange Ave Ft. Pierce, FL 34950
Indian River Transit	Phil Matson 772-226-1455 Indian River County Planning Department	Karen Wood 772-569-0903 karen@irccoa.org	692 14th Street Vero Beach, FL 32960

APPENDIX III

MID-BLOCK CROSSING PROCESS

MID-BLOCK PEDESTRIAN CROSSING
KEY IMPLEMENTATION CONSIDERATIONS
(SIGNALIZED)



NOTES: 1. THIS GUIDELINE IS PROVIDED AS A GENERAL GUIDE FOR THE DECISION MAKING PROCESS TO BE USED FOR THE CONSIDERATION OF A MID-BLOCK CROSSING.

2. THIS GUIDELINE HAS BEEN DEVELOPED FOR THE EVALUATION OF MID-BLOCK CROSSINGS THAT ARE PROVIDED FOR TRANSIT RELATED PURPOSES AND NOT SPECIFICALLY FOR SCHOOL AND OTHER SPECIAL LAND USES.

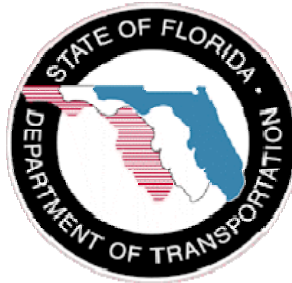
* SUFFICIENT INDICATORS ARE PRESENT TO WARRANT A COMPREHENSIVE ENGINEERING STUDY TO DETERMINE THE NEED FOR A MID-BLOCK CROSSING.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			TRANSIT FACILITIES GUIDELINES MID-BLOCK PEDESTRIAN CROSSINGS KEY IMPLEMENTATION CONSIDERATIONS	FIGURE
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION					
						ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								233151-1-12-02		3-1

\$DATE\$ \$TIME\$ \$FILE\$

MID-BLOCK PEDESTRIAN CROSSING PROCESS

**Florida Department of Transportation
District IV**



October 2007

Table of Contents

<i>INTRODUCTION.....</i>	<i>1</i>
<i>PURPOSE OF MID-BLOCK PEDESTRIAN CROSSING PROCESS</i>	<i>1</i>
<i>PURPOSE OF MID-BLOCK PEDESTRIAN CROSSINGS</i>	<i>1</i>
<i>CONTENTS</i>	<i>3</i>
<i>KEY STUDY VARIABLES</i>	<i>5</i>

List of Exhibits

Exhibit A	Sample Table of Contents
Exhibit B	Mid-block Crossing Data Collection and Analysis Variables

INTRODUCTION

Research conducted on the effectiveness of mid-block pedestrian crossings has produced conflicting conclusions and varied recommendations. The range of recommendations can be attributed to the complexity of human behavior as well as the large number of variables that come into play at vehicle-pedestrian conflict locations. Within the United States and several foreign countries, general guidelines for mid-block crossing conceptual designs have been developed, however, most guidelines only apply to lower speed (operating speeds lower than 40 MPH) facilities. The US Manual on Uniform Traffic Control Devices (MUTCD) provides warrants for installing traffic signals at mid-block crossings but does not address non-signalized locations. The minimum MUTCD thresholds for warranting the installation of mid-block crossing traffic signals are relatively high and there are no formal procedures for warranting mid-block crossings other than the performance of an engineering study and the application of engineering judgment. The lack of specific warrant thresholds requires that a comprehensive engineering study be performed prior to installation and that monitoring occur after installation to insure the continued safety of pedestrians and motorists.

The results of an engineering study performed to determine if a mid-block crossing should be installed should clearly identify that the installation of the mid-block pedestrian crossing will improve the overall safety and/or operation of pedestrian and vehicular traffic. The study should evaluate existing conditions and the intended function of the site under anticipated future travel conditions. The most essential tool for use in determining mid-block crosswalk placement continues to be engineering judgment. While no set of guidelines or warrants can cover every situation or guarantee improved safety or operations, the primary goal of a set of guidelines is to create *uniformity* in order to provide motorists and pedestrians a consistent and predictable travel environment.

PURPOSE OF MID-BLOCK PEDESTRIAN CROSSING PROCESS

The general objective of the development of a Mid-block Pedestrian Crossing Process is to provide a comprehensive site-assessment process for performing a mid-block pedestrian crossing study within District 4. This document is intended to provide guidance to engineers during the design stage in determining when mid-block pedestrian crossings are appropriate.

Mid-block crossings on roadways consisting of more than a 3 lane cross section must be signalized and approved by FDOT Traffic Operations.

PURPOSE OF MID-BLOCK PEDESTRIAN CROSSINGS

The primary purpose of a mid-block pedestrian crossing is to provide safe and effective pedestrian crossings at a non-intersection location. Mid-block pedestrian crossings should only be installed under the following circumstances:

- ❑ An alternate intersection location is not available;
- ❑ There are a significant number of pedestrian-vehicle conflicts;
- ❑ Operating vehicle speeds are commonly below 45 MPH; and
- ❑ There are adequate sight distances and pedestrian refuge areas.

There are three basic elements that must be clearly understood by the designer when considering the installation of mid-block crossings:

- 1) Once installed, regardless of the intended use or user, a mid-block pedestrian crossing will be utilized by multiple pedestrian types for multiple trip purposes. Even if the intent of the crossing is to serve transit patrons, the mere fact that a formal crossing has been installed will result in other pedestrians utilizing the crossing simply because it is available and because it may instill a sense of additional safety.
- 2) Pedestrian types that require additional safety features in order to safely cross a roadway will seek out formal mid-block crossings. Pedestrians at the highest risk will tend to utilize formal crossings more than able-bodied pedestrians simply because that is their best or only option to cross the road.
- 3) Pedestrian and driver behavior will likely change over time during the life of the crossing based on three basic phases: Phase 1 - Initial Introduction, Phase 2 – Novelty, Phase 3 – Complacency.

Phase 1 - Initial Introduction: As part of the first phase, a brand new element has been introduced into the roadway setting. During this phase, most drivers and pedestrians may encounter crossing events for the first time. Consequently, crashes and conflicts tend to be high. This phase can last several months to a couple of years depending on frequency and type of use.

Phase 2 - Novelty: As part of the second phase, the element is new but users are aware of its presence. Drivers and pedestrians have experienced the new crossing several times and are aware of its existence since it is a new but familiar element. During this phase, crashes and conflicts tend to reduce compared to the previous phase. This phase can last several months to several years depending on frequency and type of use.

Phase 3 - Complacency: As part of the third phase, the element is very familiar. Drivers and pedestrians have experienced the crossing many times and begin to not see the details of the crossing and take less safety precautions. Other newer elements begin to dominate the roadway environment. During this phase, crashes and conflicts tend to increase compared to the previous phase. This phase can last many years.

CONTENTS

The Mid-block Pedestrian Crossing Process includes a Sample Table of Contents for a Mid-block Pedestrian Crossing Engineering Study (**Exhibit A**) and a table of Mid-block Crossing Data Collection and Analysis Variables to be considered when performing a Mid-block Pedestrian Crossing Study (**Exhibit B**). The Table of Contents is intended to serve as an outline for the various technical elements of the study. Each Mid-block Pedestrian Crossing Engineering Study should include the nine major sections identified in the Sample Table of Contents and all relevant subsections. The Table of Data Collection and Analysis Variables is intended to serve as a listing of the type of data that should be obtained in the field and analyzed for supporting the recommendation to install (or not install) a mid-block pedestrian crossing.

The Table of Data Collection and Analysis Variables identify twenty-five different sub-elements that should be considered, grouped by type: pedestrian, vehicular, transit and site related. The Table includes a reference to the specific methodology for performing the data collection task as well as a description of the purpose of each task. The twenty-five sub-elements have been prioritized based on when each should ideally be considered for use in a study. The Table of Contents and Table of Data Collection and Analysis Variables are not all inclusive; each engineer should determine if additional elements should be evaluated based on specific site and user characteristics.

Not every Mid-block Pedestrian Crossing Study will include all the detailed types of studies listed in the Table of Data Collection and Analysis Variables. The level of data collection and analysis required at a particular site should be determined based on currently available data and sources, site documented history, and on engineering judgment by the designer in consultation with the Department. It is recommended that an initial field review be performed to note the major characteristics of a particular site prior to determining the level and detail of the study required. There are three levels of detail that can be implemented for collecting the relevant data:

Level 1: This effort relies primarily on existing data sources that are confirmed to be reliable.

Level 2: This effort relies on the collection of a limited amount of field data focusing primarily on the most basic types of field studies and on peak travel time periods. Visual windshield type surveys would be appropriate for this level of effort.

Level 3: This effort relies on the collection of all relevant data in the field considering larger samples over a longer period of time. More detailed sampling and questionnaire type surveys are appropriate for this level of effort.

The designer, in consultation with FDOT staff from multiple disciplines, should establish the required level for each of the data collection sub-elements. Some of the more critical variables that should be taken into consideration when developing a Scope of Study and determining the level of effort required are:

- ❑ Vehicular operating/posted speeds and roadway design speed: Generally the lower the vehicle speeds, the easier it is to justify a mid-block crossing.
- ❑ Area type (CBD, urban, rural): Generally the more urbanized, compact and densely developed an area, the easier it is to justify a mid-block crossing.
- ❑ Gap availability should also be considered for one-way and two-way gaps.
- ❑ Group size should be taken into consideration.
- ❑ Roadway functional classification and access management classification: Generally the lower the functional classification and the higher the access management classification, the easier it is to justify a mid-block crossing.
- ❑ Overall pedestrian activity (proposed site crossing volumes and other pedestrian crossing volumes along corridor): Generally the greater the amount of pedestrian crossing activity along a corridor or in an area, the easier it is to justify a mid-block crossing.
- ❑ Overall transit activity (stop density and usage along corridor): Generally the greater the amount of transit use (boardings and alightings) and overall transit activity (density of stops, number of routes) along a corridor or in an area, the easier it is to justify a mid-block crossing.
- ❑ Vehicle volumes and mix: Generally the lower the approaching vehicle volumes and the lower the number of approaching heavy vehicles, the easier it is to justify a mid-block crossing.
- ❑ Pedestrian types (potential land use indicators): Generally the greater the number of young, old and/or disabled pedestrians, the easier it is to justify a formal mid-block crossing.
- ❑ Physical characteristics of site (supportive of pedestrians): Generally the greater the number of physical characteristics that support pedestrian travel along a corridor or in an area, the easier it is to justify a mid-block crossing.

When conducting a Mid-block Pedestrian Crossing Study, every effort should be made to obtain real/actual data in the field. If current crossing information is not available for a site, a surrogate/similar site (along the corridor or at a similar facility) should be considered for obtaining field data. The surrogate site should have as many common variables as the study site. More than one surrogate site can be selected to obtain the necessary information. In addition, it is always recommended that an “after installation “ study be performed at the affected crossing site in order to determine the actual operating and safety performance of the mid-block crossing.

KEY STUDY VARIABLES

Current research in mid-block pedestrian crossings indicates that there are certain variables that are critical to the overall successful performance of a mid-block crossing site. The variables are listed below in order of importance:

- 1) Low approach vehicle operating speeds: Locations with low, and consistent approach vehicle speeds generally perform best. Roadways with operating and design speeds less than or equal to 40 MPH are best suited for pedestrian crossings.
- 2) Clear sight triangles/visibility: Locations that provide for an unobstructed, lighted view of all pedestrian waiting and crossing areas perform best. Roadways with clear sight triangles that meet or exceed the 85th percentile vehicle operating speeds tend to perform best.
- 3) Median or median refuge island: Locations that provide a useable (8 feet minimum width) median or median refuge island for separating opposing vehicle flows and providing for adequate pedestrian refuge perform best. The use of landscaping in the median that allows adequate visibility/ sight distances (low shrubs and high canopy trees) is recommended where appropriate. Curbing should be a non-mountable (Type D or F) design.
- 4) Pedestrian activated devices: The use of pedestrian activated warning (non-signalized locations) or traffic control (signalized locations) devices provides the most effective type of notice to motorists. Dual/paired and overhead devices that provide advance warning also perform well. Mid-block activated devices should be setup with a hot (nearly immediate) response.
- 5) Minimum crossing distance/ shortest path: Locations that have the least amount of crossing distance (least amount of pedestrian exposure or least number and width of traffic lanes) perform best. The use of curb extensions should be utilized in parking areas.
- 6) Pedestrian friendly area and facility type: Locations that are one of many crossing sites located along a pedestrian friendly designed roadway facility perform best.

The data collection, analysis, and recommendation sections of any Mid-block Crossing Study must specifically address these six items.

Exhibit A: SAMPLE TABLE OF CONTENTS
MID-BLOCK PEDESTRIAN CROSSING STUDY

A. EXECUTIVE SUMMARY.....	
B. INTRODUCTION.....	
1. <u>Project Description</u>	
2. <u>Purpose of Study</u>	
3. <u>Report Contents</u>	
C. HISTORICAL CONDITIONS.....	
1. <u>Historical Databases</u>	
A. Traffic/Travel.....	
B. Crashes.....	
C. Reports/Studies/Plans.....	
2. <u>Historical Development/Land Uses</u>	
D. EXISTING CONDITIONS.....	
1. <u>Data Collection</u>	
A. Existing Reports, Studies, Plans.....	
B. Existing Databases.....	
C. Existing Posted Speed Limits.....	
D. Field Data and Surveys.....	
E. Pedestrians.....	
1. Pedestrian Volume Counts	
Directional	
Group	
Individual	
2. Pedestrian Mix / Type Counts	
Age	
Physical	
Ability	
3. Pedestrian Origin - Destination Surveys	
4. Pedestrian Crossing Speed Counts	
Walking Speeds	
Start-up Times	
5. Pedestrian Conflict Study	
Pedestrian-Vehicle Conflicts	

6. Observed Violation Study
 - Pedestrian Compliers
 - Non-compliers
7. Pedestrian Delay / Gap Count
8. Pedestrian Crossing Behavior Study
 - Confusion / Hesitation
 - Inattention
 - Stopping
 - Change in Direction
 - Negotiating curb
 - Running
 - Other
9. Pedestrian Attitudinal Surveys

F. Vehicles.....

1. Volume Counts
 - Motor
 - Bicycle
2. Classification Counts
3. Speed Study Counts
4. Origin – Destination Surveys
5. Conflict Study
6. Violation Study
7. Delay / Queuing Counts

G. Transit Stop.....

1. Bus Volume Counts
2. Bus Mix / Type Counts
3. Bus Frequency / Dwell Time Counts
4. Bus Passenger Counts
5. Bus Passenger Street Crossing Counts
6. Bus Passenger Attitudinal Surveys

H. Physical Conditions (Condition Diagram).....

1. Pedestrian and Bicycle Features
 - Physical Elements
 - Geometry
 - Traffic Control Devices
 - Street Furniture
 - Pedestrian / Bicycle Barriers
2. Roadway Vehicular Features
 - Physical Elements
 - Channelization
 - Geometry
 - Sight Distances

- Traffic Control Devices
- Lighting
- Utilities
- Landscaping
- Access (Driveways and Side Streets)
- Pavement Type and Condition
- Bridges / Culverts
- 3. Transit Features
 - Physical Elements
 - Geometry
 - Traffic Control Devices
 - Shelter and Amenities
 - Routes and Scheduled Service
- 4. At-Grade Railroad Crossings
- 5. Canals / Waterways / Guardrails
- 6. On-Street Parking
 - Type / Configuration
 - Inventory

I. Area/Site Elements.....

- 1. Area Type
- 2. Terrain
- 3. Adjacent Land Uses and Density
- 4. Special Uses
 - Schools
 - Hospitals
 - Medical Centers
 - Nursing Homes
 - Libraries
 - Playgrounds / Parks
- 5. Familiar / Unfamiliar Users
- 6. Identification of Major Generators / Attractors
- 7. Corridor Access Management Classification
- 8. Proximity to Traffic Signals
- 9. Proximity to At-Grade Railroad Crossings
- 10. Proximity to Canals / Waterways
- 11. On-Street Parking Activity
 - Occupancy
 - Turnover

J. Other Relevant Data.....

2.	<u>Data Summary and Analysis</u>	
A.	General Compilation and Summary	
B.	Physical Conditions Analysis	
C.	QA/QC Procedures for Field and Crash Data	
D.	Factors, Ratios, Percentages and Trends	
E.	Facilities Design Criteria/Standards	
F.	Warrant Values/Analysis	
G.	Operational/LOS Analysis	
	1. Pedestrian and Bicycle Elements	
	2. Motor Vehicles Elements	
	3. Transit Elements	
H.	Crash/Safety Analysis	
	1. Crash Types	
	2. Crash Severity	
	3. Safety Ratios	
	4. Crash Locations	
	5. Collision Diagrams	
	6. Crash Time Elements	
	7. Crash Vehicle and Pedestrian Characteristics	
	8. Probable Crash Causal Factor Analysis	
	9. Crash Countermeasure Assessment	
I.	Conflict/Violation Analysis	
	1. Pedestrian-Vehicle Conflict Analysis	
	2. Vehicle-Vehicle Conflict Analysis	
	3. Pedestrian and Vehicular Violation Analysis	
	Vehicles	
	Red Light Running	
	Illegal Turn-On-Red	
	Turn-On-Red without Full Stop	
	Stop Bar Encroachment	
	Speeding	
	Other	
	Pedestrians	
	Jay Walking	
	Signal Violation	
	Walking in Street	
	Not Stopping/Looking Before Crossing	
J.	Comparative Analysis	
K.	Summary of Deficiencies	


<i>E. FUTURE YEAR FORECAST CONDITIONS.....</i>	
1. <u>Multimodal Transportation System Considerations.....</u>	
A. Demand Management.....	
B. Public Transit.....	
C. Bicycle/Pedestrian.....	
2. <u>Projection Assumptions.....</u>	
3. <u>Projection Methodology.....</u>	
4. <u>Future Projections.....</u>	
A. Short Term (1-5 years).....	
B. Mid Term (5-10 years).....	
C. Long Term (10-20 years).....	
5. <u>Analysis and Summary of Future Year Conditions.....</u>	
A. General Compilation and Summary.....	
B. Factors, Ratios, Percentages and Trends.....	
C. Warrant Values/Analysis.....	
D. Operational/LOS Analysis.....	
E. Crash/Safety Analysis.....	
F. Conflict/Violation Analysis.....	
G. Comparative Analysis.....	
H. Summary of Deficiencies.....	

<i>F. DEVELOPMENT OF POTENTIAL ENGINEERING IMPROVEMENTS AND STRATEGIES.....</i>	
1. <u>System Wide Improvements and Strategies.....</u>	
2. <u>Corridor Wide Improvements and Strategies.....</u>	
3. <u>Site Specific Improvements and Strategies.....</u>	
A. TSM/TDM.....	
B. Reconstruction.....	
D. Grade Separation.....	
4. <u>Time Frame for Implementation of Improvements.....</u>	
5. <u>Cost of Improvements and Strategies.....</u>	
A. Initial Investment.....	
B. Life Cycle Cost.....	
C. User Costs.....	
D. User Benefits.....	
<i>G. COMPARATIVE ANALYSIS OF IMPROVEMENTS AND STRATEGIES.....</i>	
1. <u>Development of Project Goals and Objectives.....</u>	
2. <u>Development of Evaluation Factors/Measures of Effectiveness.....</u>	
3. <u>Development of Priority Weights for Evaluation Factors.....</u>	
4. <u>Comparative Evaluation of Alternatives.....</u>	
A. Rating Score and Ranking.....	
B. Summary Matrix.....	
<i>H. SELECTION AND REFINEMENT OF PREFERRED ALTERNATIVE(S).....</i>	
1. <u>Selection of a Preferred Alternative or Alternative Strategies.....</u>	
2. <u>Public and Agency Input.....</u>	
3. <u>Refinement of Preferred Alternative.....</u>	
<i>I. EDUCATION AND ENFORCEMENT STRATEGIES.....</i>	
<i>J. EVALUATION AND FOLLOW-UP ANALYSIS.....</i>	

Exhibit B: Mid-block Crossing Data Collection and Analysis Variables

Legend:

- 1** Element shall be considered at all sites
- 2** Element shall be considered at most sites
- 3** Element shall be considered at specific sites

Pedestrian Characteristics	<div style="text-align: center; margin-bottom: 10px;">  </div> <p>Pedestrian Crossing Volumes / Demand</p> <p>Temporal variation (seasonal, weekly, daily, hourly and sub-hourly)</p> <p>Direction of flows (directional distribution)</p> <p>Individual or group crossings</p>	<p>Purpose</p> <ul style="list-style-type: none"> Pedestrian volume count studies determine the number of pedestrians crossing at a specified location. Field measured pedestrian crossing volumes are utilized to estimate current and future pedestrian travel demand. Pedestrian volumes are utilized as one of the two required MUTCD warrants for a traffic control signal. Pedestrian volumes are utilized to calculate the pedestrian crash rates. <p>Methodology</p> <ul style="list-style-type: none"> Pedestrian Volume counts should be performed as per Chapter 9 of FDOT's Manual on Uniform Traffic Studies (MUTS) and Chapter 13 of the Institute of Traffic Engineer's (ITE) Manual of Traffic Engineering Studies (MTES). Pedestrian volume counts should be obtained during the peak pedestrian and peak vehicular demand conditions, and tabulated similar to the vehicular volume counts. The normal process is to summarize the counts by 15-minute sub-hourly periods. A shorter time period or the actual time of arrival/crossing should be noted to help determine arrival time distributions. Pedestrian volumes are obtained by recording the number of pedestrians passing a point. All pedestrian volumes should be obtained on a directional basis. Each crossing area will have two possible directional flows. <p>Issues</p> <ul style="list-style-type: none"> Field measured pedestrian crossing volumes may not indicate true pedestrian demand. Latent crossing demand should be determined via area trip generation rates. Individual versus group crossings should be clearly distinguished. Variations in pedestrian volumes are a representation of the social and economic activity of an area. Seasonal variations are typically more severe near recreational areas.
-----------------------------------	--	---

Pedestrian Characteristics	<div>1</div> <p>Pedestrian Group Types</p> <p>Children (under 13 years) and strollers</p> <p>Elderly/Seniors (over 60 years)</p> <p>Able bodied adults (13 to 60 years)</p> <p>Disabled (blind/visually impaired, mobility impaired-braces/ crutches/ wheelchairs/ walkers/ canes, developmental impaired)</p> <p>English illiterates</p>	<p>Purpose</p> <ul style="list-style-type: none"> Pedestrian group size studies are used to determine the adequate gap required for the 85th percentile group size of pedestrians to cross a street of specified width at a given time. The pedestrian group type counts are utilized to identify the pedestrian mix of the area and determine if there are children, elderly, or disabled pedestrians using the crosswalk. The mix of pedestrians can also determine if pedestrians can speak or read English, supporting the use of symbol signs/messages in lieu of text signs/messages. <p>Methodology</p> <ul style="list-style-type: none"> Pedestrian Group Type counts should be performed as per Chapter 10 of FDOT's MUTS and Chapter 13 of ITE's MTES. Pedestrian group type counts should specify the group sizes and the characteristics of the pedestrians (age, sex, ability, walking speed, etc). The specific type of disability should be obtained if possible. The proximate generators/attractors of particular group types (schools, playgrounds, parks, churches, and community centers) should be identified. <p>Issues</p> <ul style="list-style-type: none"> Special features or reduced warrants may be justified for locations with large numbers of disabled pedestrians. The more elderly and younger pedestrians are not as capable to estimate the approaching speed and distance of the oncoming traffic.
	<div>2</div> <p>Pedestrian Behavior</p> <p>Exhibited pedestrian behavior related to the particular site</p>	<p>Purpose</p> <ul style="list-style-type: none"> Pedestrian behavior studies provide an understanding of the needs of pedestrians and identify the human factor relationships that are critical to the mobility and safety of pedestrians. Pedestrian behavior studies can also be utilized to identify the distance a pedestrian is willing to walk to get to a marked crosswalk location. <p>Methodology</p> <ul style="list-style-type: none"> Pedestrian behavior counts/studies should be performed similar to the other standard pedestrian counts/studies. <p>Issues</p> <ul style="list-style-type: none"> The extent of all pedestrian behaviors at or near the crossing should be investigated. Behaviors worth noting include confusion/hesitation, inattention, following other pedestrians, stopping in the street or median, changing direction within the street, difficulty stepping on or off curb, running across the street, etc.

Pedestrian Characteristics	<div>3</div> <p>Pedestrian/User Perception Survey</p>	<p>Purpose</p> <ul style="list-style-type: none"> • Pedestrian perception surveys help provide an understanding of the needs or concerns of pedestrians. <p>Methodology</p> <ul style="list-style-type: none"> • Pedestrian perception surveys should be performed similar to the other standard pedestrian counts/studies. • Obtain the opinions and perceptions of the facility users through on-site and mail-back (postal) survey instruments. • Opinions and perceptions are to be related specifically to pedestrian crossing safety, infrastructure, etc., at the site. Allow opportunity for some open-ended questions/feedback. • Analyze responses to determine consistent themes and trends in perceptions.
	<div>2</div> <p>Observed Pedestrian-Vehicle Conflicts</p>	<p>Purpose</p> <ul style="list-style-type: none"> • Observations of the visible conflicts between motor vehicles and pedestrians can help identify the crash potential of a site. • Observations of pedestrian-pedestrian and pedestrian-bicycle conflicts can help identify existing deficiencies and develop improvement countermeasures. <p>Methodology</p> <ul style="list-style-type: none"> • Pedestrian-vehicle conflict studies should be performed as per Chapter 12 of ITE's MTES. • Through vehicle, right turn, and left turn vehicle type conflicts with pedestrians should be segregated, as well as the direction of pedestrian and vehicle travel. • All pedestrian-pedestrian or pedestrian-bicycle conflicts should also be noted. • A pedestrian-vehicle conflict occurs when a driver or pedestrian has to take some action in order to avoid a collision.

Pedestrian Characteristics	<div>2</div> <p>Observed Pedestrian and Vehicle Violations</p>	<p>Purpose</p> <ul style="list-style-type: none"> • Observations of the predominant type of violations are utilized to develop and assess potential countermeasures. • The trip purpose will help identify the frequency of use and overall familiarity with the crossing site. <p>Methodology</p> <ul style="list-style-type: none"> • Traffic control compliance/understanding studies should be performed as per Chapters 13 and 15 of ITE's MTES. • Compliance is measured by observing and recording pedestrian and vehicle violations/observance of traffic control devices. This includes vehicles running red signals, right turns on red without full stop, weaving across painted gores, stop bar and crosswalk encroachments, exceeding posted speed limits, and violation of a turn restriction. For pedestrians, violations include, pedestrians crossing during prohibited signal indication, jaywalking, walking in the street, not stopping before crossing, not looking before crossing, etc.
	<div>2</div> <p>Pedestrian Trip Purpose/Frequency/Length</p> <p>Commuter/Work Student/School Shopping/Recreational/ Special Event</p>	<p>Purpose</p> <ul style="list-style-type: none"> • The trip purpose will help identify the frequency of use and overall familiarity with the crossing site. <p>Methodology</p> <ul style="list-style-type: none"> • Pedestrian trip purpose/frequency/length surveys should be performed similar to the other standard pedestrian counts/studies. • Identify the purpose/frequency and length of the pedestrian trip by performing interview type surveys. If necessary distribute surveys to the applicable adjacent generators for a potentially larger sample. • As part of the survey, information on pedestrian infrastructure, pedestrian environment, as well as, origin and destination, should be obtained. <p>Issues</p> <ul style="list-style-type: none"> • If the crossings occur only during special events, consider use of temporary specialty devices that are implemented only during event time periods. • Commuter type pedestrians tend to be more familiar with the conditions of the road and the common behavior of drivers. • Pedestrians that travel the same route every day do not pay attention to sudden changes in conditions. • Commuter type pedestrians tend to be more aggressive and walk at higher speeds than those that are shopping or engaged in recreational type activities.



Pedestrian Characteristics	<div>2</div> <p>Pedestrian Walking Rates (feet per second)</p>	<p>Purpose</p> <ul style="list-style-type: none"> Pedestrian walking rates are utilized to determine the degree of exposure and to establish pedestrian signal timings. <p>Methodology</p> <ul style="list-style-type: none"> Walking speed studies should be performed as per Chapter 13 of ITE's MTES. The pedestrian walking rate is to be measured by observers located in a position that has a clear view of the crossing location and that does not distract the pedestrians. The 15th percentile speed/walking rate is generally the accepted value for design purposes. A more conservative value can be utilized if determined by engineering judgment. <p>Issues</p> <ul style="list-style-type: none"> Pedestrian walking speed is affected by a number of factors including volume, age, sex, crossing width, weather, and speed of oncoming traffic. Walking speeds typically vary between 2.5 to 6.5 feet per second.
	<div>1</div> <p>Pedestrian Travel Route(s) Survey</p> <p>Natural pedestrian travel paths/desired lines</p> <p>Approaching walkway width (total and effective)</p> <p>Pedestrian crossing width/length</p> <p>Queuing, waiting or holding areas</p> <p>Obstacles along route</p>	<p>Purpose</p> <ul style="list-style-type: none"> The purpose of the travel route survey is to establish the ideal crossing location, to provide an appropriately sized crossing and to remove unwanted barriers to travel. <p>Methodology</p> <ul style="list-style-type: none"> Perform observational studies of the most desired crossing location for the majority of crossing pedestrians similar to the other standard pedestrian counts/studies. Measure the physical size of the various pedestrian travel and storage areas. This should include the roadside and median area. Identify all obstacles to pedestrian travel along the entire route. If there are unwanted obstacles for the pedestrians trying to reach a crossing location, they are to be identified and eliminated. <p>Issues</p> <ul style="list-style-type: none"> Pedestrians tend to stick with a desired travel path tend to cross at the same place all the time. At certain large width pedestrian generators, it may be difficult to route all pedestrian traffic into a single or consolidated location if there is no existing channelization of the pedestrian flow. The use of landscaping, fence, railing, or other means, should be considered. Off site changes may also be required.





<p>Vehicular Characteristics</p>	<div data-bbox="406 405 498 495"> <p>1</p> </div> <p>Vehicular Approach Volumes</p> <p>Temporal variation (seasonal, weekly, daily, hourly, and sub-hourly)</p> <p>Direction of Flows (directional distribution)</p> <p>Composition (trucks, recreational vehicles, buses, automobiles, emergency vehicles, bicycles)</p> <p>Correlation with pedestrian/bicycle volumes</p>	<p>Purpose</p> <ul style="list-style-type: none"> • Vehicular volume and composition volumes are utilized to estimate current and future travel demand and vehicular crash rates. <p>Methodology</p> <ul style="list-style-type: none"> • Approaching vehicular (motor vehicle and bicycle) volume and classification counts are to be performed at each crossing. Counts are to be made on the days and specific time periods with the heaviest usage. • Use of mechanical counters over a continuous period of more than one day (24-hours) is recommended. Counts are to be tabulated by 15-minute and 1-hour intervals. • All vehicular volumes should be obtained on a directional basis. • Intersection turning volume counts should be performed at all driveways and intersections within 600 ft of the crossing site. The counts should be performed at a minimum during the respective peak hours. • The peak times of vehicular and bicycle traffic should be directly compared with the peak times of pedestrian traffic. <p>Issues</p> <ul style="list-style-type: none"> • Seasonal variations in traffic represent of the social and economic activity of the area. Seasonal variations are typically more severe in rural areas than in urban areas and more drastic near recreational areas. • The type of vehicles approaching the crossing location affects pedestrian behavior. Most likely, pedestrians are more cautious crossing the street when larger numbers of heavier vehicles are approaching the crossing. • The directional distribution of traffic affects the crossing behavior of pedestrians. Providing refugee islands for pedestrians can help reduce risk, allowing the pedestrian to deal with each direction of traffic flow separately.
---	---	--

Vehicular Characteristics	<div data-bbox="406 619 495 709" data-label="Image"> </div> <p data-bbox="298 730 596 798">Vehicular Approaching Speeds</p> <p data-bbox="298 814 634 846">Posted (regulatory/advisory)</p> <p data-bbox="298 863 383 894">Design</p> <p data-bbox="298 911 610 942">Operating (85th percentile)</p>	<p data-bbox="670 199 776 226">Purpose</p> <ul data-bbox="670 233 1349 363" style="list-style-type: none"> • Spot speed studies are designed to measure operating speeds at specific locations under the traffic and environmental conditions prevailing at the time of the study. <p data-bbox="670 369 837 396">Methodology</p> <ul data-bbox="670 403 1382 974" style="list-style-type: none"> • Vehicle spot speed studies should be performed as per Chapter 13 of FDOT's MUTS, FDOT's Speed Zoning for Highways, Roads, and Streets in Florida (SZHRSF), and Chapter 3 of ITE's MTES. • The posted speed limit and the design speed (current and original) of the roadway facility are to be obtained and noted. • An all-vehicle sampling method should be utilized for measuring vehicle-operating speeds. The operating speeds should be obtained during the exact same time periods as the vehicle approach volume/classification counts and the pedestrian volume counts. • The relative speeds of the vehicles crossing the site are measured to determine the 85th percentile value. • The 85th percentile speed is utilized to determine if the location complies with the minimum crosswalk guidelines. <p data-bbox="670 980 748 1008">Issues</p> <ul data-bbox="670 1014 1382 1516" style="list-style-type: none"> • The 85th percentile operating speed is the most important vehicle speed value for determining site safety. • A very large number of factors influence a driver's choice of speed as illustrated in FDOT's SZHRSF Manual. These factors should be kept in mind as the study is being conducted. • The operating speed of the approaching vehicles affects the judgment of both pedestrians and drivers because both of their reaction times are affected. • In many areas, the operating speed is higher than the design or posted speed limit. Consequently, pedestrian-vehicle crashes could increase. • Speed is an important transportation consideration since highway users relate speed to economics, safety, travel time, comfort, and convenience.
----------------------------------	--	---


Vehicular Characteristics	<div> <div>1</div> <div> Usable Vehicular Gaps in Traffic Stream Average number in peak period Average duration in peak period Non-peak number and duration </div> </div>	Purpose <ul style="list-style-type: none"> The vehicle gap study is used to determine the size, number, and frequency of gaps in the vehicular traffic streams for pedestrian and school crossing studies. The results of the gap study are utilized as one of the two required MUTCD warrants for installation of a traffic control signal. Methodology <ul style="list-style-type: none"> Vehicle gap studies should be performed as per Chapter 8 of FDOT's MUTS and Chapter 13 of ITE's MTES. Waiting times of pedestrians attempting to cross a roadway should be measured along with the gaps. A stopwatch is normally used to measure the traffic gaps. It is important to know that not all the gaps must be measured. Only usable gaps should be accounted for in order to determine the number and frequency of possible crossing opportunities. Driver trip purpose/frequency/length surveys should be performed as part of an origin and destination (O&D) type survey. Surveys should be performed on drivers in the area in order to determine the trip purpose/frequency/length and the general driver population. Issues <ul style="list-style-type: none"> A traffic stream without adequate traffic gaps will not allow pedestrians to cross in a simple pedestrian crossing (a simple crossing refers to a crossing with pavement markings only). If there are not enough gaps in the traffic stream, extra measures may need to be taken in order to provide a safer crossing solution for pedestrians. Commuter type drivers tend to be more familiar with the conditions of the road and the common behavior of pedestrians.
	<div> <div>2</div> <div> Driver Population/Trip Purpose/Frequency/Length Commuter Recreational Special event </div> </div>	Issues <ul style="list-style-type: none"> Drivers that travel through the same road every day do not pay attention to sudden changes in the driving conditions, which can be disadvantageous for pedestrians. Recreational drivers that travel through new areas are both concentrated on the changes of the road and distracted by the unfamiliarity of the area. Often when special events take place, there are precautions taken for traffic congestion and pedestrians. Special attention must be given to the unique conditions and to extremely heavy travel demand.


Vehicular Characteristics	<div data-bbox="407 285 496 373">1</div> <p>Roadway Characteristics</p> <p>Number of approaching lanes</p> <p>Median type and width</p> <p>Roadway cross slope</p> <p>Roadway pavement type</p> <p>Curb type</p> <p>Skid resistance of pavement</p> <p>Vehicle turning restrictions</p> <p>Access point/driveway density (FDOT Access Class)</p> <p>One-way or two-way traffic</p> <p>Intersection turning radii</p>	<p>Methodology</p> <ul style="list-style-type: none"> Obtain basic information on roadway characteristics from existing plans and site visits. <p>Issues</p> <ul style="list-style-type: none"> The roadway characteristics affect driving behavior and vehicle mix. Potential users could see certain roadway characteristics as not being pedestrian friendly. The width of the road is an important factor for pedestrian safety. It is difficult for pedestrians to cross four or more lanes of traffic at the same time if they are not aided with extra measures such as traffic lights, high visibility crosswalks, median islands, curb extensions, etc. The size/width of the median affects the crossing behavior of the drivers and the pedestrians. Medians/center refuge islands help pedestrians cross the street by dividing the traffic streams into two different crossings, so pedestrians only have to deal with traffic coming from one direction at a time. Pedestrians with disabilities can have a difficult time crossing the street if the cross section of the road is abrupt or the pavement conditions at the crossing are not optimal. Too many vehicular and pedestrian access points to a roadway can encourage pedestrians to cross indiscriminately. In some cases, it may be possible to limit or reduce the number of access connections or restrict turning maneuvers. Each access connection to a roadway increases the number of pedestrian-vehicle and vehicle-vehicle conflicts.
----------------------------------	---	---

Vehicular Characteristics	<div style="text-align: center;">  </div> <p>Vehicular Traffic Conflict Studies/ Conflict Diagrams</p>	<p>Purpose</p> <ul style="list-style-type: none"> • Vehicle-vehicle traffic conflict studies are used to supplement traffic crash studies to estimate the traffic crash potential. • Traffic conflict studies are very useful in determining the types of safety problems that exist at a location. Once the type of problem is identified, possible countermeasures can be identified. • The purpose of the conflict diagram is to pictorially represent different types of conflicts that have occurred at the particular location. • Vehicle-vehicle traffic conflict studies consider the interactions between two or more vehicles when one or more vehicles take evasive action, such as breaking or weaving, to avoid a collision. <p>Methodology</p> <ul style="list-style-type: none"> • Vehicle-vehicle conflict studies should be performed as per Chapter 12 of ITE's MTES. • Vehicle conflict studies are performed by observers that sit upstream of the place of interest. Conflict studies are normally conducted in daylight with dry weather and pavement unless the study is specifically intended for other conditions. <p>Issues</p> <ul style="list-style-type: none"> • Frequent conflicts between two or more vehicles near a crossing site can jeopardize the safety of pedestrians waiting or attempting to cross the street.
Transit Characteristics	<div style="text-align: center;">  </div> <p>Transit Vehicles Size / Passenger Capacity Headway</p>	<p>Methodology</p> <ul style="list-style-type: none"> • Transit vehicle information is to be obtained from the transit agency and supplemented with field counts. • Coordination with the local transit agency is very important in order to assess the most appropriate location for transit and transit pedestrian activity. <p>Issues</p> <ul style="list-style-type: none"> • The size of the transit vehicle utilizing a stop and the route headway are usually indicators of user/pedestrian demand. • The size of the vehicle could affect use and therefore pedestrian demand. Generally, passengers do not want to travel in a large empty bus, and they do not want to travel in a crowded small bus. • The geometric and operating characteristics are different for larger and smaller buses.

Transit Characteristics	<div style="text-align: center;">  </div> <p>Transit Stop / Terminal</p> <p>Number of Boarding & Alighting Passengers</p> <p>Number of Routes</p> <p>Types of Routes</p> <p>Configuration / Location</p> <p>Waiting Area Capacity</p> <p>Amenities</p>	<p>Methodology</p> <ul style="list-style-type: none"> Transit stop information is to be obtained from the transit agency and supplemented with field data. <p>Issues</p> <ul style="list-style-type: none"> The amount of bus activity at a particular bus stop will impact pedestrian demand. The geometric and overall design of a bus stop will influence pedestrian demand. Transit users that have to wait for long periods of time for a bus, can behave more aggressively if they know that they could miss a bus. Therefore, they may run and cross a busy street in order to reach the bus stop on time.
Area/Site Elements	<div style="text-align: center;">  </div> <p>Area Type</p> <p>Central Business District (CBD)</p> <p>Urban</p> <p>Suburban</p> <p>Rural</p>	<p>Purpose</p> <ul style="list-style-type: none"> The general area type where the crossing is taking place is essential to determine the type of treatment that must be applied to each specific situation. Pedestrian and driver behaviors are usually different depending on the area type. <p>Methodology</p> <ul style="list-style-type: none"> Area type information is to be obtained based on current and anticipated conditions. <p>Issues</p> <ul style="list-style-type: none"> Overall pedestrian activity and behavior is typically different depending on the area type.
	<div style="text-align: center;">  </div> <p>Adjacent Land Use</p> <p>Type / Mix</p> <p>Density</p> <p>Present Condition</p>	<p>Purpose</p> <ul style="list-style-type: none"> The type and mix of land uses surrounding the crossing location typically affects the pedestrian volume. <p>Methodology</p> <ul style="list-style-type: none"> Land use information is to be obtained from the planning agency and supplemented with field data. Both the current and anticipated future land uses should be identified. <p>Issues</p> <ul style="list-style-type: none"> The number of pedestrians using a crossing is most often directly related to the density of the surrounding area.
Area/Site Elements	<div style="text-align: center;">  </div> <p>Roadway Functional Classification</p> <p>Major Arterial</p> <p>Minor Arterial</p> <p>Major Collector</p> <p>Minor Collector</p>	<p>Purpose</p> <ul style="list-style-type: none"> The functional classification of the roadway establishes the amount of priority given to vehicles. <p>Methodology</p> <ul style="list-style-type: none"> The functional classification of the roadway established the amount of priority given to vehicles. <p>Issues</p> <ul style="list-style-type: none"> Lower functionally classified roadways are commonly more pedestrian friendly while higher functionally classified roadways are commonly less pedestrian friendly.

	<p style="text-align: center;">1</p> <p>Proximity to Origin/Destination</p>	<p>Methodology</p> <ul style="list-style-type: none"> Obtain origin and destination information for both vehicles and pedestrians. The relative distance of the crossing site to the pedestrian and drivers trip origin and destination should be noted.
	<p style="text-align: center;">1</p> <p>Proximity to Upstream/Downstream Signal</p>	<p>Methodology</p> <ul style="list-style-type: none"> Obtain physical distance to all upstream and downstream traffic signals. In order to install a crosswalk closer than 600-feet from a signalized intersection, there must be a special condition that warrants the installation of a traffic signal or a speed zone like a school zone. <p>Issues</p> <ul style="list-style-type: none"> When crossings are located too close to a signal, drivers are focusing on the signal and they are not expecting pedestrians to cross in front of them.
	<p style="text-align: center;">1</p> <p>Proximity to Upstream/Downstream Intersection/Driveway</p>	<p>Purpose</p> <ul style="list-style-type: none"> The proximity of a mid-block crosswalk to a driveway or an intersection affects the behavior of the drivers and pedestrians. Cars backing out of driveways or turning at intersections are not expecting to find a pedestrian crossing in close proximity. <p>Methodology</p> <ul style="list-style-type: none"> Obtain physical distance to all upstream and downstream intersections and driveways. <p>Issues</p> <ul style="list-style-type: none"> Right turning and left turning vehicles represent a threat to pedestrians since drivers are focusing on oncoming cars and not on the pedestrians crossing the street.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Area/Site Elements</p>	<div style="text-align: center;">  </div> <p>Condition Diagram (Physical Layout)</p> <p>Geometrics</p> <p>Channelization/Curbs</p> <p>Traffic lanes (number/width)</p> <p>Sight Distances</p> <p>Bus Stops and Routing</p> <p>Parking Conditions</p> <p>Pavement Markings</p> <p>Signs</p> <p>Street Lighting</p> <p>Sidewalks</p> <p>Curb Extensions</p> <p>Curb Type</p> <p>Medians/Islands</p> <p>Driveways</p> <p>Railroad Crossings</p> <p>Closest Signals</p> <p>Closest Crossing and Type</p> <p>Utility Poles</p> <p>Street Furniture</p> <p>Landscaping</p> <p>Property lines</p>	<p>Purpose</p> <ul style="list-style-type: none"> • The condition diagram provides the engineer with details of field conditions and helps investigate the need for changes in the roadway characteristics and features. • A detailed and comprehensive study of the vehicle-vehicle, vehicle-bicycle and vehicle-pedestrian crash types should be performed in order to identify the predominant type of crashes that occur near the crossing location. All contributing factors should be identified. <p>Methodology</p> <ul style="list-style-type: none"> • Produce a condition diagram as per Chapter 5 of FDOT's MUTS. • Produce a condition diagram to show the existing conditions in the area near the study crossing. The diagram should include the roadway alignment, items such as light poles, sidewalks, buildings, trees, fire hydrants, traffic signs, number of lanes, etc. • A crash analysis should be performed as per FDOT's Highway Safety Improvement Program Guidelines and Chapter 11 of ITE's MTES. • Pedestrian and non-pedestrian related crashes should be segregated. Use of the PBCAT software is recommended as an initial analysis tool. • Obtain and evaluate the long form crash reports over the most recent 5-year period to accurately identify the location of the crashes and the totality of events that occurred. <p>Issues</p> <ul style="list-style-type: none"> • Parking, landscaping, utility poles, and other obstructions, must be removed in the approach sight triangle area in order to provide totally unobstructed views of pedestrian areas. • Bus stops should be located close to the intersections whenever possible. A bus stop located in the middle of the block will encourage pedestrians to cross the street at unmarked locations. If a bus stop is located in the middle of the block, all efforts should be made to accommodate pedestrians in the vicinity of the stop. • A road with complex geometric conditions can affect the behavior of the drivers and the pedestrians. If a driver has to be alert to the changes in the road, he/she most likely will not be expecting a crosswalk or a pedestrian crossing at an unmarked location. • It is very important to channelize all the pedestrians to cross in the same location in order to alert drivers of the oncoming crossing and to define the safest possible place.
--	--	---

<p style="text-align: center;">Area/Site Elements</p>	<div style="text-align: center;">  </div> <p style="text-align: center;">Condition Diagram (Physical Layout) (cont.)</p>	<p>Issues (cont.)</p> <ul style="list-style-type: none"> • Sight distance is a very important factor in crossing design. Drivers require enough time/distance to identify a crossing pedestrian and take corrective action if necessary. • There should not be parking close to a mid-block crossing since the parked cars obstruct the driver's view. Whenever there is on-street parking near a mid-block crossing, bulb-outs should be constructed to reduce the crossing distance and to enhance the sight distance of both pedestrians and drivers. • Pavement markings have to alert motorists of oncoming crossings. In mid-block crossings it is very important to utilize high visibility markings to advise pedestrians to cross the street in the specified location and to help drivers identify designated marking locations. • The minimum signs that must be used are the advance warning pedestrian crossing and the pedestrian crossing sign. The pedestrians crossing sign must be used whenever the crosswalk is clearly defined. • It is very important to install mid-block crossings in the vicinity of street light poles. • Mid-block crossings should not be located next to driveways since the operations of the driveway and the crossing could interfere with each other. • Avoid installing crosswalks close to any at grade Railroad Crossing. Pedestrians should not be encouraged to cross a street near a railroad crossing since the street already has many elements affecting driving behavior. • Mid-block pedestrian crossings should not be installed in blocks that are 1200-feet in length or less. Special exceptions can be made in locations with extremely high pedestrian usage. • Mid-block crossings should not be located close to utility poles in order to avoid sight obstructions. If the utility pole is installed in the same place as the crosswalk, even if on the back of sidewalk, it can interfere with the pedestrian flow on the sidewalk and the curb cut ramp • Street furniture should not be placed next to mid-block pedestrian crossings in order to avoid pedestrian flow obstructions. • Landscaping near mid-block pedestrian crossings cannot block the sight lines of drivers and pedestrians.
--	--	--

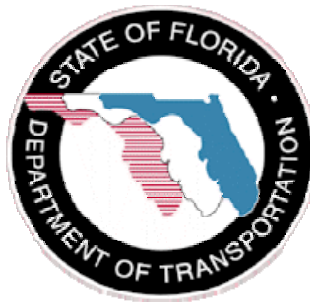
Area/Site Elements	<div data-bbox="430 262 521 352" data-label="Image"> </div> <p>Collision Diagram/Crash History</p> <p>Crash types</p> <p>Crash severity</p> <p>Crash location</p> <p>Direction of vehicle(s)</p> <p>Direction of pedestrian(s)</p> <p>Time of day</p> <p>Day of week</p> <p>Season or month</p> <p>Other relevant factors</p>	<p>Purpose</p> <ul style="list-style-type: none"> • The purpose of the collision diagram is to pictorially represent different types of collisions that have occurred at the particular location. <p>Methodology</p> <ul style="list-style-type: none"> • For pedestrian crashes, identify the characteristics of the victims (age, gender, etc.) • Identify the pre-crash actions of both pedestrians and drivers. • Estimate crash costs as per Section 23.2.2 of FDOT's PPM. • Identify the time of the day, day of week, month or season that the crashes occurred. • Segregate the crashes by severity of injury and type of impact. • Prepare collision diagrams as per Chapter 6 of FDOT's MUTS. • Define the threshold for crashes being included in the FDOT crash database. <p>Issues</p> <ul style="list-style-type: none"> • If vehicle-vehicle or vehicle-pedestrian crashes are occurring in the vicinity of a crosswalk, efforts should be made to channelize all the pedestrian crossings to a single location in order to alert motorists of the oncoming crossing.
---------------------------	--	--

APPENDIX IV

DESIGN REVIEW FOR TRANSIT ACCESSIBILITY CHECKLIST

***ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY
DESIGN REVIEW CHECKLIST***

**Florida Department of Transportation
District IV**



October 2007

INTRODUCTION

The Florida Department of Transportation has adopted the Roadway Plans Review for Transit Connectivity – Design Review Checklist as the guide for the review and approval of roadway plans within its jurisdiction. The checklist is employed by the Department to insure a consistent and complete review of roadway plans submitted for approval. The checklist is not all-inclusive and does not limit the Department's right to consider other aspects of a proposed design in determining consistency and compliance with adopted standards.

Designers are encouraged to review the checklist during plans preparation to facilitate the production of complete roadway plans. Not all components of the checklist will apply to every project; however an understanding of the basis of the review performed by the Department is intended to aid the designer.

**DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY
DESIGN REVIEW CHECKLIST**

PROJECT NAME: _____

FROM: _____

W.P.I. NO.: _____

F.M. NO.: _____

TO: _____

TYPE OF REVIEW: _____

1. GENERAL PLANNING/PROJECT SCOPING		SATISFACTORY			COMMENTS
		N/A	NO	YES	
1	HAVE CONSULTANT DOCUMENT SPECIFIC ISSUES THAT WERE IDENTIFIED DURING FIELD REVIEW (EXAMPLE, HEAVY PEDESTRIAN CROSSING AT A CERTAIN LOCATION).				
2	COLLECT THE FOLLOWING DOCUMENTS FOR REVIEW:				
	a) TRANSIT DEVELOPMENT PLAN;				
	b) MOST CURRENT BUS ROUTE MAP;				
	c) BUS SHELTER INVENTORY;				
	d) DESIGN GUIDELINES SPECIFIC TO TRANSIT PROPERTY;				
	e) LONG RANGE TRANSPORTATION PLAN;				
	f) COMPREHENSIVE PLAN POLICIES FOR COUNTY, AND/OR				
	g) REQUIREMENTS FOR DESIGN FROM PD&E OR OTHER STUDIES				
3	RESULTS OF PROJECT DISCUSSION WITH PTO AND/OR OTHER PARTICIPATING FDOT REVIEWERS AND/OR REQUIREMENTS FOR DESIGN FROM PD&E OR OTHER STUDIES.				

DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

1. GENERAL PLANNING/PROJECT SCOPING		SATISFACTORY			COMMENTS
		N/A	NO	YES	
4	RESULTS OF PROJECT DISCUSSIONS, IF ANY, WITH TRANSIT AGENCY REVIEWERS.				
5	CONFIRM WHETHER RIDERSHIP FIGURES (CURRENT AND PROJECTED) HAVE BEEN COLLECTED FROM TRANSIT AGENCY.				
6	VERIFY IF A LOCAL JURISDICTION HAS DEVELOPMENT CODE REQUIREMENTS THAT IMPACT TRANSIT, BICYCLE OR PEDESTRIAN AMENITIES.				
7	MAKE SURE ISSUES ARE CLEARLY UNDERSTOOD BY CONSULTANT PRIOR TO REVIEW (I.E., TYPES OF TRANSIT AMENITIES PREFERRED BY FDOT, RIGHT-OF-WAY CONSTRAINTS, ETC.).				

2. PLANNING OF TRANSIT FACILITIES		SATISFACTORY			COMMENTS
		N/A	NO	YES	
1	CONFIRM IF THE PROJECT HAS A FIXED ROUTE SERVING THE CORRIDOR.				
2	IF A FIXED ROUTE SERVES THE CORRIDOR, CONFIRM IF THERE ARE BUS STOPS LOCATED WITHIN THE PROJECT LIMITS (<i>REVIEW BUS STOP INVENTORY AND/OR CHECK WITH THE TRANSIT AGENCY</i>).				
3	CONFIRM IF THE NUMBER OF BUS STOPS AND THE LOCATION AND SPACING HAVE BEEN COORDINATED WITH THE LOCAL TRANSIT AGENCY. <i>FACILITIES SHOULD CORRESPOND TO SPECIFIC PROJECT CONDITIONS.</i>				
4	CONFIRM IF INFRASTRUCURE HAS BEEN INCORPORATED TO MATCH RIDERSHIP NEEDS AND LAND USE. (<i>CONSIDERATIONS SHOULD BE AVERAGE NUMBER OF PATRONS WAITING AT ONE TIME, ADJACENT LAND USE AND SAFETY ISSUES</i>)				
5	VERIFY IF BUS BAY LOCATIONS HAVE BEEN COORDINATED WITH LOCAL TRANSIT AGENCY.				

DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

3. PLAN AND PROFILE SHEETS		SATISFACTORY			COMMENTS
		N/A	NO	YES	
1	CONFIRM THAT PROPOSED BUS STOPS LOCATED LATERALLY AGAINST THE SIDEWALK, THAT ADA LANDINGS HAVE BEEN ADDRESSED. <i>- MINIMUM FDOT CRITERIA = 5' LONG BY 8' LONG.</i>				
2	CONFIRM THE BUS STOPS SHOWN IN THE PLANS HAVE BEEN CHECKED AGAINST THE BUS STOP INVENTORY FOR THE PROJECT CORRIDOR.				
3	CONFIRM THAT ALL THE BUS STOPS SHOWN IN THE INVENTORY HAVE BEEN PLOTTED ON THE PLANS.				
4	VERIFY THAT ALL THE BUS STOPS HAVE BEEN LOCATED BY STATION AND OFFSET.				
5	VERIFY IF THE ROADWAY IS DESIGNED TO ACCOMMODATE SIZE, WEIGHT, AND TURNING REQUIREMENTS OF BUSES. <i>BUS CLEARANCE REQUIREMENTS: - 12' VERTICAL CLEARANCE - 2' MIN. LATERAL CLEARANCE FROM EDGE OF PAV'T TO ACCOMMODATE BUS MIRRORS. - DESIRED LANE WIDTH 12'</i>				
6	VERIFY IF THERE IS SUFFICIENT SIGHT DISTANCE FOR A BUS TO RE-ENTER TRAFFIC SAFELY.				
7	VERIFY IF BUS STOPS HAVE BEEN LOCATED IN SECTIONS OF THE PROJECT THAT ARE TANGENT. <i>AVOID LOCATING BUS STOPS ON SHARPLY CURVED SECTIONS WITH LIMITED SIGHT DISTANCE FOR APPROACHING VEHICLES.</i>				
8	VERIFY IF CONFLICTS BETWEEN DRIVEWAYS AND BUS STOP LOCATIONS HAVE BEEN ADDRESSED. <i>BUSES PICKING UP PASSENGERS SHOULD NOT BLOCK ACCESS TO DRIVEWAYS. THIS IS A SAFETY HAZARD FOR PEDESTRIANS EMBARKING AND ALIGHTING THE BUSES.</i>				
9	VERIFY THAT THE BUS STOP LOCATION IS VISIBLE.				

DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

3. PLAN AND PROFILE SHEETS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
10	AT EACH BUS STOP ALONG THE CORRIDOR: VERIFY IF ADEQUATE SIDEWALKS/WALKWAYS/PAVED PLATFORMS HAVE BEEN PROVIDED TO CONVEY THE USER FROM THE BOARDING PLATFORM TO THE BUS.(I.E., CAN A PATRON GET ON/OFF THE BUS USING PAVED SURFACE?).				
11	VERIFY IF A WALKWAY IS PROVIDED FROM THE BOARDING PLATFORM TO THE SIDEWALK, AS WELL AS FROM THE CURBSIDE TO THE SIDEWALK.				
12	VERIFY IF BUS STOP PADS HAVE BEEN PROVIDED. - -FOR CURBSIDE BUS STOPS, BC ₁ REQUIRES A 30' X 8' CONCRETE PAD.				
13	VERIFY IF THE PROPOSED WALKWAYS COMPLY WITH FDOT/ADA REQUIREMENTS. IS THEIR LOCATION APPROPRIATE? IS THEIR WIDTH APPROPRIATE? -5' WIDE STANDARD (WITH GRASS STRIP BETWEEN ROAD AND SIDEWALK) -6' WIDE (NEXT TO CURB) -MUST PROVIDE 3' CLEAR AT OBSTRUCTIONS (LIGHT POLES, ETC.) ARE ALL SLOPES LESS THAN 1:20? ARE ALL CROSS SLOPES LESS THAN 1:50? ARE APPROPRIATE FDOT REFERENCES PROVIDED?				
14	IF THE BUS STOP LOCATIONS HAVE BEEN DETERMINED THROUGH COORDINATION WITH THE TRANSIT AGENCY – VERIFY IF THE FOLLOWING ITEMS HAVE BEEN CONSIDERED IN LOCATING THE STOPS: - DESIGN VEHICLE - STOPPING SIGHT DISTANCE - PASSING SIGHT DISTANCE - SIGHT DISTANCE AT DECISION POINTS - INTERSECTION SIGHT DISTANCE - DESIGN SPEED				
15	VERIFY WHETHER THERE IS UNINTERRUPTED ACCESS TO AND FROM EACH BUS STOP TO THE NEAREST CROSS-STREET OR INTERSECTION.				
16	VERIFY IF TRAFFIC CALMING APPROACHES (NARROWING OF TRAFFIC LANES, WIDENING OF SIDEWALKS, INCORPORATION OF LANDSCAPED AREAS, ADDITION OF MEDIANS, ETC.) CONFLICT WITH TRANSIT OPERATIONS.				

DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

3. PLAN AND PROFILE SHEETS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
17	VERIFY WHETHER BUS PASSENGER LANDING PADS BE INCORPORATED WITH THE CURRENT DESIGN. (<i>CHECK FOR POTENTIAL INFERENCES SUCH AS THE WIDTH OF EXISTING RIGHT OF WAY, EXISTING UTILITIES, DRAINAGE STRUCTURES, LANDSCAPING, GRADE DIFFERENTIALS, ETC.</i>)				

4. INTERSECTION LAYOUT PLANS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
1	VERIFY WHETHER THERE ARE ANY BUS STOPS THAT INTERFERE WITH DRIVEWAYS AT THE INTERSECTION. VERIFY WHETHER THE CONFLICT CAN BE MINIMIZED OR ELIMINATED.				
2	VERIFY WHETHER CURB RETURNS ON BUS ROUTES MEET MINIMUM DESIGN RADII REQUIREMENTS FOR THE BUS VEHICLES USED BY THE LOCAL TRANSIT AGENCIES. (<i>25' MIN. TURNING RADIUS FOR 40' OR 60' ARTICULATED BUS</i>)				
3	WHEN NEAR SIDE STOPS/STATIONS ARE REQUIRED, VERIFY WHETHER THE GEOMETRY OF THE DEDICATED RIGHT TURN LANE HAS ADDRESSED BUS OPERATIONS AT THAT INTERSECTION.				

5. DRAINAGE STRUCTURE SHEETS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
1	STORMWATER RUNOFF SHOULD NOT POND IN BUS BAY. VERIFY IF AN INLET CAN BE PROVIDED OR IF THE AREA ACAN BE RE-GRADED.				
2	VERIFY IF THE SWALE CAN BE RE-GRADED TO AVOID INLET ADJACENT TO BUS STOP OR SHELTER.				
3	VERIFY IF THE SWALE INLET LOCATION CAN BE ADJUSTED TO AT LEAST 10 FEET FROM BUS STOP AREA.				
4	VERIFY IF THE BUS STOP SIGN CAN BE RELOCATED TO ELIMINATE CONFLICT WITH PROPOSED EXFILTRATION TRENCH OR OTHER DRAINAGE STRUCTURE.				

DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

6. CROSS SECTIONS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
1	VERIFY IF CROSS SECTIONS SHOW BUS BAY LOCATIONS.				
2	VERIFY IF CROSS SECTIONS SHOW LANDINGS, CURB CUTS OR OTHER PEDESTRIAN FEATURES.				
3	CONFIRM IF CROSS SECTIONS AT BUS STOPS INDICATE A POTENTIAL DRAINAGE OR ADA COMPLIANCE PROBLEM.				
4	VERIFY IF THE CROSS SECTIONS AT BUS STOPS OR OTHER TRANSIT FACILITIES MATCH THE PROPOSED LAYOUT THAT APPEARS ON THE ROADWAY PLAN.				

7. TRAFFIC CONTROL PLANS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
1	VERIFY IF TRAFFIC CONTROL PLANS ARE DESIGNED TO ACCOMMODATE BUS TRAFFIC AND THE LOADING/ UNLOADING OF PASSENGERS.				
2	VERIFY IF PEDESTRIAN DETOURS HAVE BEEN PROVIDED THAT ALLOW SAFE ACCESS TO BUS STOPS.				
3	VERIFY IF THERE HAS BEEN COORDINATION WITH TRANSIT AGENCY REGARDING POSSIBLE TEMPORARY BUS STOP RELOCATIONS.				
4	BASED ON THE MAGNITUDE AND DURATION OF IMPACT OF CONSTRUCTION ON THE TRANSIT FACILITIES ALONG THE CORRIDOR, VERIFY IF THE TCP ADDRESSES TRANSIT SAFETY CONCERNS.				
5	AS REQUIRED, VERIFY IF TEMPORARY PAVEMENTS, RELOCATION OF BUS STOP SIGNS, ETC. HAVE BEEN ADDRESSED.				

8. SIGNING AND PAVEMENT MARKING PLANS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
1	VERIFY IF THE SIX INCH EDGE STRIPE EXTENDS ACROSS BUS BAY LOCATION.				

DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

8. SIGNING AND PAVEMENT MARKING PLANS		SATISFACTORY			COMMENTS
		N/A	NO	YES	
2	VERIFY IF THE BUS BAY IS ACCURATELY IDENTIFIED AS “BUS ONLY”.				
3	VERIFY IF THERE ARE NOTES IN THE PLANS THAT CLARIFY WHETHER THE FDOT OR THE TRANSIT AGENCY WILL PROVIDE THE SIGNS.				
4	VERIFY IF EXISTING BUS STOP SIGNS OR AMENITIES (SHELTERS) THAT NEED TO REMAIN OR BE RELOCATED HAVE BEEN IDENTIFIED ON THE PLANS. <i>THIS INCLUDES INDICATING THE CONTACT PERSON FOR DISTRIBUTION OF THE RELOCATED AMENITIES, I.E. PALM TRAN’S MISSING SHELTER PROBLEM.</i>				
5	VERIFY IF ALL NEW BUS STOP SIGN POSTS (OR COMPLETE ASSEMBLIES) HAVE BEEN IDENTIFIED IN THE PLANS.				
6	VERIFY IF SIGN POSTS ARE LOCATED IN ACCORDANCE WITH FDOT CLEAR ZONE REQUIREMENTS.				
7	VERIFY IF FRANGIBLE POSTS ARE SPECIFIED FOR SIGNS THAT ARE NOT LOCATED BEHIND CURB OR OTHER BARRIER.				
8	VERIFY IF EXISTING SIGNS TO REMAIN, TO BE RELOCATED OR NEW SIGNS HAVE BEEN LOCATED SO THAT THE BUS DRIVER KNOWS WHERE TO STOP THE BUS. <i>BUS STOP SIGNS ARE NORMALLY LOCATED WHERE THE PASSENGERS SHOULD WAIT TO BOARD.</i>				

9. LIGHTING PLANS		SATISFACTORY			COMMENTS
		N/A	NO	YES	
1	VERIFY IF LIGHTING IS BEING PROVIDED AT MAJOR BUS STOPS. <i>-SO THAT THE BUS DRIVER CAN SEE THAT USERS ARE WAITING AT NIGHT.</i>				
2	VERIFY IF PROPOSED MINOR BUS STOPS HAVE BEEN LOCATED CONVENIENTLY ADJACENT TO EXISTING OR PROPOSED ROADWAY LIGHTING POLES.				

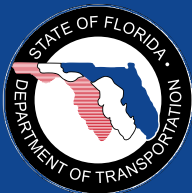
DISTRICT 4
ROADWAY PLANS REVIEW FOR TRANSIT CONNECTIVITY

9. LIGHTING PLANS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
3	VERIFY IF PROVISIONS HAVE BEEN MADE TO PROVIDE LIGHTING AT BUS STOPS WHEN EXISTING OR PROPOSED LIGHTPOLE LOCATIONS CAN NOT BE ALIGNED WITH THE STOP LOCATIONS.				

10. LANDSCAPE PLANS		SATISFACTORY			
		N/A	NO	YES	COMMENTS
1	VERIFY IF PROPOSED LANDSCAPING AT BUS STOPS INTERFERES WITH VISIBILITY OF PEDESTRIANS OR VEHICLES UTILIZING GENERAL AREA.				
2	VERIFY IF PROPOSED LANDSCAPING INTERFERES WITH SAFETY OR VISIBILITY OF PEDESTRIANS AT BUS STOPS.				
3	VERIFY IF LANDSCAPING ALLOWS ACCESS BY PEDESTRIANS TO BUS LANDINGS OR CURB EXTENSIONS. <i>LARGE TREES SHOULD BE KEPT AWAY FROM THE BUS STOP PEDESTRIAN CIRCULATION AREAS.</i>				

REFERENCES

1. **Potential Tort Liability For Transit Agencies Arising Out of The American With Disabilities Act**, *Transportation Research Board - National Research Council*, “Legal Research Digest”, July 1998, No. 11.
2. **Transit Cooperative Research Program Report 33: Transit-Friendly Streets: Design And Traffic Management Strategies to Support Livable Communities**, *Transportation Research Board - National Research Council*, Project for Public Spaces, Inc., National Academy Press, Washington, D.C., 1998.
3. **Transit Cooperative Research Program, TCRP Synthesis 21: Improving Transit Security**, *Transportation Research Board - Sponsored by The Federal Transit Administration*, Jerome A. Needle and Renee M. Cobb, J.D., Int’l. Assoc. of Chiefs of Police, National Academy Press, Washington, D.C., 1997.
4. **Transit Cooperative Research Program Report 26: Operational Analysis of Bus Lanes on Arterials**, *Transportation Research Board - National Research Council*, Kevin St. Jacques, Wilbur Smith Assoc., Houston, TX and Herbert S. Levinson, New Haven, CT, National Academy Press, Washington, D.C., 1997.
5. **Transit Cooperative Research Program Report 19: Guidelines For The Location And Design of Bus Stops**, *Transportation Research Board*, National Academy Press, Washington, D.C., 1996.
6. **Transit Cooperative Research Program Report 9: Transit Operations for Individuals with Disabilities**, *Transportation Research Board - National Research Council*, EG&G Dynatrend, Burlington, MA and Crain & Assoc., Inc., Menlo Park, CA, National Academy Press, Washington, D.C., 1995.
7. **HARTline-Transit Friendly Planning and Design Handbook and Technical Manual**
8. **Pedestrian-and Transit-Friendly Design**
9. **Transportation & Land Use Innovations-When You Can’t Pave Your Way Out of Congestion**
10. **Creating Transit-Supportive Land-Use Regulations**
11. **Building Livable Communities: A Policymaker’s Guide to Transit-Oriented Development**
12. **Best Development Practices-Doing the Right Thing and Making Money at the Same Time**
13. **Recommendations for Pedestrian, Bicycle and Transit Friendly Development Ordinances**
14. **Central Florida Design Manual**, *LYNX - The Central Florida Regional Transportation Authority*, Glatting Jackson Kercher Anglin Lopez Rinehart, Inc., in association with Herbert Halback and Assoc., Inc, 1994/1995 Edition.
15. **Transit Cooperative Research Program Web Document 6: Transit Capacity and Quality of Service Manual**, *Transportation Research Board - National Research Council*, Kittelson & Associates, Inc., in association with Texas Transportation Institute, Transport Consulting Limited, January 1999.
16. **ADA Transportation Accessibility**, Project Action National Easter Seal Society * U.S. Architectural and Transportation Barriers Compliance Board, KRW Incorporated, 1991.
17. **Federal Register, Part IV**, *U.S. Department of Transportation*, 49 CFR, Parts 27, 37 and 38, September 6, 1991.
18. **Project Development and Environmental Manual**, *Florida Department of Transportation*
19. **Roadway Plans Preparation Manual**, *Florida Department of Transportation*
20. **Roadway Traffic and Design Standards**, *Florida Department of Transportation*
21. **Standard Specifications for Road and Bridge Construction**, *Florida Department of Transportation*
22. **Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways**, *Florida Department of Transportation*
23. **A Policy on Geometric Design of Highways and Streets**, *American Association of State Highway and Transportation Officials (AASHTO)*
24. **Roadside Design Guide**, *AASHTO*
25. **Manual of Uniform Traffic Control Devices**, *Federal Highway Administration*
26. **Access Management Manual**, *Florida Department of Transportation*
27. **Bicycle Facilities Planning & Design Manual**, *Florida Department of Transportation*
28. **Guide for the Development of Bicycle Facilities**, *AASHTO*



Florida Department
of Transportation

