Chapter 8

Pedestrian, Bicycle and Public Transit Facilities

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8.1 General

It is the goal of the Department and in accordance with ***Section 335.065(1)(a), Florida Statutes***, that "Bicycle and pedestrian ways shall be given full consideration in the planning and development of transportation facilities, including the incorporation of such ways into state, regional, and local transportation plans and programs. Bicycle and pedestrian ways shall be established in conjunction with construction, reconstruction, or other change of any state transportation facility, and special emphasis shall be given to projects within 1 mile of an urban area."

Pedestrian, bicycle and transit facilities must be given full consideration on all proposed projects including Resurfacing, Restoration and Rehabilitation (RRR), safety, and traffic operation projects. Their inclusion on intersection reconstruction projects is particularly important as these may be excepted out of later roadway projects. Where an existing route for bicyclists is present it shall be maintained. For projects within the operational limits of a local transit agency service area, consideration should be given to connectivity of pedestrian and bicycle facilities with transit stops. The provision for bicycle accommodation is an important element of passenger facilities, as it helps to reduce the need for parking of automobiles and facilitates another viable option for accessing the facility. Bicycles should be accommodated at all pedestrian bridges (i.e. provide an alternative to stairs). Bicycle access to transit facilities should be provided because most bus service has bike-on-bus (bicycle rack) capability. Decisions on appropriate pedestrian and bicycle facilities shall be determined with input from the District Pedestrian/Bicycle Coordinators, District Modal Development Office Coordinators, District Americans with Disabilities Act (ADA) Coordinators, and the District Public Transportation staff. The project records must support and document why facilities were not included.

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

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

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

8.2 References

1. ***Manual on Uniform Traffic Control Devices (MUTCD)***
2. ***Design Standards***
3. ***FDOT Pedestrian Planning and Design Handbook***
4. ***FDOT Bicycle Facilities Planning and Design Handbook***
5. ***FDOT Trail Intersection Design Handbook***
6. ***AASHTO Guide for Bicycle Facilities***
7. ***Highway Capacity Manual***
8. ***Americans With Disabilities Act (ADA)/Florida Accessibility Code for Building Construction (FACBC)***
9. ***Uniform Vehicle Code (UVC)***
10. ***AASHTO LRFD Bridge Design Specifications, Current Edition***
11. ***AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities***
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***
13. ***FDOT Accessing Transit: Design Handbook for Florida Bus Passenger Facilities***
14. ***Transit Facilities Guidelines on the Public Transportation Office website: http://www.dot.state.fl.us/transit/***
15. ***FDOT Structures Manual, Current Edition***

8.3 Pedestrian Facilities

All roadways and bridges where pedestrian travel is expected should have separate walking areas such as sidewalks or shared use paths that are outside the vehicle travel lanes. Refer to ***Section 8.6*** for shared use paths.

8.3.1 Sidewalks

Sidewalks are walkways parallel to the roadway and designed for use by pedestrians. Generally, sidewalks should be constructed along both sides of arterial roadways that are not provided with shoulders, even though pedestrian traffic may be light. However, the construction of sidewalks on both sides of the street would not be required in such cases as when the roadway parallels a railroad or drainage canal and pedestrians would not be expected. If sidewalks are constructed on the approaches to bridges, they should be continued across the structure. If continuous sidewalks are constructed on only one side of the street, pedestrians should be provided access to transit facilities located on the opposite side of the street.

The minimum width of a sidewalk shall be 5 ft. when separated from the curb by a buffer strip. The minimum separation for a 5 ft. sidewalk from the back of curb is 2 ft. The buffer strip should be 6 ft. where possible to eliminate the need to narrow or reroute sidewalks around driveways. If the sidewalk is located adjacent to the curb, the minimum width of sidewalk is 6 ft. Grades on sidewalks should not exceed 5% when not adjacent to a travel way. There should be enough sidewalk cross slope to allow for adequate drainage, however the maximum shall be no more than 2% to comply with ADA requirements. Edge drop-offs should be avoided. When drop-offs cannot be avoided, they should be shielded as discussed in ***Section 8.8***.

A 5-foot wide sidewalk that connects a transit stop or facility with an existing sidewalk or shared use path shall be included to comply with ADA accessibility standards.

Particular attention should be given to pedestrian accommodations at the termini of each project. If full accommodations cannot be provided due to the limited scope or an existing sidewalk isn't present at the termini, then temporary measures should be considered such as: Extend sidewalk and project limits to next appropriate pedestrian crossing or access point. If special accommodations are made, it is equally important to address these measures on the adjoining projects. In all cases, the District Pedestrian/Bicycle Coordinator should be contacted to make a determination regarding continuous passage.

On roadways with flush shoulders, the minimum width of sidewalk is 5 feet.

On existing roadways with flush shoulders, sidewalks or pedestrian pathways should be placed as far from the roadway as practical in the following sequence of desirability:

1. Outside of the roadway right of way in a separate, offsite and/or parallel facility.
2. At or near the right of way line.
3. Outside of the clear zone.
4. As far from edge of driving lane as practical.

For new roadway construction with flush shoulders, the sidewalk should be outside of the clear zone.

8.3.2 Disability Considerations

Pedestrian facilities must be designed in accordance with ADA to accommodate the physically and visually challenged citizens whose mobility is dependent on wheelchairs and other devices. In areas with sidewalks, curb ramps shall be incorporated at locations where a marked crosswalk adjoins the sidewalk. ***Index 304*** of the ***Design Standards*** sets forth requirements. Pull boxes, manholes, and other types of existing surface features in the location of a proposed curb ramp should be relocated when feasible. When relocation is not feasible, the feature shall be adjusted to the new ramp to meet the ADA requirements for surfaces (including the provision of a non-slip top surface, and adjustment to be flush with and at the same slope as the curb ramp).

The detectable warning systems on the QPL are designed to work with concrete surfaces. In areas where the pedestrian facility has an asphalt surface, such as a shared use path, the engineer must specify an appropriate detectable warning system. In these cases, consider including a short section of concrete that will accommodate any system.

To assist pedestrians who are visually or mobility impaired, curb ramps should be parallel to the crossing. By providing ramps parallel to the crossing, the pedestrian is directed into the crossing. At intersections where more than one road is crossed, each crossing should have a separate curb ramp. Under no circumstance shall a curb ramp be installed allowing a pedestrian to enter a crossing without providing a curb cut (or at grade sidewalk if no curb is present) on the opposite side of the crossing. Crossings shall also meet the same grade and cross slope requirements as sidewalks where the grade should not exceed 5%, and the maximum cross slope shall be no more than 2%.

8.3.3 Marked Crosswalks at Uncontrolled Locations

There are a number of treatments that may be used to get pedestrians safely across the street, whether crossing at an intersection or midblock. A marked crosswalk is one of these tools, but it is best used in conjunction with other treatments (including signs, flashing beacons, curb extensions, raised crossing islands, and enhanced overhead lighting). Not only are marked crosswalks used to advise pedestrians where to cross, but also to alert motorists to expect pedestrians crossing at those locations. The criteria provided in this section do not apply to school crossings.

Marked crosswalks shall not be installed in an uncontrolled environment (without signals, stop signs, or yield signs) when posted speeds are greater than 40 mph or on multilane roads where traffic volumes exceed 12,000 vpd (without a raised median) or 15,000 vpd (with a raised median).

Roundabouts present a unique challenge for the design of pedestrian crossings. In a roundabout, the crosswalk markings should comply with the ***MUTCD*** and the ***FDOT Traffic Engineering Manual***.

8.3.3.1 Midblock Crosswalks

Marked crosswalks can be used to supplement the pedestrian crossing needs in an area through the use of midblock crosswalks. This can provide pedestrians with a more direct route to their destination. The use of unsignalized midblock crosswalks should be carefully considered. When used, midblock crosswalks should be illuminated, marked and outfitted with advanced warning signs or warning flashers in accordance with the ***Manual of Uniform Traffic Control Devices (MUTCD)***. Pedestrian-activated, signalized midblock crosswalks may be appropriate at some locations, but the locations must meet the warrants established in the ***MUTCD***.

In addition to the requirements in ***Section 8.3.3***, the following conditions also apply:

1. Midblock crosswalks should not be located where the spacing between adjacent intersections is less than 660 feet
2. Midblock crosswalks should not be located where the distance from the crosswalk to the nearest intersection (or crossing location) is less than 300 feet
3. Midblock crosswalks shall not be provided where the crossing distance exceeds 60 feet (unless a median or a crossing island is provided)

4. Midblock crosswalks shall not be provided where the sight distance for both the pedestrian and motorist is not adequate (stopping sight distance per ***Table 2.7.1***)
5. Midblock crosswalks shall not be provided where the roadway lighting illuminating the proposed crosswalk is inadequate
6. Midblock crosswalks shall not be located where the ADA cross slope and grade criteria along the crosswalk cannot be met (per ***Section 8.3.2***).

An engineering study is required before a marked midblock crosswalk is installed at an uncontrolled location. This study shall examine such factors as sight distance for pedestrians and vehicles (stopping sight distance), traffic volume, turning volumes near proposed crosswalk location, roadway width, presence of a median, lighting, landscaping, drainage, traffic speed, adjacent land use (pedestrian generators / destinations), pedestrian volume and existing crossing patterns. Midblock crosswalks should only be used in areas where the need truly exists, and the engineering study will help to determine if an uncontrolled midblock crosswalk is a viable option. Refer to the Department's ***Manual on Uniform Traffic Studies (MUTS)***.

If any problem areas are identified that would preclude the placement of a justified midblock crosswalk, additional features must be included in the design to remedy those problem areas before a midblock crosswalk can be placed at that location. Features like overhead signing can help alert motorists and be used to light the crossing. Curb extensions or bulb-outs can improve sight distance and decrease the crossing distance. Adjustment of the profile on the roadway crossing may be required to improve the cross slope of the crosswalk.

Additional guidance on marked crosswalks at uncontrolled locations can be found in the ***AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities***, or ***FHWA's Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines*** (http://safety.fhwa.dot.gov/ped_bike/docs/cros.pdf).

8.4 Bicycle Facilities

The bicycle has become an important element for consideration in the roadway design process. The emphasis in bicycle planning has changed from the attempts to provide completely separate facilities for bicyclists, to the growing recognition that bicyclists are legitimate users of the roadway. Appropriately designed and located bicycle facilities play an important role in encouraging safe bicycle travel. Bicycle facility needs include bicycle lanes, route systems, and separate paths with the appropriate signs, control devices, parking facilities, etc. Measures that can considerably enhance a route's safety and capacity for bicycle traffic are:

1. Paved shoulders, either designated or undesignated as bike lanes
2. Bicycle-safe drainage grates
3. Manhole covers flush with grade
4. Maintaining a smooth, clean riding surface
5. Bicycle corridors on off-system routes

8.4.1 Bicycle Lanes (Designated)

A designated bicycle lane is a portion of the roadway designated by striping, signing and/or special pavement markings for the exclusive use of bicyclists. FDOT striping is shown in the ***Design Standards***. Designated lane signs shall be used in accordance with the ***MUTCD***.

Designated bicycle lane width requirements are provided in ***Chapter 2*** of this volume.

On roadways with flush shoulders, the FDOT standard 5' paved shoulder provides for a bicycle lane.

On curb and gutter roadways, a 4' width measured from the lip of the gutter is required. This provides for a 5.5' width to the face of curb when FDOT Type F curb and gutter is used. The 1.5' gutter width should not be considered as part of the rideable surface area, but this width provides useable clearance to the curb face. Where parking is present, the bike lane should be placed between the parking lane and the travel lane and have a minimum width of 5'. At intersections with right turn lanes, the bicycle lane should continue adjacent to the through lane between the through lane and the right turn lane, and should be 5' in width, 4' minimum. Standard drawings for various bicycle lane configurations are provided in ***Design Standards, Index 17346***.

Wide curb lanes no longer meet Department requirements for bicycle lanes. In some conditions, such as RRR projects, they may be the only practical option. If possible, on existing multilane facilities without bicycle lanes, and if truck volumes are low, consideration should be given to reducing vehicle lane width to 11 ft. and providing a bicycle lane. Bicycle lanes can be provided by widening existing roadways, paving shoulder areas, eliminating parking, or using emergency lanes normally provided for disabled vehicles.

8.4.2 Bicycle Lanes (Undesignated)

An undesignated bicycle lane is separated from traffic lanes by an edge stripe and should follow the same requirements for width and location as a designated bicycle lane, except it does not include bicycle lane signs and/or special pavement markings.

8.4.3 Bicycle Route Systems

Bicycle route systems are linked by signs to aid bicyclists. Bicycle route systems are ineffectual unless signs are highly specific, giving a clear indication of destination. It may be advantageous to sign some urban and rural roadways as bicycle route systems. Bicycle route signing should not end at a barrier. Information directing the bicyclists around the barrier should be provided.

The decision whether to provide bicycle route systems should be based on the advisability of encouraging bicycle use on a particular road, instead of on parallel and adjacent roadways. The roadway width, along with factors such as volume, speed, types of traffic, parking conditions, grade, sight distance and connectivity to transit, should be considered when determining the feasibility of bicycle route systems. Roadway improvements such as adequate pavement width, drainage grates, railroad crossings, pavement surface, maintenance schedules and signals responsive to bicycles should always be considered before a roadway is identified as a bicycle route system. Further guidance on signing bicycle route systems is provided in the ***MUTCD***.

8.5 Drainage and Utility Considerations

Drainage inlets, grates and utility covers are potential problems to bicyclists. When a new roadway is designed, all such grates and covers should be kept out of the bicyclists' expected path. Refer to the ***Design Standards*** for required grates and inlet tops.

See ***Chapter 2*** of this volume for horizontal clearances for light poles.

8.6 Shared Use Paths

Shared use paths are typically facilities on exclusive rights of way and with minimal cross flow of motor vehicles. They are almost always used by pedestrians, joggers, in-line skaters, bicyclists, and in some cases equestrians. However, the bicycle's operating characteristics will dictate the design of shared use paths. The criteria in this section apply to paved shared use paths. The term *path* as used in this section refers to these paved shared use paths. An example typical design is provided for guidance in ***Volume II, Exhibit TYP-15***.

Shared use paths should be thought of as extensions of the highway system that are intended for the exclusive or preferential use of bicycles and pedestrians in much the same way as freeways are intended for the exclusive or preferential use of motor vehicles. Well-planned and designed paths can provide good pedestrian and bicycle mobility.

Shared use paths can serve a variety of purposes. They can provide a school age child or a bicycle commuter with a shortcut away from busy roadways. They can provide recreational cyclists a peaceful place to ride, away from motor vehicle traffic. Shared use paths can be located along abandoned railroad rights of way, the banks of rivers and other similar areas. They can provide bicycle access to areas that are otherwise served only by limited access highways and closed to bicycles.

8.6.1 Considerations

Shared use paths adjacent to a roadway may be considered if the following conditions are met:

1. The path will be separated from the roadway.
2. There will be few access points or roadways crossing the path.
3. There will be adequate access to local streets and other facilities along the path.
4. There is a commitment to provide path continuity with other bikeways throughout the corridor.

Shared use paths are not replacements for on-street bike lanes. Within a roadway right of way, bike lanes are the safest, most efficient bicycle facility. When paths are located immediately adjacent to roadways, some operational problems are likely to occur:

1. Paths require one direction of bicycle traffic to ride against motor vehicle traffic, which is contrary to the normal Rules of the Road. Motorists are not in the habit of scanning for traffic from that direction.
2. At path ends, bicyclists riding against traffic will tend to continue to travel on the wrong side of the street, as do bicyclists getting on to a path. Wrong-way travel by bicyclists is a major cause of bicycle/automobile crashes and should be discouraged.
3. Many bicyclists will use the roadway instead of the path because they have found the roadway to be safer, less congested, more convenient, or better maintained.
4. Bicyclists using shared use paths generally are required to stop or yield at all cross streets and driveways. Bicyclists using the through roadway have the same priority over cross traffic, because they have the same right of way as motorists.
5. Because of the proximity of motor vehicle traffic to opposing bicycle traffic, barriers may be necessary. Barriers keep motor vehicles separated from paths and path users from traffic lanes but reduce maneuvering room and can complicate maintenance.

8.6.2 Widths

The minimum width of a one-directional shared use path is 6 feet. It should be recognized, however, that one-way paths will often be used as two-way facilities unless effective measures are taken to assure one-way operation.

The minimum width for a two-way shared use path is 12 feet. Under certain conditions it may be necessary or desirable to increase the width of a path due to substantial use by bicycles, joggers, skaters and pedestrians, by large maintenance or emergency vehicles and steep grades. Only under severe constraints should providing less than 12 feet be considered.

8.6.3 Cross Slopes

Since pedestrian use is expected on shared use paths, ADA requirements must be met. Therefore, the maximum cross-slope should be 2%.

The maximum cross-slope for a path used exclusively by bicyclists is 6%.

8.6.4 Grades

To meet ADA the maximum grade is 5%. Grades greater than 5% should be considered ramps and designed accordingly. Maximum ramp slopes are 8.33% and can have a maximum rise of 30 inches, with a level landing at least 60 inches in length.

To accommodate bicycles exclusively, grades should not exceed 5%, since steeper grades cause difficulties for many bicyclists. If the terrain makes it necessary to use steeper grades on short sections, the following restrictions are recommended:

Table 8.6.4 Maximum Grade Lengths

Grade (%)	Maximum Length
6%	For up to 800 feet
7%	For up to 400 feet
8%	For up to 300 feet
9%	For up to 200 feet
10%	For up to 100 feet
11+%	For up to 50 feet

NOTE: When using a longer grade, 4 to 6 feet of additional width should be added to the path to allow some bicyclists to dismount and walk their bikes. Additional clear distances should be provided and sight distances must be modified to accommodate longer grades.

Refer to ***Section 8.6.9*** for controls on grade changes.

8.6.5 Horizontal Clearance

A 4-foot horizontal clearance to lateral obstructions should be maintained on both sides of a shared use path. A 2-foot wide graded area with a maximum 1:6 slope should be maintained adjacent to both sides of the path.

Edge drop-offs should be avoided. When drop-offs cannot be avoided they should be shielded as discussed in ***Section 8.8***.

8.6.6 Vertical Clearance

The vertical clearance to obstructions should be a minimum of 8 feet. However, vertical clearance may need to be greater to permit passage of maintenance and emergency vehicles. In underpasses and tunnels, 10 feet is desirable.

8.6.7 Design Speed

A design speed of 20 mph should normally be used. When a downgrade exceeds 4 percent, a design speed of 30 mph should be considered.

8.6.8 Horizontal Alignment

8.6.8.1 Minimum Radii

The effective superelevation is usually limited to the existing 2% cross slope and may be positive or negative. If a transition is needed, then a minimum 75-foot transition should be used. See ***Table 8.6.8.1*** for minimum radii for shared use paths.

Table 8.6.8.1 Minimum Radii for Shared Use Paths

Design Speed	Superelevation	Friction Factor	Minimum Radius (ft.)
20	2%	0.27	95
20	-2%	0.27	110
30	2%	0.22	250
30	-2%	0.22	300

8.6.8.2 Stopping Sight Distance

The minimum stopping sight distances for a shared use path are given in ***Table 8.6.8.2***. For a shared use path the object height is assumed 0.0 feet and the eye height is 4.5 feet.

Table 8.6.8.2 Minimum Stopping Sight Distances

MINIMUM STOPPING SIGHT DISTANCE (FEET) FOR 20 MPH PATH = 127 FEET, FOR 30 MPH PATH = 230 FEET														
Design Speed	**GRADES**													
	-9%	-8%	-7%	-6%	-5%	-4%	-3%	3%	4%	5%	6%	7%	8%	9%
20 MPH	Use 30 MPH Values					137	134	121	119	118	116	115	114	113
30 MPH	298	287	277	268	260	Use 20 MPH Values								

8.6.9 Vertical Alignment

The minimum length of vertical curve necessary to provide minimum stopping sight distance at various speeds on crest vertical curves is selected by using the formula listed below:

When S > L: $L = 2S - (900 / A)$

When S < L: $L = AS^2 / 900$

L = Min. Length of Vertical Curve (ft.)

A = Algebraic Grade Difference (%)

S = Stopping Sight Distance (ft.)

8.6.10 Separation Between Shared Use Path and Roadway

When two-way shared use paths are located adjacent to a roadway, a separation shall be provided. This demonstrates to both path users and motorists that the shared use path is a separate facility.

On roadways with flush shoulders, this separation is 5 feet measured from the outside edge of shoulder to the inside edge of the path. On roadways with curbs, the separation is 4 feet measured from the back of curb to the inside edge of the path, with consideration of other roadside obstructions (signs, light poles, etc.).

8.6.11 Path Railings

Railings or fences shall be provided as indicated in ***Section 8.8***.

8.6.12 Lighting

Lighting for shared use paths is important and should be considered where riding at night is expected, such as paths serving college students or commuters, and at roadway intersections. Lighting should also be considered through underpasses or tunnels. Lighting standards are provided in ***Table 7.3.1*** of this volume.

8.6.13 Signing, Pavement Marking, and Signalization

The ***MUTCD*** shall be consulted for all signage, pavement markings, and signals, especially on path/roadway intersections.

8.7 Bridges, Overpasses, and Underpasses

A bridge, an overpass, or an underpass may be necessary to provide pedestrian/bicycle continuity to sidewalks and shared use paths.

The overpass or bridge design shall be in accordance with the criteria established below:

1. ***FDOT Structures Design Guidelines – Chapter 10***.
2. ***Section 8.2*** of this volume.
3. The minimum clear width for new FDOT pedestrian bridges is:
    a. On a pedestrian structure - 8 feet.
    b. On a shared use path structure - 12 feet.
    c. If the approach sidewalk or path is wider than these minimums, the clear width of the structure should match the approach width. The desirable clear width should include additional 2-foot wide clear area on each side.
4. Vertical clearance criteria shall be as per ***Chapter 2, Table 2.10.1*** of this volume. Horizontal clearances shall take into affect future widening plans of the roadway below.
5. Ramps
    a. Comply with ADA requirements. See the ***Structures Design ADA Website:***

        http://www.dot.state.fl.us/structures/ada/default.htm

    b. Ramps (routes with grades>5%) should be provided at all pedestrian separation structures. When possible, stairways should be provided in addition to ramps.
    c. Design ramps with the least possible grade, but in no case more than 8.33% and with 5 feet long, intermediate level platforms at a maximum 30-inch rise. Provide level platforms 5 feet long at the top of the ramp and 6 feet long at the bottom.
    d. Provide full-length pedestrian ADA grab handrails on both sides of pedestrian ramps.
6. Fencing/Railing
    a. Provide fencing/railing options in accordance with the ***SDG Chapter 10***.
    b. Provide full or partial screening on pedestrian bridges crossing FDOT right of way in order to reduce the likelihood of objects being dropped or thrown onto

the roadway below. See ***Figure 8.1*** for example of full screening.

c. Pedestrian Bridges on FDOT right of way but not crossing FDOT right of way are not required to be screened.

d. Check with local authorities for guidance on screening for FDOT pedestrian bridges crossing local rights of way.

e. The use of chain link fence on ramps of the pedestrian bridges will be determined on a project-by-project basis.

See ***Chapter 26*** for review requirements based on pedestrian bridge structure category.

Pedestrian underpasses are generally undesirable; however, if one is required, the geometrics and lighting requirements should be discussed with the Department Project Manager and the District Pedestrian/Bicycle Coordinator. Local law enforcement personnel may need to be consulted to assure public safety, emergency accessibility and other desirable features.

8.8 Drop-off Hazards for Pedestrians and Bicyclists

Drop-off hazards are defined as steep or abrupt downward slopes that can be perilous to pedestrians and bicyclists. The Engineer should consider shielding any drop-off determined to be a hazard. Generally, pedestrians and bicyclists will be adequately protected from a drop-off hazard if a guardrail or barrier has been installed between the path or sidewalk and the drop-off. However, circumstances do exist that will ultimately dictate when a railing is needed. Railings or fences should be provided for vertical drop-off hazards. The horizontal clearance discussed in ***Section 8.6.5*** should be maintained where practical when railings or fences are used for drop-offs along shared-use paths.

The following guidelines will be useful in standardizing the identification and treatment of drop-off hazards for pedestrians and bicyclists.

There are two cases that require shielding. As shown in ***Figure 8.2 (Case I)***, a drop-off greater than 10 inches that is closer than 2 feet from the pedestrians' or bicyclists' pathway or edge of sidewalk should be considered a hazard and shielded. Also, as shown in ***Figure 8.2 (Case II)***, a slope steeper than 1:2 that begins closer than 2 feet from the pedestrians' or bicyclists' pathway or edge of sidewalk should be considered a hazard and shielded when the total drop-off is greater than 30 inches. Also, depending on the depth of the drop-off and severity of the conditions below, shielding may be necessary for cases other than described above.

However, in determining if shielding a drop-off hazard would be feasible for protecting pedestrians and bicyclists, the following should be considered:

1. The engineer should ask the Pedestrian/Bicycle Coordinator for information on the number of pedestrians and bicyclists and their routes.
2. Installing fencing or railings are two ways to shield the drop-offs. Fencing is generally intended for rural areas along paths and trails. Standard railing is generally intended for urbanized areas, locations attaching to bridge rail or along concrete walkways. Railings* shown on ***Indexes 850*** and ***860*** of the ***Design Standards*** are appropriate for all drop-offs. ***Indexes 870*** and ***880*** of the ***Design Standards*** are appropriate where drop-offs are 30 inches or less.
   * Note: Care should be taken when using railings or fencing near intersections as they could obstruct the driver's line of sight.
3. Along continuous sections where the drop-off varies above and below the 30" threshold for using ***Index 870*** or ***880***, for uniformity the engineer should consider using only one of the railing types appropriate for all drop-offs (***Index 850*** or ***860***).

4. The height of railings for bicyclists are generally the same as the minimum pedestrian railing height of 42 inches, except a minimum 54 inch railing or fence should be considered on bridges and retaining walls for special circumstances as identified in the commentary of the ***AASHTO LRFD Bridge Design Specifications Section 13.9***. Specify the height of the pedestrian/bicycle railing in the contract plans.

8.9 Florida Intrastate Highway System/Strategic Intermodal System

Department Procedure No. 525-030-250, Development of the Florida Intrastate Highway System (FIHS), gives the following guidance relating to the provisions of bicycle and pedestrian facilities on the FIHS:

"Bicycle and pedestrian facilities shall not be provided on FIHS limited access roadways. For FIHS controlled access facilities, the safe movement of bicycles and pedestrians must be carefully considered and accommodated in such a way as to have no adverse impact to safety, capacity or speed. Separate, offsite, and/or parallel facilities, shall be used where practical and feasible. Bicycle facilities shall be consistent with the requirements of the Department's ***Plans Preparation Manuals, (Topic Nos. 625-000-007*** and ***625-000-008)***."

The above guidance will apply to the Strategic Intermodal System (SIS), until such time that a SIS procedure is developed.

8.10 Public Transit Facilities

When a project includes a public transit route, curb side and street side transit facilities for bus stops should be considered in the roadway design process.

The FDOT ***Accessing Transit: Design Handbook for Florida Bus Passenger Facilities*** provides guidance relating to provisions for curb side and street side facilities. Refer to ***Table 2.11.9*** for criteria on the placement of shelters and benches.

8.10.1. Curb-Side Facilities

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

8.10.2 Street-Side Facilities

Bus stop locations can be categorized as far-side, near-side and midblock stops. Bus stops may be designed with a bus bay or pullout to allow buses to pick up and discharge passengers in an area outside of the travel lane. This design feature allows traffic to flow freely without the obstruction of stopped buses. See ***Figure 8.3*** for typical detail for the bus stop categories. ***Chapter 2 of Accessing Transit*** provides additional details for each facility.

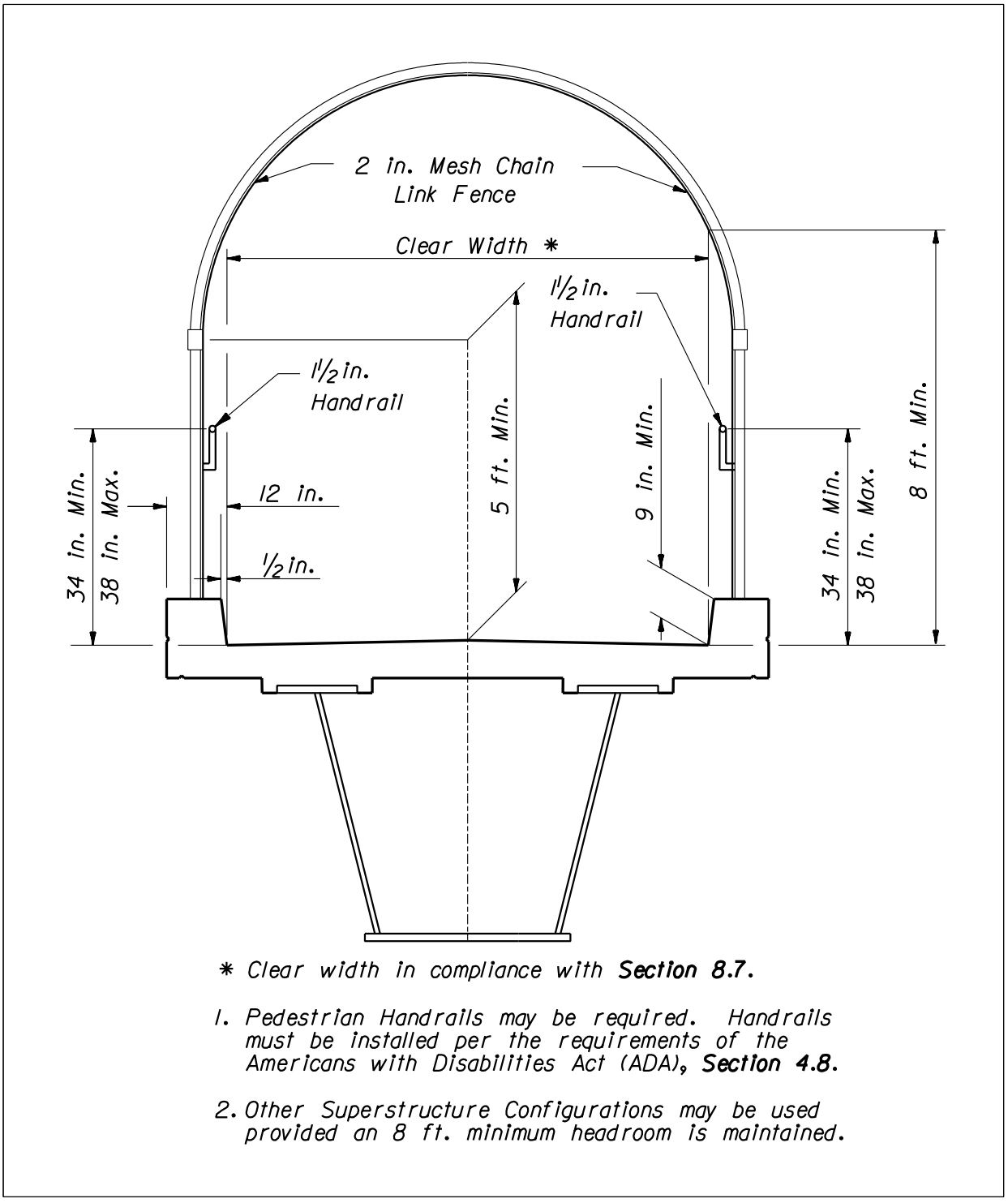
The greater distance placed between waiting passengers and the travel lane increases safety at a stop. Bus bays are encouraged on roadways with high operating speeds, such as roads that are part of the Urban Principal Arterial System. For a particular bus stop, a high frequency of crashes involving buses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

At a specific location, a balance must be obtained based on the designer's judgment and input from the applicable transit agencies. In locations where the traffic volumes exceed

1,000 vehicles per hour per lane, it is difficult to maneuver the bus into the bay and back into the travel lane. Incorporating an acceleration distance, signal priority, or a far-side (rather than near-side or midblock) placement, are potential solutions when traffic volumes exceed 1,000 vehicles per hour per lane.

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

Figure 8.1 Pedestrian/Shared Use Path Bridge Typical Section

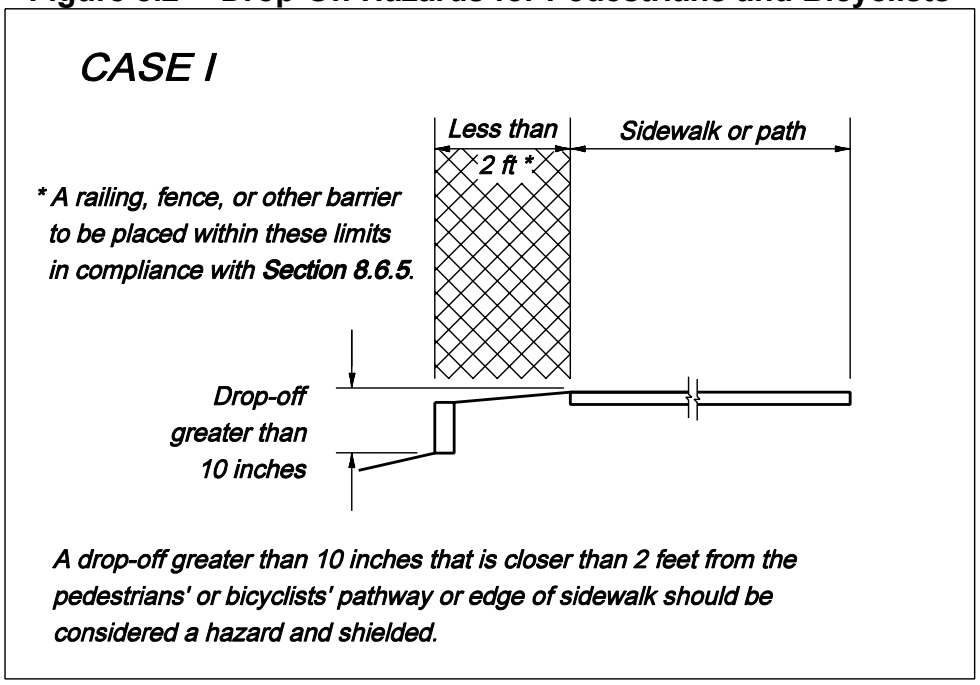


* Clear width in compliance with **Section 8.7.**

1. Pedestrian Handrails may be required. Handrails must be installed per the requirements of the Americans with Disabilities Act (ADA), **Section 4.8.**

2. Other Superstructure Configurations may be used provided an 8 ft. minimum headroom is maintained.

Figure 8.2 Drop-Off Hazards for Pedestrians and Bicyclists



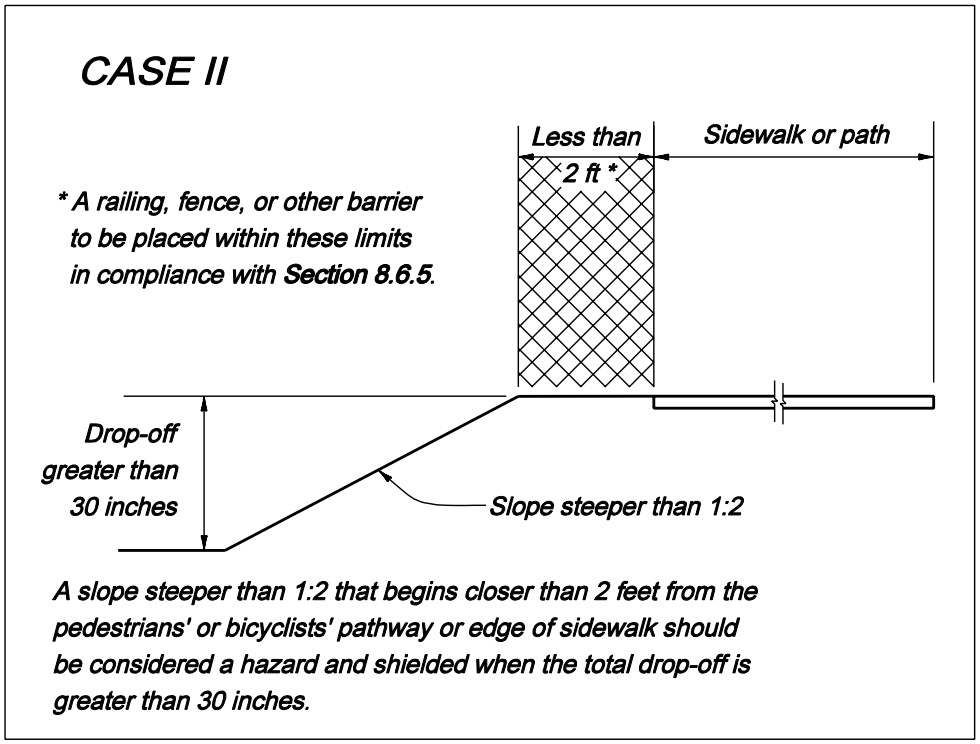
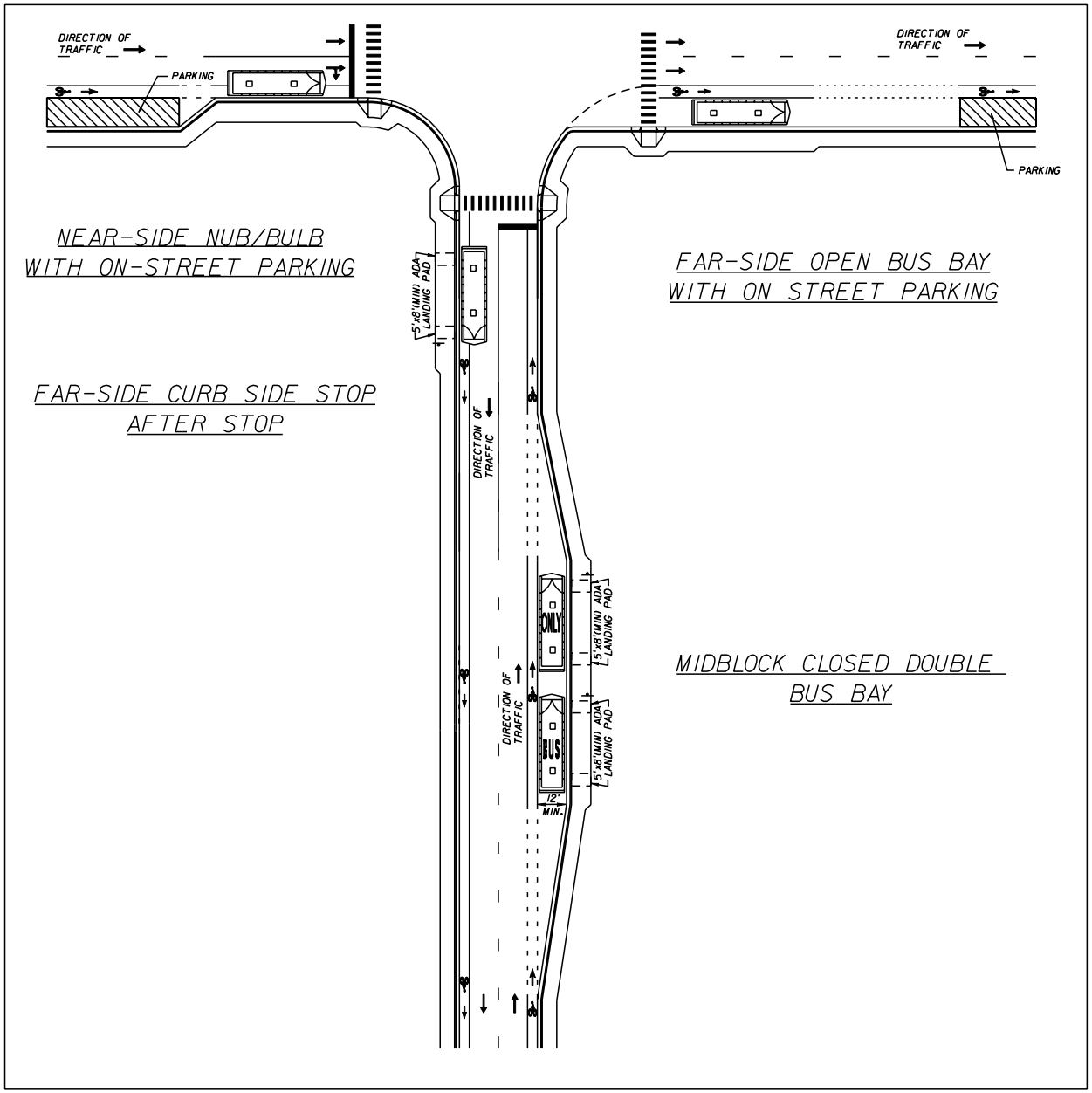


Figure 8.3 Bus Stop Categories



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