PCPT

Pasco County Public Transportation

Transit Infrastructure

Guidelines Manual

June 2005

[Park-and-Ride Section added December 2012]

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Park-and-Ride Facilities

Note: For effectively locating, planning, and designing park-and-ride facilities in Pasco County, this chapter should be used in concert with the Pasco County MPO Conceptual Vision for Park and Ride Facilities (December 2012), prepared and available separately.

Introduction

This portion of the Park-and-Ride Facilities chapter provides the standards necessary to achieve accessibility compliance. Issues concerning the planning elements of park-and-ride facilities are covered in the earlier section, providing conceptual vision aspects for planning parking facilities in support of public transit infrastructure. Additionally, the newly-released revision of the FDOT *State Park-and-Ride Guide* (June 1, 2012) provides ample information necessary to plan, implement, and manage park-and-ride facilities. The State document, located at http://www.dot.state.fl.us/transit/PagesFinalParkandRideGuide 20120601.pdf, provides guidance on the following elements:

- Park-and-Ride Planning Process
- Site Selection
- Demand and Facility Size Estimation
- Impact Assessments
- Economic Analysis and Project Justification
- Conceptual Design Considerations
- Project Selection, Funding, and Allocation Methods
- Maintenance and Management
- Promotion Marketing
- Inventorying, Evaluating, and Reporting on Existing Facilities
- Program Performance Evaluations
- Private Participation

Use of this chapter of the *PCPT Transit Infrastructure Guidelines Manual* and the *State Park-and-Ride Guide* will provide adequate planning, design, and code compliance information for the development of park-and-ride facilities required to support the Pasco County Public Transportation system.

Existing Park-and-Ride Facilities in Pasco County

Currently, there are two park-and-ride lots available in Pasco County, ocated in the south central portion of the county—one at the Crossroads Community Methodist Church on Old Pasco Road and the other at the Victorious Life Church just north of the Hillsborough-Pasco county line.

Crossroads Community United Methodist Church Park-and-Ride Lot


Victorious Life Church Park-and-Ride Lot

Key Park-and-Ride Facility Elements

Types of park-and-ride lots include urban corridor, urban fringe, peripheral , and remote. Urban lots are usually served by express routes that collect transit passengers near their homes in the suburbs and are likely to be used for long-haul trips or car/vanpooling. Peripheral lots are generally located at the edges of an activity center. Note that for the purpose of this chapter, activity centers are described as major trip generator/attractors such commercial hubs, downtowns, collages/universities, office/retail centers, etc. Urban and remote lots can sometimes be joint-use lots near developments such as libraries, meeting halls, sports facilities, theaters, and commercial land uses along major corridors that are not generally used during the work day.

Refer to the *Pasco County MPO Conceptual Vision for Park and Ride Facilities* for a detailed review of urban corridor, urban fringe, peripheral, and remote park-and-ride facilities.

Park-and-ride facilities that exclusively serve local areas (transit routes) are generally smaller due to relatively low demand and often require fewer amenities. Facilities that serve commuter or express routes are often larger and require shelters, bus idling areas, and passenger drop-off areas.

Automobiles should be able to access a park-and-ride lot from collector or access roads intersecting arterials, and bus turning movements should be in the direction opposite incoming traffic. Lots should be connected to multiple streets and ensure minimum conflict with other traffic. Locating facilities on the passenger side of larger traffic streams can avoid conflicts with buses flowing in the opposite direction when they attempt to enter the facility.

Area traffic patterns should be taken into consideration, and adequate queuing space for motorists to wait in cars before parking and transferring to transit should be provided. Lots should be located and designed such that passenger safety, accessibility, and convenience are maximized.

Park-and-ride lots require all-day parking for commuters and should be located within 300 feet of bus loading zones. The number of parking spaces is determined on the basis of current and future ridership; approximately 90 to 100 spaces per acre are reasonable for such facilities. Designated spaces for accessible parking must be located nearest to the bus boarding and alighting areas and must include accessible connections between the accessible parking spaces and the bus loading areas and to amenities throughout the facility.

Some key considerations for the installation of park-and-ride facilities include the following.

- **Adjacent Land Use** – Within existing developments, ease of access to transit should be provided in a car-friendly manner, developed by state or local governments or on private properties such as churches, schools, and recreation and community centers. This simply means to build-in connections, both pedestrian and vehicular, as appropriate, between adjacent developed facilities to facilitate use of the park-and-ride facility.
- **Approximate Site Area** – The site area connected by multiple streets should ensure minimal conflict with other traffic with consideration of traffic patterns and commute patterns. Enough space for motorists to park cars based on the demand needed for transferring to transit or van/ carpooling should be provided. Passenger

comfort, safety, and accessibility should be maximized and and should reduce conflicts with congestion and traffic.

- **Street Characteristics** – Major arterial that serves a commuting corridor.
- **Bus-side Elements** – Bus idling area, off-line bus stop/storage area, bus bay, half-sawtooth bay, vehicle access points.
- **Curbside Elements** – Sheltered stop with benches, bus boarding and alighting area (ADA component), bike parking/securement, trash receptacles, signage, and route information.
- **Park-and-Ride Connections** – Access for all-day vehicle parking; access to bicycle and pedestrian pathways and transit boarding and alighting areas.

Locating Park-and-Ride Facilities

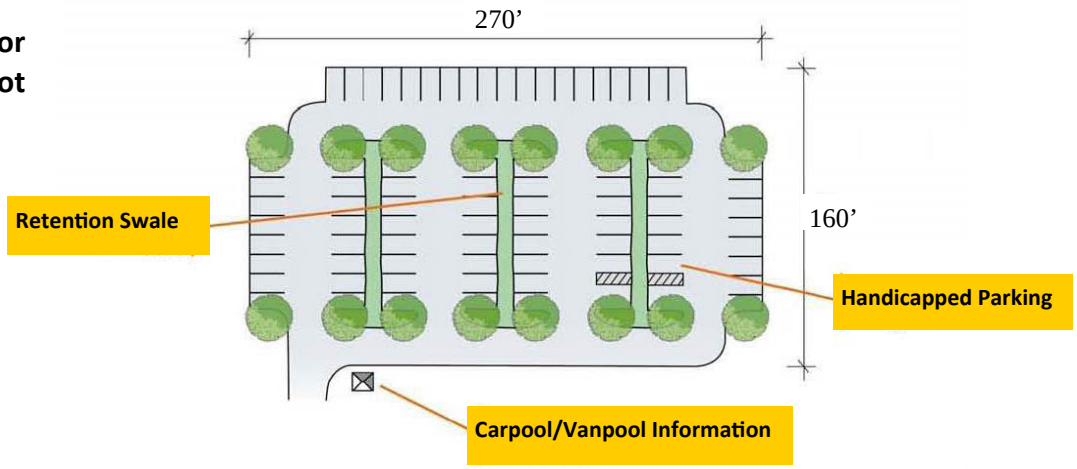
Pasco County MPO has developed the *Conceptual Vision for Pasco Park-and-Ride Facilities*, which identifies potential locations for park-and-ride areas in Pasco County for the next 23 years. The areas are categorized into the four park-and-ride facility types: remote/rural, urban fringe, peripheral, and urban corridor.

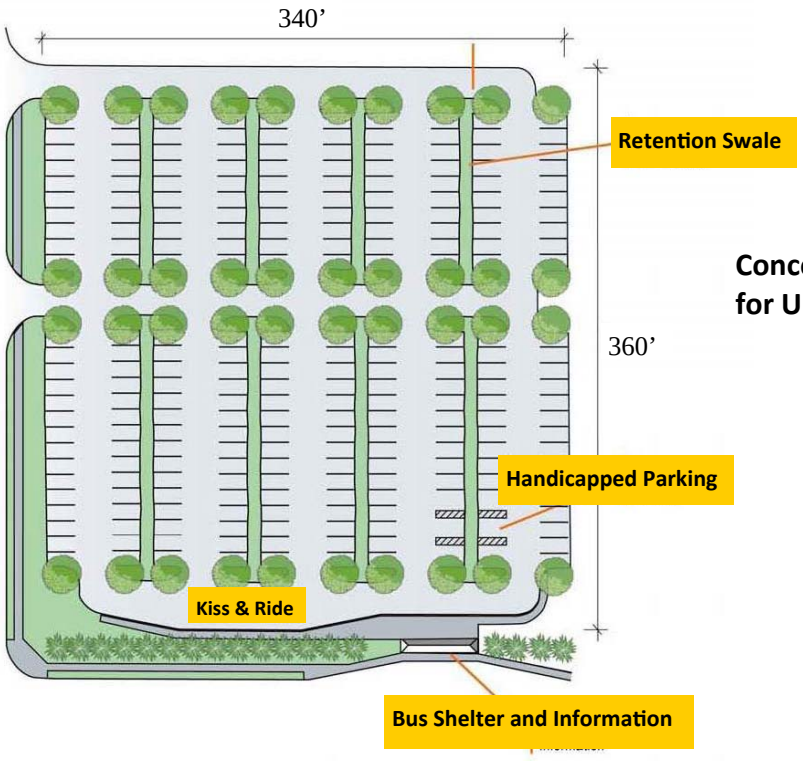
The park-and-ride vision is intended to provide Pasco County with initial guidance for the effective planning and successful integration of park-and-ride facilities into the growing multimodal transportation network in Pasco County. Therefore, prior to identifying potential sites for developing park-and-ride facilities, the Conceptual Vision should be reviewed in consultation with the MPO.

Layout Design

Park-and-ride design layouts vary based on the type of mode served and location of the site. Typical design layouts for rural and urban park-and-ride lots are shown below.

Conceptual Design for Rural Park-and-Ride Lot





Conceptual Design for Urban Park-and-Ride Lot

Source: *FDOT State Park-and-Ride Guide*

The parking layout should consider the following types of parking areas in the site layout:

- Accessible parking
- Kiss-and-ride (passenger drop-off and pick-up areas)
- Short-term parking
- Standard park-and-ride parking

When measured by square feet per space, 90˚parking provides the most efficient layout. Aisles must be designed for two-way traffic for 90˚parking and should be aligned to facilitate convenient pedestrian movement toward the transit loading zone. Aisle lengths should not exceed 400 feet, if possible.

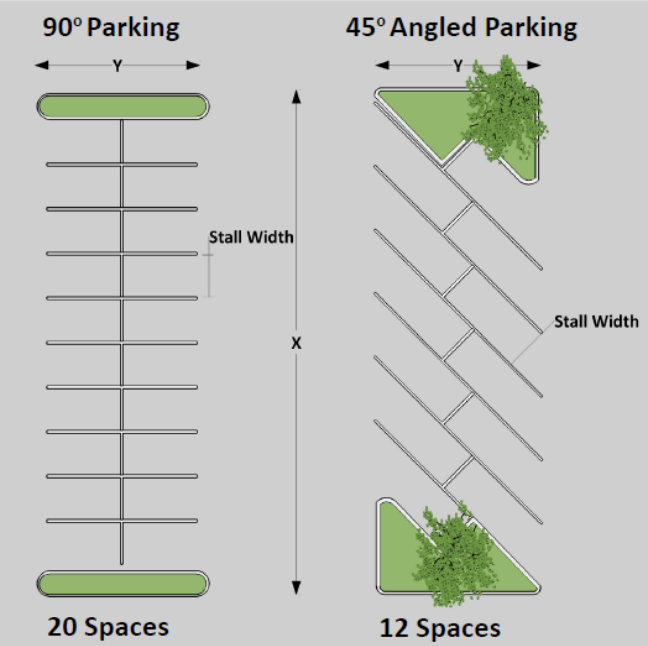
Parking Layout Dimensions for Lots with 90˚and 45˚Angle Parking

(refer to Parking Layout for Small Lot diagram to the right)

Dimension (feet)	On diagram	45˚	90˚
Space width, parallel to aisle	A	12.7	9
Space length of line	B	25	18.5
Space depth of wall	C	17.5	18.5
Aisle width between parking space lines	D	12	26
Space depth, interlock	E	15.3	18.5
Module, wall to interlock	F	44.8	63
Module, interlocking	G	42.6	63
Module, interlock to curb face	H	42.8	60.5
Bumper overhang (typical)	I	2	2.5
Offset	J	6.3	0
Setback	K	11	0
Cross aisle, one-way	L	14	14
Cross aisle, two-way	-	24	24

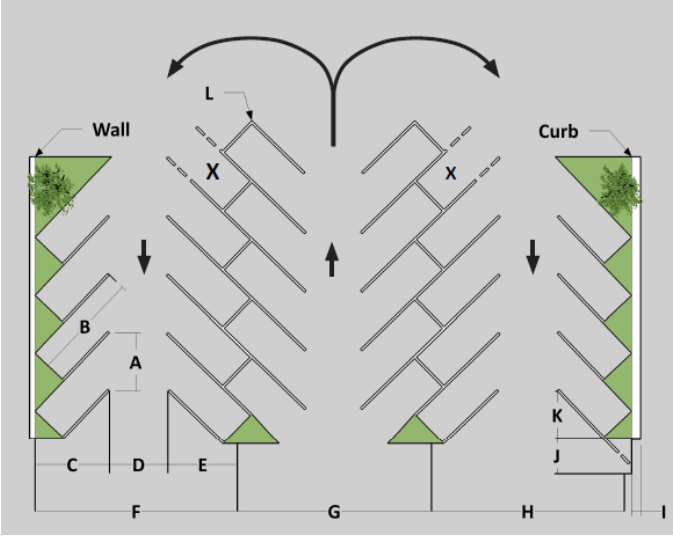
Source: *FDOT State Park-and-Ride Guide*

Comparison of 90˚ and 45˚ Angle Parking Layouts



Source: *FDOT State Park-and-Ride Guide*

Parking Layout with 45˚ Angles for Small Lot



Source: *FDOT State Park-and-Ride Guide*

Lot Size Estimation

The lot sizes for park-and-ride facilities in Pasco County should be determined using one of the following two estimation methods:

- Lot size classification table
- Forecast/model data

Each of the two lot size estimation methods for remote and urban park-and-ride lots, including urban corridor, urban fringe, and peripheral facilities, are discussed in detail below.

Lot Size Estimation Using Lot Classification Table

A park-and-ride lot size classification table has been developed for Pasco County to facilitate the determination of remote and urban park-and-ride lot sizes. The classification table provides ranges of lot sizes for both rural and urban lots as well as the suggested number of parking spaces for each type of lot. It should be noted that for determining more accurate lot sizes for park-and-ride facilities, the methodology using the demand-based approach (see Lot Size Estimation Using Forecast/Model Data) should be used. The classification table is intended to provide general and preliminary information on lot size and space ranges.

The lot size and space estimates may vary from the suggested ranges identified in the table due to forecast demand, right-of-way availability, County/City code requirements, and/or construction costs. The final determination on lot size and space requirements is subject to revisions/approval from Pasco County and where necessary, FDOT.

Park-and-Ride Lot Size Classification Table for Pasco County

Lot Type	Lot Size (acres)[1]	Infrastructure/Amenities Allocation per Lot (acres)[2]	Number of Parking Spaces (300 sf per space)[3]
Remote	0.5–1.0	0.2–0.4	44–87 spaces
Urban[4]	1.0–3.0	0.4–1.2	87–261 spaces

[1] Ranges for lot size and number of spaces are for surface park-and-ride lots. The ranges are based on information from FDOT *State Park-and-Ride Guide (2012),* Transit Cooperative Research Program (TCRP) Report 95: *Park-and-Ride/Pool* (2007), Washington State DOT Design Manual (2009) and through professional judgment. Currently, no specific standards can be found in published literature on urban or remote park-and-ride lot sizes for Florida or elsewhere. A review of industry data also have not yielded any tested scientific data, as size is generally a function of demand and estimated through various formulas. For more accurate lot size determinations, refer to the lot size estimation techniques using forecast/model data (see Lot Size Estimation Using Forecast/Model Data).

[2] Infrastructure/amenities allocation of 40% assumed based on review of industry data. Typically, allows for borders, landscaping, passenger amenities, bus facilities for larger lots, and future expansion.

[3] Allocation of 300 sf for a surface parking lot assumed based on review of industry standards. Includes sufficient area for parking, circulation, and access. If parking structure/garage planned, 325 sf per parking stall recommended.

[4] Urban park-and-ride lots sizes/space ranges are applicable to all urban lot types, including corridor, urban fringe, and peripheral park-and-ride facilities.

Lot Size Estimation Using Forecast/Model Data

Lot size estimation for remote and urban lots, including data needs and estimation methodologies, are discussed below.

The information provided here is from the *FDOT State Park-and-Ride Guide,* which should be referred to for more details on lot size estimation.

Remote Lot Size Estimation

Data needed:

- Observations of actual informal parking
- Population data at the trip origin
- Employment data at the destination end

The methodology for estimating lot size for a remote facility includes counting existing informal parking and adjusting for growth and expected error. The methodology and an example calculation are provided below. The example assumes design in five years.

Remote Lot Size Estimation – Methodology

Step 1: Identify parking activity surrounding the candidate site in Pasco County and count Actual Informal Parking (AIP). AIP counts the parking occurring at informal locations serving a candidate site, including on available right-of-way (ROW) or unused parking spaces at nearby private parking lots, etc. This should be performed by an individual or study team familiar with the area, its commuting patterns, and employment and activity centers attracting commuters. Identifying the area in which to perform the counts may be somewhat challenging due to the highly variable roadway configurations, location of commuter routes, and population.

Step 2: Select a design year and compute an appropriate growth factor. Compute the growth factor based on projections of population within the service area of the lot (origin) and employment in the urban area(s) the lot serves (destination). A 2.5-mile buffer around the facility can be used as lot service area. (Research has shown that 50% of a park-and-ride facility's demand is typically generated within a 2.5-mile buffer area around the facility.) However, the service area may need to be expanded and adjusted based on size and location of the population densities. Suggested sources of population and employment forecast data include Pasco County MPO's LRTP or the University of Florida's *Florida Statistical Abstract*.

Step 3: Compute the design year parking demand. Multiply the existing number of parked vehicles from Step 1 by the growth factor computed in Step 2. This estimate of future design year parking demand may need to be adjusted downward based on the experience that size estimates for remote lots tend to be overstated. As construction of a remote lot does not ensure its use by those observed to be parking at informal locations nearby, the computed estimate of demand should account for this. This downward adjustment should be based on local knowledge of public travel behavior and perceptions, potential effectiveness of increased parking enforcement, and amount of citizen requests and complaints associated with facility provision.

Step 4: Convert total parking space needs to an area needed. A factor of 300 sf per space should be used for lot size calculations. This factor includes sufficient area for parking, circulation, and access; however, ROW availability often constrains or dictates the size of remote facilities. In situations where ROW is being provided at an existing facility, the estimate must also account for parking needs generated by that facility during coinciding hours of use.

Remote Lot Size Estimation – Sample Calculation

Step 1: Count actual informal parking and collect population data at the origin and employment data at the destination for both current and design years.

Step 2: Compute an appropriate growth factor.

Pop_c (1)	Pop_d (2)	F_{pop} (3) = (2) ÷(1)	Emp_c (4)	Emp_d (5)	F_{emp} (6) = (5) ÷(4)	Growth Factor (7) = $\sqrt{(3)\times(6)}$
3000	**3200**	**1.067**	**750**	**850**	**1.133**	**1.100**

Pop_c = Population at origin in current year
Pop_d = Population at origin in design year
Emp_c = Employment at destination in current year
Emp_d = Employment at destination in design year
F_{pop} = Population growth factor
F_{emp} = Employment growth factor

Step 3: Compute design year parking demand (number of vehicles)

AIP (1)	Growth Factor (2)	Design Year Parking Demand (3) = (1) × (2)
30	**1.100**	**33**

AIP = Count of actual informal parking (number of vehicles)

Step 4: Convert parking space needs to an area measure (lot size).

Design Year Parking Demand (1)	Area per Space (2)	Design Year Area Measure (3) = (1) × (2)
33	**300 sq ft**	**9,900 sq ft**

Urban Lot Size Estimation

This lot size estimation methodology can be used for urban corridor, urban fringe, and peripheral facilities.

Data needed include the following:

- Activity center employment (from ZDATA file)
- Home-based work mode share data (such as from urban model mode split step)
- Home-based work trip vehicle occupancy data (such as from urban model mode split step)
- Activity center parking inventory from local data source or field data collection exercise

Estimation of lot size for urban facilities require more data and involves more detailed calculations.

The TAZ map, design year employment, and design year population can be obtained from the urban area data sets maintained by the local MPO and/or the FDOT District Planning Office. Interpolation may be necessary if the base or planning years of these data are not consistent with those of the sizing analysis.

Traffic counts for State facilities are available from FDOT District Offices. Counts for County and City facilities are available from County and City agencies.

In some communities, the MPO or other local agency compiles and publishes traffic counts from all jurisdictions with scheduled traffic count programs.

An inventory of available parking spaces may need to be performed. Such inventories may already exist and can be obtained by contacting the local parking authority, city, county, and/or MPO. The inventory should concentrate on spaces in public and private surface lots and structures, and also include curbside parking spaces.

The methodology is described below. An example calculation also is provided thereafter. The example assumes design in five years.

(Note: Peripheral facilities are designed to supplement parking deficiencies in highly-congested or access-restrained activity centers. Therefore, per FDOT, the size requirements for peripheral facilities can also be determined from estimates of the parking deficiencies, with considerations for transit usage and the distribution of existing parking supply. If transit service is not provided, the peripheral parking facility will need to be located within comfortable walking distance of high activity centers.)

Urban Lot Size Estimation – Methodology

Step 1: Estimate total parking demand for the activity center. Identify the TAZs contained in the activity center. The "Total Employment" variable contained in FSUTMS ZDATA files is then accumulated for these zones. The resulting value represents work trips for the activity center. Total parking demand for work trips on a person-trip basis is computed by subtracting transit usage from the total activity center employment. The mode split distributions from the Tampa Bay Regional Planning Model (TBRPM) can be used to factor out transit usage. If data are not available, use 4% for a large/medium urban area or 1% for a small urban area (Source: *FDOT State Park-and-Ride Guide*).

Parking demand is then computed by dividing the number of work-purpose person trips by vehicle occupancy. Local occupancy values should be used and can be found in the urban area model documentation and mode split model setups. If data are not available, use 1.110 (Source: 1996 Tampa Bay Area Household Survey, AM Peak) or 1.130 (Source: *FDOT State Park-and-Ride Guide*), or other locally-recommended sources.

Total parking demand is computed by dividing the work trip parking demand by the ratio of work trips to total parking in the activity center.

$$\text{Total Parking Demand} = \frac{[\text{Emp} \times (1-T_{share})]}{[\text{Occ} \times R_w]}$$

Emp = Total activity center employment at destination
T_{share} = Proportion of work trips using transit
O_{cc} = Average vehicle occupancy for activity center work trips
R_w = Proportion of parking spaces used for work trip parking

The table below presents distributions of activity center parking by trip purpose that can be used to obtain values for R_w (Source: *FDOT State Park-and-Ride Guide*). The work trip factor is selected based on the population of the entire urban area in which the study is being conducted. For Pasco County, 23 percent can be used for R_w.

Distribution of Trip Purpose (R_w)

Urban Area Population	Work (%)	Shopping (%)	Personal Business (%)	Other (%)
Northeast Florida	23	29	24	24
Southeast Florida	31	16	23	30
Tampa Bay Area	23	34	23	20
Volusia County	28	24	28	20
Statewide Average	26.3	25.8	24.5	23.5

Step 2: Determine parking supply deficiency. The following formula is used to determine the parking supply deficiency:

$$\text{Parking Deficiency} = \text{Total Parking Demand} - \text{Supply}$$

Supply in the above equation is existing parking supply obtained from parking inventory at the destination. The equation defines a parking deficiency if a positive value is produced. However, a negative value does not necessarily indicate that there is sufficient parking throughout the entire activity center; subareas within the activity center may be under-supplied.

Step 3: Compute the maximum number of parking vehicles the facility can capture. This is based on the orientation of the parking facility to important access routes. Identify the roads that provide access to the area in which the parking facility is to be located. Then, calculate the maximum number of parked vehicles that could use the facility:

$$\text{Maximum Parking Capture} = \text{Parking Deficiency} \times (V_{adj} / V_{all})$$

V_{adj} = Traffic volume on adjacent roadways from which parkers are expected to access facility
V_{all} = Total traffic volume on commuting arterials and highways accessing activity center

Step 4: Determine park-and-ride parking demand. Compare the supply of existing parking in the vicinity of the potential new facility with the maximum number of potential parkers computed in Step 3. Not all of the parking capture computed in Step 3 will use the new park-and-ride facility; some will use other available parking in the area. Therefore, an adjustment needs to be made to compute the actual parking demand for a new facility. The location and quantity of existing parking available in the activity centers in relation to the final destinations and traffic circulation patterns must be considered.

Step 5: Determine the facility size needs. The actual parking demand computed in Step 4 is used to determine the facility size needs. Both surface lots and parking garages are possible options, depending on the size of parcel, cost of land, surrounding land use, and density. Parking spaces, circulation, access, and transit loading areas should be considered.

Compute the size needs for surface and structural facilities as follows:

$$\text{Surface Lot: Size (acres)} = \frac{[(300 \times S) + (240 \times B)]}{43{,}560}$$

$$\text{Garage: Size (acres)} = \frac{[\{325 \times (S \div F)\} + (240 \times B)]}{43{,}560}$$

S = Number of parking spaces (actual parking demand from Step 4)
B = Number of bus bays
F = Number of floors of parking structure/garage
240 = Sq. ft. per bus bay
300 = Sq. ft. per parking space for surface facilities
325 = Sq. ft. per parking space for structure facilities (i.e., parking garage)
43,560 = Conversion factor from sq. ft. to acres

Urban Lot Size Estimation – Sample Calculation

Step 1: Compute total parking demand.

Emp (1)	T_{share} (2)	1-T_{share} (3) = 1.00 - (2)	Occ (4)	R_w (5)	Total Parking Demand (6) = [(1) × (3)] ÷ [(4) × (5)]
800	**0.04**	**0.96**	**1.171**	**0.235**	**2,791**

Emp = Total activity center employment at destination
T_{share} = Proportion of work trips using transit
O_{cc} = Average vehicle occupancy for activity center work trips
R_w = Proportion of parking spaces used for work trip parking

Step 2: Compute parking deficiency.

Total Parking Demand (1)	Parking Supply (2)	Parking Deficiency (PD) (3) = (1) – (2)
2,791	**1,800**	**991**

Step 3: Compute maximum parking capture.

Parking Deficiency (PD) (1)	V_{adj} (2)	V_{all} (3)	Max Parking Capture (4) = (1) × [(2) ÷ (3)]
991	**2,400**	**3,000**	**793**

V_{adj} = Traffic volume on adjacent roadways from which parkers are expected to access facility
V_{all} = Total traffic volume on commuting arterials and highways accessing activity center

Step 4: Determine actual park-and-ride parking demand (number of vehicles). This step involves a subjective assessment of the actual parking demand by considering the supply of existing parking in the vicinity of the new facility with the maximum number of potential parkers computed in Step 3. For the example, assume a supply of 300 spaces in the vicinity of the new facility. This results in an actual parking demand of 493 (793 – 300) spaces for the new park-and-ride facility.

Step 5: Determine facility size.

Type of Facility (1)	Spaces (2)	Bus Bays (3)	Floors (4)	Facility Size Surface: (5) = [300×(2) + 240×(3)] ÷ 43,560 Garage: (5) = [325×{(2)÷(4)} + 240×(3)] ÷ 43,560
Surface lot	**493**	**10**	**--**	**3.45 acres**
Garage	**493**	**10**	**4**	**0.92 acres**

Examples of various size park-and-ride lots in Florida

Accessibility Compliance Overview

Passengers generally reach bus boarding and alighting areas from park-and-ride lots after parking their automobiles. As the placement of park-and-ride lots may vary from site to site due to various property or financial limitations and physical conditions unique to the site, accessibility for passengers from such lots to the transit vehicle must be designed on a case-by-case basis. In every such case, however, basic minimum ADA standards must be followed in each and every aspect of providing park-and-ride facilities to ensure proper compliance with existing federal and state regulations.

Federal accessibility requirements are provided by the Americans with Disabilities Accessibility Guidelines (ADAAG) as revised in 2004 and adopted and enforced by the U.S. Department of Transportation (DOT) on November 29, 2006. Additionally, the U.S. Department of Justice (DOJ) adopted the 2010 ADA Standards for Accessible Design with full enforcement as of March 15, 2012.

State requirements are from the Florida Building Code, Chapter 11 (Florida Accessibility Code). On March 15, 2012, the State of Florida enacted a revised set of accessibility standards titled the 2012 Florida Accessibility Code (FAC) as an adjunct to the 2010 Florida Building Code. The 2012 FAC standards are, in part, more stringent than are the DOT and DOJ standards, particularly when applied to parking requirements. The State frequently updates its building code standards and generally issues published updates to the codes every two years. The 2012 FAC rulemaking is a major update to the accessibility code due to the federal adoption of the 2010 ADA Standards for Accessible Design. The previous FAC had received certification by the DOJ of its conformance to the ADAAG requirements, but with the revision, recertification is necessary. The 2012 FAC has been developed in conformance with the 2010 ADA Standards for Accessible Design and is expected to receive recertification by DOJ.

With expectations of another revision of the ADAAG standards considerably distant in time, another major update of the FAC is also not expected. **This chapter includes the accessibility requirements enforced as of the date of creation of this chapter** covering park-and-ride facilities; earlier chapters of this manual are based on earlier code requirements.

Accessibility Code Requirements

Bus boarding and alighting (B&A) areas must meet the minimum requirements of the ADAAG (mirrored by FAC requirements). These requirements cover the following potential elements of park-and-ride facilities:

- pedestrian pathways and access
- bus boarding and alighting
- passenger amenities
- information/communication features
- operational features
- parking facilities

The broad categories listed above include the following detailed accessibility parameters as applied to park-and-ride facilities.

Accessible Routes

- Must be 36 inches minimum wide continuous unobstructed path (note that FDOT standards specify walkways must be 48 inches wide minimum).
- Must have a 32-inch minimum width at doorways.
- Must have 60- × 60-inch passing spaces at 200-foot intervals.
- The running slope (direction of travel) must be equal to or less than 5 percent (>5% = ramp).

- The cross slope (perpendicular to direction of travel) must be equal to or less than 2%.

Surfaces and Sidewalks

- Surface must be firm, stable, and slip-resistant (wet or dry).
- Changes in level between 1/4 and 1/2 inch must be beveled at 1:2 slope.
- Changes in level greater than 1/2 inch are not allowed or must be ramped.
- Gaps in gratings must be no greater than 1/2-inch wide, and openings must be aligned perpendicular to travel.

Protruding Objects

- Objects at 27–80 inches above grade must not be more than a 4-inch protrusion.
- Post-mounted objects must not be more than a 12-inch protrusion.
- Overhead clearance must be equal to or greater than 80 inches above the surface.

Ramps and Curb Ramps

- The maximum ramp segment slope permitted is 1:12 (8.3%).
- The maximum cross slope permitted is 1:48 (2.08%).
- Level landings must be provided at each 30 feet (1:12) or 40 feet (1:16) horizontal projection.
- Landings must be no less than 60 inches long and run the full width of the ramp segment.
- Handrails must be provided on both sides of the ramp (handrails are not required on curb ramps).
- Edge protection must be provided on ramp drop-offs.
- Change in direction on ramps must be equal to or greater than 60 × 60 inches.
- Curb ramps must have detectable warning material the full width of the ramp and either the full length of the ramp or 24 inches from the back edge of the curb.
- Curb ramps must have a 36-inch-long landing at the top of the slope.
- Curb ramps must have detectable warning in truncated domes with pattern and characteristics defined by regulations, including contrasting color.
- A detectable warning also is required at landings and flush transitions at street crossings.

Parking Facilities

- Accessible parking must be provided at public access park-and-ride facilities.
- The quantity of accessible parking spaces must be provided according to the following table.

Total Parking in Area/Lot or Structure	Required Minimum Number of Accessible Spaces
1–25	1
26–50	2
51–75	3
76–100	4
101–150	5
151–200	6
201–300	7
301–400	8
401–500	9
501–1000	2% of total
1001 and over	20 + 1 for each 100 over 1000

- FAC requires that each accessible parking space be no less than 12 feet wide (ADAAG specifies an 8-foot-wide parking space).

- Each accessible parking space must have an adjacent 60-inch-wide access aisle (two accessible spaces can share an access aisle). The access aisle must be striped diagonally to designate it as a No Parking zone.
- Accessible parking spaces and their access aisles must be connected to the accessible route (44 inches wide per FAC) closest to the facility's accessible entrance and configured in a manner so that users will not be compelled to travel behind parked vehicles.
- On-street parallel parking spaces must be located either at the beginning or end of a block or adjacent to alley entrances.
- Curb ramps must be located outside of the disabled parking spaces and access aisles.
- Parked vehicle overhangs must not reduce the clear width of an accessible route.
- Parking spaces and access aisles must be level, with surface slopes not exceeding 1:48 (2.08%) in all directions.
- Per the FAC, each accessible parking space must be prominently outlined with blue paint and must be repainted as necessary so as to be clearly distinguishable as a parking space designated for persons with disabilities and must be posted with a permanent above-grade sign bearing the international symbol for accessibility, meeting the requirements of color and design approved by FDOT, Section 11-4.30.7, and the caption "Parking by Disabled Permit Only." Such sign erected after October 1, 1996, must indicate the penalty for illegal use of the space.
- Van-accessible parking spaces located within a parking structure must have an additional sign reading "Van Accessible" mounted below the symbol of accessibility. Such signs must be located so they cannot be obscured by a vehicle parked in the space. A minimum of 1 in every 6 accessible spaces or fraction thereof must be identified as van accessible.
- Van-accessible spaces must provide a minimum vertical clearance of 114 inches at accessible passenger loading zones and along at least 1 vehicle access route to such areas from site entrance(s) and exit(s). Non-van-accessible spaces must provide a minimum vertical clearance of 98 inches at the space and along at least one vehicle access route to the site entrance.
- Surfaces of parking spaces and access aisles must be stable, firm, slip-resistant, and located on the same level (elevation).

Bus Boarding and Alighting Areas

- Must be on or connect to an accessible route.
- Must have an accessible approach to the boarding and alighting area and all provided amenities.
- The clear area of the boarding and alighting area must be equal to or no less than 60 inches parallel and 96 inches perpendicular to the curb or street/roadway edge and connected to the accessible route.
- The cross slope of the boarding and alighting area (perpendicular to the curb) must be equal to or less than 2%.
- The running slope (parallel to the curb) of the boarding and alighting area should match the slope of roadway.
- The boarding and alighting area must provide a firm, stable, slip-resistant surface.
- The bus stop site must be chosen to provide the greatest degree of accessibility practicable.
- Bus stop amenities must be connected to an accessible route and allow accessible

maneuvering space and be within a 48-inch maximum reach range of all operating controls.
- If a shelter is provided, it must connect to the accessible route and allow a minimum space of 30 × 48 inches fully within the shelter.
- If a bench is included within a shelter, it must allow minimum space of 30 × 48 inches resting/ transfer space at one end of the bench.

Park-and-Ride Signs

Park-and-ride signs may be used to direct road users to park-and-ride facilities. They also promote use of the facility. They should be placed on all routes providing access to a park-and-ride lot and should be placed to intercept users on their normal paths and guide them directly to the facility.

The signs should conform with the applicable *Manual on Uniform Traffic Control Devices* (MUTCD) and *FDOT Design Standards*. The following standards and guidelines are included in the most recent MUTCD:

- The signs must contain the word message "Park–Ride" and direction information (arrow or word message). However, they also may contain the local transit pictograph and/or carpool symbol.
- If used, the local transit pictograph and/or carpool symbol must be located in the top part of the sign above the "Park–Ride" message. In no case should the vertical dimension of the local transit pictograph and/or carpool symbol exceed 18 inches. (If the function of the parking facility is to provide parking for persons using public transportation, the local transit pictograph should be used on the guide sign. If the function of the parking facility is to serve carpool riders, the carpool symbol should be used on the guide sign. If the parking facility serves both functions, both the local transit pictograph and carpool symbol should be used.)
- These signs must have a retroreflective white legend and border on a rectangular green background. The color of the local transit pictograph must be selected by the local transit authority. (To increase the target value and contrast of the local transit pictograph, and to allow the local transit pictograph to retain its distinctive color and shape, the pictograph may be included within a white border or placed on a white background.)

The FDOT Traffic Engineering and Operations Office should be contacted to ensure appropriate placement distances for guide signs.

Signs should be considered at interstate or major arterial highways to direct users to nearby facilities. When feasible and applicable, using Variable Message Signs (VMSs) may promote the lot and provide real-time information on the number of parking spaces available and time until the next transit vehicle leaves. However, VMS use requires approval by Federal Highway Administration (FHWA) and/or FDOT Traffic Engineering and Operations.

Bus Stop Signs

Proper signs at bus stops are an important element of good transit service. Signs serve as a source of information to patrons and operators regarding the location of the bus stop and are excellent marketing tools to promote transit use. For example, letter styles, sign appearance, and color choice should be unique to the transit system so that passengers can readily identify bus stops.

- Double-sided signs that provide for visibility from both directions and reflectorized signs for night-time visibility are preferred.
- Bus stop signs should be placed at the location where people board the front door of the bus. The bus stop sign should show the area where passengers should stand while waiting for the bus and serve as a guide for the bus operator in positioning the vehicle at the stop.
- The bottom of the sign should be at least 7 feet above ground level and should not be located closer than 2 feet from the curb face.

Other Signage

- Signs providing route designations, bus numbers, destinations, and access information must be designed for use by transit riders with vision impairments. In some cases, two sets of signs may be needed to ensure visibility for most users and to assist users with sight limitations. Route maps or timetables are not required at the stop, although such information would be valuable to all passengers.
- Specific guidelines are given for these signs in Section 703 of the ADAAG and must be followed to ensure compliance.
- Signage should follow the MUTCD, FDOT, and local guidelines.

Other Parameters

- Transit route information can be displayed on shelters, in building lobbies, along developed walkways, and in other appropriate areas to provide accurate route and schedule information to the public. PCPT bus stop installations at park-and-ride facilities could include a route schedule sign display mounted to the bus stop sign post or on the shelter wall when provided.
- Landscape features can be used at transit waiting areas to increase passenger comfort and to develop an attractive transit waiting area. Earth berming, trees, and other plantings can be used to provide shade, act as windbreaks, and offer an aesthetically-appealing environment to transit users. However, passenger security, as well as the corner sight-distance triangle, must be considered when designing these features.

Doors

- Doors at entrance, exits, and within facilities must provide a minimum clear width opening of 32 inches.
- Maneuvering clearances in compliance with ADAAG Section 404 must be provided at doors to provide sufficient space for the maneuverability of a wheelchair to gain egress.
- If thresholds are provided at doorways, the vertical change in level must be no greater than 1/2 inch.
- If doors are in series (as in a vestibule), the space between two hinged or pivoted doors or gates must provide a minimum of 48 inches plus the width of the doors or gates that swing into the space.
- Handles, pulls, latches, locks, and other operable parts on doors and gates must be located at 34 inches minimum and 48 inches maximum above the finished floor or ground surface; they must not require tight grasping, pinching, or twisting of the wrist to operate; and they must not require more than 5 pounds of force to operate.
- When a door is equipped with a closer and is open to the 90˚ position and allowed to swing shut to 12˚ from the latch, the time required to close the door cannot exceed 5 seconds.

- When a door is equipped with spring hinges and is open to the 70˚ position and allowed to swing shut to the latch, the time required to close the door cannot exceed 1.5 seconds.
- The force required to push or pull a door or gate open can be no greater than 5 pounds.
- Swinging door surfaces that are within 10 inches above the finish floor or ground must be provided with a smooth surface on the push side of the door and cover the full width of the door.
- Glazed panels within doors or adjacent to doors that permit viewing through the panels must have the bottom edge of at least 1 glazed panel located no higher than 43 inches above the finished floor.
- Where automatic or power-assisted doors are provided as a means of egress without standby power, a clear break-out opening must be provided that is at least 32 inches wide for emergency use.

Amenities

Shelters, benches, leaning rails, trash receptacles, bicycle racks, system information signage, or other elements placed at park-and-ride facilities must be placed in a manner to be fully accessible to people with disabilities, as follows:

- The amenity must be connected to an accessible path that provides a direct connection to the boarding and alighting area and to other amenities provided at the site.
- A clear 30- × 48-inch space must be provided at each amenity to allow for wheelchair access.
- A clear unobstructed pathway width of 36 inches minimum must be provided.
- A maximum vertical reach range of 48 inches must be provided for activation of any controls on use of objects such as pedestrian crossing signal buttons, brochures in information racks, switches, on other control features that require patron activation for use. Note that FDOT requires a 42-inch reach range limit for pedestrian signal control buttons.

References

Brasco International, Inc., Detroit, MI. Slimline Series bus shelter schematics and images.

Ewing, Reid. *Pedestrian and Transit-Friendly Design.* 1996.

Florida Department of Transportation. *District 4 Transit Facilities Guidelines.* April 2002.

Florida Department of Transportation. *FDOT State Park-and-Ride Guide.* June 2012.

Jacksonville Transportation Authority. *JTA Mobility Access Program Handbook.* September 2003.

Maryland Department of Transportation. *Access by Design: Transit Role in Land Development*. September 1988.

Metropolitan Transit Development Board. *Designing For Transit.* San Diego, California, July 1993.

Parsons Brinckerhoff. *Geometric Design Guide for Transit Facilities on Highways and Streets—Phase I, Interim Guide.* July 2002.

Transit Cooperative Research Program. *Report 19, Guidelines for the Location and Design of Bus Stops.* 1996.

Transit Cooperative Research Program. *Report 95, Park-and-Ride/Pool-Traveler Response to Transportation System Changes.* 2004.

Tri-County Metropolitan Transportation District of Oregon. *Planning and Design for Transit Handbook.* 1996.

U.S. Department of Transportation. *Manual on Uniform Traffic Control Devices.* 2009.