



RAPID TRANSIT SYSTEM EXTENSIONS
COMPENDIUM OF DESIGN CRITERIA

VOLUME I
SYSTEMWIDE DESIGN CRITERIA

CHAPTER 3
TRAFFIC DESIGN CRITERIA

INTERIM RELEASE
REV 1

OCTOBER 30, 2008

PROGRAM MANAGEMENT CONSULTANT

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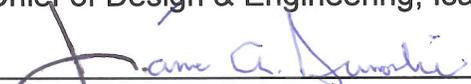
VOLUME I – SYSTEMWIDE
CHAPTER 3 – TRAFFIC DESIGN CRITERIA
REVISION 1

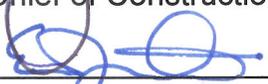
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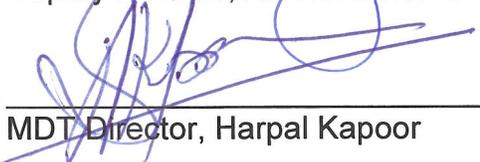
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CHAPTER 3 TRAFFIC DESIGN CRITERIA
REVISION 1

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3.1 INTRODUCTION

This chapter establishes criteria and standards for the design of various facilities within or associated with the Rapid Transit System Extensions including streets, parking lots, parking structures, pedestrian facilities, and driveways (including signing and marking). Replacement of existing facilities to be maintained by others shall be replacement in kind, in conformance with applicable standards. New facilities to be maintained by others shall be designed in conformance with standards of the agency having jurisdiction, or criteria contained herein if approved by such agency.

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3.2 GOALS AND OBJECTIVES

The basic goals of this chapter are to define those criteria necessary to:

- A. Provide for the safety of Rapid Transit System patrons while arriving at or departing from the station site.
- B. Provide safe, efficient and convenient traffic circulation patterns for vehicular and pedestrian movements within and adjacent to the Rapid Transit System Extension facilities.
- C. Provide Rapid Transit System Extension parking facilities which are safe, convenient, attractive, efficient, functional and easily maintained.
- D. Provide for the reconstruction of local roads and streets disturbed by Rapid Transit System Extension construction and to ensure that equal or better service is provided.

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3.3 DEFINITIONS

Special terms used in this chapter are defined as follows.

Aisle: The traveled way provided primarily for vehicular circulation between rows of stalls in a parking lot or parking structure. Stall entrances occur on one or both sides of an aisle.

Auxiliary Lane: The portion of the roadway adjoining the traveled way for direction change, speed change, or for other purposes supplementary to the through traffic movement.

Average Daily Traffic: The total volume during a given time period in whole days greater than one day and less than one year divided by the number of days in that time period; commonly abbreviated as ADT.

Border: The portion of a street extending from the curb face to the right-of-way line.

Circulation Road: A roadway, within a parking lot, used only to provide vehicular circulation. No parking stall entrances occur on either side of a circulation road.

Construction Sign: A sign that alerts motorists to special conditions which are due to construction work. Construction signs may include regulatory, warning, and guide signs.

Curb, Barrier: A curb that is designed to prevent or discourage vehicles from leaving the pavement.

Curb, Mountable: A curb that can be readily driven over by a moving vehicle.

Driveway: A street connection which provides vehicular access from the street to adjacent property.

Eighty-Five Percentile Speed: The speed below which 85 percent of the traffic is moving.

Entrance: A means of direct access from a public street to either a parking lot or parking structure.

Face of Curb: The curb face nearest the traveled way.

Grade: The rate of inclination of a slope with respect to true horizontal, in percent.

Ground Level: A level of parking structure, or a portion thereof, which is approximately at the same elevation as the adjacent ground.

Guide Sign: A sign that shows directional information.

Kiss-and-Ride: A term used to describe that vehicle mode in which passenger cars or taxis park only to pick up or discharge passengers and where the duration of parking is limited to a relatively short time period.

Median Lane: An auxiliary lane, including tapered areas within the median, to accommodate left turning vehicles.

Overhead Sign: A sign mounted over or extending over the roadway.

Park-and-Ride: A term used to describe that vehicle mode in which passengers park their cars, ride the Rapid Transit System, and return to their cars later in the day.

Parking Lane: A paved area adjacent to and continuous with a traffic lane with the primary purpose of accommodating parked vehicles.

Pedestrian Barrier: A barricade or other device erected for the purpose of restricting pedestrian movement.

Pedestrian Walkway: An area, within or adjacent to a parking facility or Station, intended for the exclusive use of pedestrians.

Public Street: A thoroughfare outside the Rapid Transit System station site boundary or right-of-way, including the roadbed and borders.

Ramp, External: An inclined roadway outside the building line of a parking structure. Its purpose is to provide direct vehicular access between an adjacent street and a structure level not at common elevation with the adjacent street.

Ramp, Internal: An inclined roadway within a parking structure. Its purpose is to provide vehicular travel between levels of a structure. An internal ramp may or may not have parking stalls thereon.

Rapid Transit System (System): The initial stage of the Miami-Dade Transit Rapid Transit System and its Extensions including guideway trackage, yards and shops, stations and parking facilities.

Regulatory Sign: A sign that informs motorists of governing regulations.

Roadway: The portion of the road extending from face of curb to face of curb, or outside edge of shoulder to outside edge of shoulder.

Safe Approach Speed: The maximum speed at which a vehicle may approach an intersection under the prevailing conditions of gradient and available sight distance and be capable of a safe stop.

Shoulder: The portion of the roadway adjacent to and continuous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

Short-Term Parking: Is defined as that area of the parking spaces to be utilized during noncommute hours. Usually located adjacent to the kiss-and-ride pick-up and discharge area and in most cases includes the kiss-and-ride area during the midday.

System Road: A roadway which is the primary means of vehicular access to the station for the principal purpose of parking or loading/unloading passengers.

Traffic Control Device: Any sign, signal, pavement marking, or device placed or erected for the purpose of regulating, warning, or guiding vehicular traffic and/or pedestrians.

Traffic Lane: A strip of roadway intended to accommodate a single line of moving vehicles.

Traveled Way: The portion of the roadway for the movement of vehicles, exclusive of gutters, shoulders, and auxiliary lanes.

Upper Level: A level of a parking structure which is above the ground level.

Valley Gutter: A street connection which provides vehicular access from the street to adjacent property and flume for continuous gutter flow along the street.

Volume, Pedestrian: Pedestrian design volumes (in pedestrians per minute) generated by System patrons shall be based on one-fifth of the AM peak five minute period of the average annual weekday (AAWD) of the design year.

Volume, Vehicular: Vehicles per hour, based on the Average Annual Week Day AM peak hour, peak design day of the design year.

Warning Sign: A sign that cautions motorists of the need for added alertness to some condition.

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3.4 CODES AND REGULATIONS

The current adopted version of [the](#) codes, standards and regulations cited within this document shall apply, and unless otherwise directed, all addenda, interim supplements, revisions and ordinances by the respective code body shall also apply. Where conflicts exist between these, the more stringent requirement shall take precedence, unless otherwise directed by MDT.

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3.5 PATRONAGE ACCESS/EGRESS MODES

3.5.1 BASIC MODES

Patrons will arrive at, and depart from, the station in four basic modes. These modes, in order of priority for convenience and directness of routing, are as follows:

- A. Pedestrian (including bicycle)
- B. Bus
- C. Kiss-and-ride (including taxi)
- D. Park-and-ride (including motorcycle)

3.5.2 SEPARATION BETWEEN MODES

The maximum possible separation between modes of transportation in the station area should be provided in the following order of priority:

- A. Between pedestrian and other modes.
- B. Between public and private transportation.
- C. Between kiss-and-ride and park-and-ride.

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3.6 DESIGN ELEMENTS

3.6.1 VEHICULAR ENTRANCES/EXITS TO STATION SITES

Vehicular entrances to station sites shall be in accordance with the following:

- A. Vehicular entrances/exits from public streets shall be from minor streets where possible, with provisions for sufficient queuing length provided at intersections with major streets. The minimum desirable queuing space is 120 feet.
- B. Entrances/exits, where feasible, should be so located that a vehicle approaching the station from any direction, missing one entrance, will find a second available without circuitous routing.
- C. The number of vehicular entrances/exits along any one street shall be minimized. The minimum distance between entrances/exits shall be in accordance with access management requirements of the jurisdictional agencies responsible for the corridor.
- D. Sufficient number of entrances/exits shall be provided so as not to exceed the following criteria:
 - 1) Entrance lanes

| | |
|--------------------------------|---------------|
| 500 vehicles per hour per lane | Noncontrolled |
|--------------------------------|---------------|
 - 2) Exit lanes

| | |
|--------------------------------|----------------------|
| 300 vehicles per hour per lane | Noncontrolled |
| 200 vehicles per hour per lane | Automatic controlled |
| 150 vehicles per hour per lane | Manual controlled |

- E. Wherever the volume of traffic entering or exiting a public street increases the street traffic volume beyond the street capacity, an auxiliary lane shall be considered.
- F. Wherever it is necessary to locate an entrance near a "T" intersection, it shall, if possible, be placed directly at the intersection. If a "dog leg" is unavoidable, the distance between streets shall be at least 100 feet as shown in Figure 3-1.
- G. Generally, right turns in and turns out of the stations are preferred to left turns.
- H. Where weaving across traffic lanes is required, provide a minimum of 100 feet as shown in Figure 3-2.
- I. Entrances should be clearly visible to drivers along approach streets.

3.6.2 SYSTEM ROADS

System roads shall have not less than two traffic lanes for each direction of travel, except that where traffic in one direction is less than 300 vehicles per hour, one lane in that direction is acceptable, with provisions for passing of emergency or stalled vehicles. The width of System roads shall be determined by the number of traffic lanes, auxiliary lanes, and parking lanes required.

System roads shall be located and aligned so that patrons may be picked up and discharged as near as practicable to the station concourse within the constraints of site specific development. Roadways shall be one way in areas immediately adjacent to station loading area if practical.

3.6.3 TRAFFIC LANES FOR SYSTEM ROADS

All roads other than those used mainly for service or maintenance purposes shall have at least one traffic lane for each direction of travel. The number of traffic lanes provided on these roads shall be sufficient so that the vehicular volume per lane does not exceed 300 vehicles per hour. Where these roads are one way and have only a single traffic lane, the traveled way, on a tangent shall be a minimum width of 16 feet. In the event that bus traffic constitutes 20 percent or more of the ADT, the traveled way width shall be 18 feet with either a gutter or shoulder on each side giving a clear distance of at least 20 feet between constraints. Lane width for roads of more than one lane, exclusive of gutter or shoulder width, should be 12 feet, but shall be not less than 11 feet.

3.6.4 DESIGN OF NON-SYSTEM ROADS

Design criteria for non-system roads shall be in accordance with the standards, in effect at the time, of the applicable governmental agency.

3.6.5 AUXILIARY LANES FOR TURNING TRAFFIC

Auxiliary lanes to accommodate right turning and left turning traffic shall be provided for two way access roads in accordance with the warrants shown in Figures 3-3 and 3-4. Auxiliary lanes shall be a minimum width of 10 feet where adjacent to a traffic lane and 12 foot minimum where separate from traffic lanes. For unsignalized and signalized intersections, median lanes or right turning lanes and tapered areas shall be in accordance with the "Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways", Florida Department of Transportation, and "A Policy on Geometric Design of Highways and Streets", published by the American

Association of State Highway and Transportation Officials (AASHTO), as applicable.

3.6.6 TAPERS

Tapers for System as well as non-system roads shall be in accordance with criteria set forth in the Manual on Uniform Traffic Control Devices.

3.6.7 CURB LOADING/UNLOADING ZONES

Placement of loading/unloading zones on System roads shall reflect the following order of preference with respect to proximity of the loading zone to the station concourse:

- A. Buses
- B. Passenger cars (kiss-and-ride)
- C. Taxi reservoirs

Parking on System roads shall be parallel to the curb. Lane width prescribed herein for loading/unloading zones may include the gutter width where gutters occur.

Design of loading/unloading and parking zones for non-system roads shall be in accordance with standards of the applicable governmental agency or those set forth in the following paragraphs if approved by the appropriate agency.

3.6.7.1 Loading/Unloading Lanes for Passenger Cars and Taxis

Loading/unloading zones for passenger cars and taxis shall be located in the kiss-and-ride area. Loading/unloading lanes for passenger cars and taxis shall have a minimum width of 10 feet, and shall be at least 30 feet long. Loading/unloading zones shall not be closer than 20 feet to a crosswalk.

3.6.7.2 Loading/Unloading Zones for Buses

- A. The required bus design capacity for a station shall be based on the individual requirements for each station.
- B. Loading zones for buses shall be located to provide the most direct and safest intermodal transfer.
- C. The following are standard design criteria for various types of bus loading zones.
 - 1) Sawtooth Bus Bays: Minimum bus bay design dimensions shall be coordinated with MDT for each station location. Sawtooth bus bays will reduce the length of loading zone, but will increase the width of roadway. The critical movement in this layout is the operation of moving a bus out and around a parked bus at the loading zone. The minimum actual roadway width shall be 25 feet. For additional information, refer to Section 3.07.5 of this Chapter.
 - 2) Recessed Bus Bays: Where the volume of passenger cars or buses is sufficient on roads used jointly by cars and buses, the bus loading zone shall be recessed from the through traffic lane.

Recessed bus bays shall be designed parallel to and close enough to the curb so that passengers may enter and leave any door by an easy step to the curb. Upon leaving, the merging lane will afford the bus easy reentry into the through traffic lane.

The loading zone shall have a minimum 10 foot wide lane, and the total length for recessed bus loading areas shall be coordinated

with MDT for each station location.

- 3) **Parallel-to-Curb Bus Bays:** Parallel to curb bus bays shall have minimum 10 foot wide lanes and the total length for parallel bus loading areas shall be coordinated with MDT for each station location. This layout for bus loading area provides the minimum roadway width, but requires the longest length for a bus loading zone. The critical movement in this layout is moving into position ahead of the parked bus. Critical distance between busses shall be designed to minimize the offset from the platform curb to the rear door.

3.6.8 CHANNELIZATION

It is recommended that traffic islands and medians generally be raised and outlined by curbs.

3.6.9 TRAFFIC ISLANDS (OTHER THAN MEDIANS)

Triangular, bulb shaped, and irregularly shaped islands within the roadway shall, in general, be not less than 100 square feet in area and shall not have any side which is less than 12 feet long out-to-out after rounding of corners. Elongated or divisional islands shall have a width of not less than four feet and a length of not less than 20 feet.

3.6.10 TRAFFIC MEDIANS

The minimum width of a median within a two way access roadway shall be four feet curb face to curb face, except that the width of medians designed as an integral part of a left turn storage lane may, when space is limited, be reduced to a minimum of two feet. Isolated raised traffic medians shall not be less than 15 feet in overall length.

3.6.11 BORDERS

Borders will generally include curbs, sidewalks, and landscaping to right-of-way line.

3.6.12 VEHICLES AND SPEED

System roads shall be designed to accommodate passenger cars, buses, or a WB-50 truck. The design speed for System roads shall be 30 miles per hour.

3.6.13 CLEARANCES

Minimum vertical clearance shall be 16 feet six inches over all streets, 24 feet three inches above top of rail over the South Florida Rail Corridor and 23 feet six inches above top of rail over railroads. Minimum horizontal clearance between any structure, including buildings, fences, bases of light standards, and pedestrian barriers, shall be four feet from back face of curb. Clearances over waterways shall be in accordance with the standards set by the governing public agency.

Additional information relative to clearances is contained in the Civil and Trackwork Chapters of this Compendium of Design Criteria.

3.6.14 SIGHT DISTANCES

Criteria for sight distances shall be in accordance with "A Policy on Geometric Design of Highways and Streets", AASHTO, and the "Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways", Florida Department of Transportation, as applicable.

3.6.15 CURVATURE

On roadways having a design speed of 30 miles per hour or more, the radius of horizontal curves, measured to the center of the traveled way, shall not be less than 200 feet except as prescribed in the paragraph on "Intersections". In special purpose areas and roadways where the design is sufficiently restrictive so that speeds will not exceed seven miles per hour, the applicable design vehicle turning path shall be used.

Parabolic vertical curves shall be used to affect a gradual change between breaks in street grade. The minimum length of vertical curve on roadways having a design speed of 30 miles per hour shall be determined from the following formula:

$$L = KA, \text{ but not less than 100 feet}$$

Where: L= Length of curve, feet
A= Algebraic difference in grades, percent
K= 28 for crest curves, 35 for sag curves

3.6.16 GRADES

The maximum grade of System streets preferably shall be less than six percent, but shall in no case exceed eight percent. The desirable minimum grade of streets should be 0.50 percent, but shall in no case be less than 0.30 percent.

Grades shall be established to eliminate ponding of water at fare collection areas and in areas with significant pedestrian traffic. Clogged drain grates shall be considered in the drainage design and ponding analysis when establishing grades.

3.6.17 INTERSECTIONS

Intersection angles shall be as near to 90 degrees as possible. When intersection angles are skewed more than 30 degrees from a right angle, consideration shall be given to realignment of the streets or to channelization. Grades at intersections shall be as flat as practicable, but shall be such as to provide adequate drainage. It is recommended that intersecting streets not have horizontal curvature within 150 feet of the centerline of the intersection. Where vehicle turns are permitted, curb return radii (to face of curb) shall be 30.5 feet minimum. Otherwise, curb return radii shall be five feet minimum. Wheelchair and pedestrian ramps shall be provided at the intersection as required by the Americans with Disabilities Act (ADA).

3.6.18 CROSS SLOPES

Normal roadway cross slopes shall be two percent. Undivided pavements on tangents shall have a crown in the center and slope downward toward the edge. On divided highways with tangent sections up to four lanes, each one-way pavement shall have a constant slope across pavement downward to the outer edge. Pavements on curves may have varying cross slopes as required by superelevation. At intersections or in unusual situations, the cross slope may vary, depending upon drainage requirements or local conditions.

3.6.19 CURBS AND GUTTERS

Curbs may be omitted where curbs are not warranted by aesthetic considerations, drainage requirements, control of access, or for improving traffic flow and safety.

Curbs in general, shall be barrier type. Mountable type curbs may be used in special cases.

Valley gutters shall not extend across System roadways. At other streets, the use of valley gutters shall be minimized.

Expansion joints shall be provided at least every 500 feet, at curb returns, and junctures with structures. Contraction joints shall be provided every 10 feet. Joints shall coincide with sidewalk joints as much as possible where adjacent to sidewalks.

3.6.20 DRIVEWAYS

Unobstructed visibility shall be provided at exits in accordance with the previously described requirements for sight distance. The maximum driveway grade within 10 feet of curbs shall be five percent. The maximum grade at other points shall not exceed 10 percent. Differences in grade at grade breaks shall not exceed 15 percent.

Driveways which provide access to service and maintenance facilities shall conform to the following requirements:

Driveway width, exclusive of transitions, shall be the same as the width of the roadway served by the driveway, as previously prescribed.

Where a driveway does not serve a roadway, the driveway width, exclusive of transitions, shall not be less than 12 feet.

3.6.21 SHOULDERS

Shoulders shall be provided where curbs do not occur.

Cross slope of shoulders shall not be less than 0.03 feet per foot or greater than 0.08 feet per foot. Change in cross slope between a traffic lane and adjacent shoulder shall not be greater than 0.07 feet per foot. Shoulders on the outside of superelevated curves should be rounded (vertical curve) to avoid an excessive break in cross slope and to direct drainage away from the adjacent travel lane.

3.6.22 SIDE SLOPES

Side slopes shall be as flat as available right-of-way permits. Where the right-of-way is restricted, cut slopes shall be two horizontal to one vertical, unless otherwise recommended by the soils engineer. The top of all cut slopes, other than those in rock, shall be rounded.

Where the right-of-way is restricted, fill slopes for embankments over 12 feet shall be two horizontal to one vertical, unless otherwise recommended by the soils engineer. Where heights are less than four feet, slopes shall be four horizontal to one vertical, or flatter. Slope rounding shall be used at the top of fill slopes.

3.6.23 PAVEMENT STRUCTURE

The required thickness of the various layers of the pavement structure shall be chosen in accordance with the requirements of the governing agency involved. Pavement structures for State routes shall be coordinated with the Florida Department of Transportation.

Pavement structures for Miami-Dade County Roadways and roadways within the System right-of-way shall be chosen from Part I: Standard Details, published by the Miami-Dade County Department of Public Works. The

structure chosen shall be approved for the given location by the Miami-Dade County Department of Public Works.

3.6.24 ATTENUATING DEVICES

In those cases where the combination of pier location and roadway geometrics indicates the possible need for attenuating devices, the Design Consultant shall be responsible for notifying the appropriate governmental agency and resolving the issue. The final determination, as to the need for attenuating devices, shall be coordinated with Florida Department of Transportation or Miami-Dade County Department of Public Works.

3.7 PARKING

3.7.1 GENERAL

Each site shall contain provision for motorcycle storage, bicycle storage, park-and-ride facilities, kiss-and-ride discharge and pick-up facilities, short-term parking facilities, bus bays, accessible facilities for the disabled and baby strollers.

The design of these facilities is influenced by availability of land, existing access roads, station patronage requirements and the type of station.

Areas directly beneath the platform and associated track structures may be developed as sheltered bus waiting areas. Areas adjacent to or under the track structures beyond the station platform and ancillary space may be developed as kiss-and-ride and short-term parking with pedestrian walkways under the track structure leading to the main or alternate station entrance when physical conditions allow. Park-and-ride stalls shall be laid out parallel to the station wherever possible. Parking lot and structure walking distances to the concourse should be minimized with a maximum desirable walking distance of 1,320 feet.

Parking and discharge and pickup facilities for the System shall be on grade for buses, kiss-and-ride, short-term accessible parking. Parking facilities for park-and-ride can be at grade or in parking structures not to exceed six levels. Design criteria for motorcycle and bicycle storage areas are contained in Volume II, Chapter I, Section 1.03 of this Compendium of Design Criteria.

Parking spaces for MDT maintenance vehicles shall be provided as near as possible to equipment rooms. The number and size of parking spaces shall be coordinated with MDT for each station location.

3.7.2 PARKING FEE COLLECTION

In general, parking fees will be collected from all motor vehicles, excluding transit buses, parking on the station site for an extended period of time. For short-term parking, the hours will be limited to the off peak hours of the transit operation. For the park-and-ride, the following criteria should be followed:

- A. No parking fees should be collected on entering the station site or parking areas.
- B. No tickets should be dispensed on entering the station site or parking areas.
- C. Should it be decided that parking fees be collected on exiting from the facility, the devices and procedures should be capable of processing no fewer than 200 vehicles per lane per hour.

3.7.3 PARK-AND-RIDE FACILITIES

- A. Park-and-ride entrances and exits should be separated from bus, kiss-and-ride entrances and exits at all locations.
- B. Entrances and exits shall be located so that transit traffic loads are evenly distributed over traffic facilities serving the site with the number of entrances along any one street kept to a minimum.
- C. Exits shall be located as far from the station as possible.
- D. The spacing of right hand turning points is less critical than left hand turning points.

- E. Entry and exit approach lanes shall be provided on streets where entrances occur, if possible.
- F. Entrances and exits at "T" intersections shall be placed directly at the intersection wherever possible so that "dog leg" crossings are avoided. Refer to Figure 3-1.
- G. Right turns in and out of entrances are preferred. Entering left turns are preferred over exiting left turns; separation of left turns in and out is desirable.
- H. The direction of aisles shall be determined according to the circulation requirements of vehicles and pedestrians. Generally, aisles shall be laid out perpendicular to the axis of the station along the desired pedestrian movement.
- I. Vehicular circulation within parking bays shall be two way in a consistent pattern, and perimeter circulation shall be two way, unless site conditions require otherwise.
- J. Curbs and barriers between stalls and bays are prohibited except at ends of bays. Curbs shall be provided where major pedestrian ways occur within park-and-ride areas.
- K. Landscaped perimeters of parking areas shall be designed to assure good visibility for vehicles entering or exiting the station site. Refer to the Manual of Landscape Standards, Volume V.

- L. Parking area lighting is discussed in Volume II, Chapter 4 of this Compendium of Design Criteria.
- M. Standard 90 degree parking stalls shall be employed wherever possible.

3.7.3.1 Parking Lots

Parking lots shall be designed as visual units with landscape elements utilized as perimeter buffers. Refer to the Manual of Landscape Standards, Volume V. Arbitrary division of large parking areas into smaller lots for other than functional reasons is prohibited; such divisions shall occur only where traffic flow and safety are enhanced by intermediate roadways and landscaping.

A. Stall Size

Stall size shall meet the requirements of the Miami-Dade Zoning Code for standard, accessible and babystroller parking spaces.

B. Stall Layouts

Stalls shall preferably be parallel to station platforms whenever possible to facilitate safe pedestrian access..

C. Striping

Striping shall be white in color for standard and babystroller spaces and blue for accessible spaces.

D. Sight Distances

Visibility at driveways and other points of access such as exit ramps shall be designed in such a manner that vehicles can enter into or exit from a facility with minimum hazard and disruption of traffic. When a driveway intersects a public right-of-way, any wall, fence landscaping,

earth mound or other sight obstruction within a triangular area on each side of the driveway shall provide for unobstructed cross visibility at a level between 30 inches and eight feet parallel to the driving surface. The triangular area referred to is the area of property on both sides of a driveway formed by the intersection of each side of the driveway and the public right-of-way line with two sides of each triangle being ten feet in length from the point of intersection and the third side being a line connecting the ends of the two other sides.

Any wall or fence adjacent to a driveway must be constructed in such a manner as to provide cross visibility over or through the structure between 30 inches and eight feet in height above the driving surface. The visibility opening through the structure shall extend a minimum distance of 10 feet from the right-of-way line (or future right-of-way line where applicable).

All landscaping within the sight triangle areas shall provide unobstructed cross visibility at a level between 30 inches and eight feet provided; however, trees or palms having limbs and foliage trimmed in such a manner that no limbs or foliage extend into the cross visibility area shall be allowed provided they are located so as not to create a traffic hazard. Landscaping, except required grass or ground cover, shall not be located closer than three feet from the edge of any driveway pavement. Driveways designed exclusively for use by passenger vehicles may reduce the visibility height to a minimum level of six feet above the driving surface where specifically approved by MDT. Cross visibility shall also be provided for vehicles which back out directly into public right-of-way (where permitted) or traffic circulation aisles.

Additional information regarding planting details may be found in the Manual of Landscape Standards, Volume V of these Design Criteria.

E. Ingress and Egress

Entrances and exits shall be adequate to serve the facility but shall be located to minimize interference with traffic on any adjacent street.

Entrances and exits shall provide for proper traffic flow, both on adjacent streets and inside the parking facility. For one way movements, a minimum of 12 feet and a minimum of 24 feet for two way movements.

Entrance and exit ramp slopes across sidewalk or to pavement grade shall not cause a vehicle to drag its frame on a downward driveway approach or drag the rear bumper on an upward driveway approach. In addition, wheelchair ramps must be provided conforming to ADA guidelines. As previously discussed, adequate open area shall be provided at all driveways for proper sight distance. Adequate internal storage for vehicles entering or leaving shall be provided. The length of storage area provided shall be a function of the type of parking fee collection methods provided. Entrances located on major thoroughfares may require deceleration lanes in order to reduce hazards on the adjacent roadway and increase the capacity of the driveway.

F. Aisle Widths

Minimum aisle widths shall be as follows:

| Parking Angle | Vehicle Movements | Aisle Width |
|---------------|-------------------|-------------|
| 90° | 2-Way | 22'-0" |
| 75° | 1-Way | 21'-0" |
| 60° | 1-Way | 17'-0" |
| 45° | 1-Way | 12'-0" |

G. Internal Circulation Roadways

Circulation roadways within the facility should be designed to reduce travel distance and the number of turns. Directional signs should be properly displayed, where necessary, to promote safe and orderly movements. Internal circulation roadways shall be a minimum of 24 feet to allow for two way movements. If one-way operation is employed, internal circulation roadways shall be a minimum of 16 feet wide.

H. Turning Radii

Minimum inside turning radii shall be 16 feet and minimum outside turning radii shall be 30 feet.

I. Signing

Signing placement and needs shall be according to the standards and criteria set forth in the Manual of Graphic Standards, Volume VI of this Compendium of Design Criteria.

J. Clearances

Minimum vertical clearance between any overhead obstruction and parking lot surface shall be 15 feet.

At the head of parking stalls, horizontal clearance shall be two feet six inches from the front face of curb to any obstruction. At the sides of

stalls, no horizontal clearance need be provided between stalls and obstructions except at walls, where a one foot minimum clearance shall be provided.

3.7.3.2 Parking Structures

Ground levels shall contain entrances and exits, reservoir areas, and internal ramps. Ground levels may also contain kiss-and-ride and park-and-ride areas.

Upper levels generally shall contain only ramps and as many parking stalls as practicable.

Initial design of parking structures shall reflect acceptance of the ultimate future development, both vertical and horizontal.

Stall size, layout, striping, exit and entrance sight distance, ingress and egress, aisle widths shall be the same as specified for parking lots in Section 3.7.3.1. Accessible parking shall be provided in one location, with a separate ingress and egress to facilitate the segmentation of automated vehicle counts.

The following additional criteria shall be apply:

A. Ramps

Internal ramps shall be placed as far as practicable from entrances and exits. The ramps shall be so placed that they do not constitute a direct and natural path for pedestrian travel to the station concourse. Internal ramps shall be designed for two way travel. Parking stalls shall not be located on curved internal ramps. The design capacity of ramps shall be 500 vehicles per lane per hour.

Ramp grades shall be kept as low as practicable, and excluding areas of transition, shall not exceed five percent on ramps with parking or 12 percent on ramps without parking. Ramps with grades greater than five percent cannot be used for pedestrian or emergency access. The grade on curved ramps shall be calculated along the inside edge of the roadbed.

Where the difference in grades between a ramp and a floor exceeds six percent, a transition shall be provided as shown in Figure 3-5. Transitions shall have a grade equal to one half of the ramp grade. Ramps shall be rounded at all breaks in grade for a distance of three feet on each side of the grade break, as shown in Figure 3-5.

Straight ramps without parking thereon, and curved ramps, shall have a cross section as shown in Figure 3-6. The ramps shall have a transverse slope as shown. On curved ramps, the transverse slope shall slope down toward the center of the curve. Curved ramps shall have a minimum radius of 20 feet measured at the curb face nearest the center of the curve. Curved ramps shall not be superelevated.

Straight ramps shall be a minimum of 12 feet wide and curved ramps shall be a minimum of 18 feet wide for one-way circulation

B. Turning Radii

Minimum turning radii on ramps shall be 20 feet whereas minimum turning radii for parking areas shall be 16 feet.

C. Clearances

Structures shall be clear span design, having a clear column spacing equal to the unit parking depth, plus the required horizontal clearance. Unit parking depth is the width of an aisle, plus the depth of the adjacent parking stall on each side of the aisle.

Vertical clearances between the floors of any structure and any overhead obstruction, including signs, lighting fixtures, piping, or any other appurtenances shall be a maximum of seven feet-six inches and a minimum of seven feet-four inches. Appropriate signing shall be provided to prevent entry of overheight or overweight vehicles to travel areas.

D. Horizontal Clearances

A minimum horizontal clearance of two feet should be maintained between the traveled way and or one foot from front face of curb, whichever is more restrictive, the face of columns or other vertical members.

E. Internal Circulation

Traffic circulation with parking structures shall be designed to minimize vehicular travel distances and number of turns. Circulation on one-way ramps shall preferably be counterclockwise whereas circulation on two-way ramps shall preferably be clockwise. Designs shall eliminate the need to travel on internal ramps to reach dropoff areas.

A minimum queuing length of 120 feet shall be provided within parking structures, immediately adjacent to entrances and exits. Areas between the building line and a sidewalk may be included as part of the queuing area. Ramps may not be included in the minimum queuing length.

F. Signing

All signing shall be in accordance with the Manual of Graphic Standards, Volume VI of this Compendium of Design Criteria.

G. Communications

Refer to Chapter 7, Communications, Volume VII of this Compendium of Design Criteria for communication and surveillance equipment requirements including, but not limited to, vehicle counting and display systems, closed circuit television systems and fire panel alarm systems.

H. Uninterrupted Power Supply (UPS) System

Refer to Chapter 7, Communications, Volume VII of this Compendium of Design Criteria for UPS system requirements.

I. Network Connectivity

Refer to Chapter 7, Communications, Volume VII of this Compendium of Design Criteria for network connectivity requirements.

3.7.4 KISS-AND-RIDE FACILITIES

Kiss-and-ride facilities shall follow bus circulation in priority. These areas shall also serve taxicab circulation and, for planning purposes, the two functions shall be considered identical. Kiss-and-ride facilities shall be located so that their use does not interfere with bus or park-and-ride operations. The kiss-and-ride lot may be used for short-term parking (shoppers, etc.) during the day, but must be cleared from 6:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 7:00 p.m.

3.7.4.1 Capacity

The required design capacity for a station shall be coordinated with MDT.

3.7.4.2 Location

Kiss-and-ride facilities located off-street, either in a parking lot or a parking structure, shall be located as near to the station concourse entrances as practicable and shall be physically separated so as not to appear as an integral part of long-term parking areas within the parking lot or parking structure.

Kiss-and-ride facilities located within a parking structure shall only be upon levels of the structure which have direct access to an adjacent street.

3.7.4.3 Layout

Right-hand drop-off and pickup is preferred, however, a large percentage of transit patrons will change seats with kiss-and-ride drivers during both a.m. and p.m. operations so that this provision is not mandatory.

The kiss-and-ride parking area, for persons waiting to pick up passengers, should be conveniently located to provide good visibility of the station exit. This area may be open for short-term parking during the day, but must be cleared for the a.m. and p.m. rush hours.

During morning and afternoon peak periods, parallel parking spaces shall be employed for drop-off and pick-up in kiss-and-ride areas adjacent to the pedestrian area at most station sites.

Parking spaces for persons waiting to pick up disabled persons shall be provided, as required, by installing appropriate pavement markings and signs and shall comply with the requirements of ADA.

3.7.4.4 Ingress and Egress

Ingress and egress to kiss-and-ride facilities is preferred to be from minor roads, wherever possible. Kiss-and-ride vehicles shall enter and leave the station site without passing through paid park-and-ride control zones. Ingress and egress roads shall be a minimum of one lane with a minimum width of 16 feet. At the point they leave the drop-off area, there should be two lanes with 24 feet of pavement whenever possible.

3.7.4.5 Circulation

Circulation at discharge and pickup areas shall be designed for one-way movements with a minimum of two lanes (22 feet wide). Refer to Figure 3-7. Pedestrian access to stations from kiss-and-ride areas may cross busways at properly marked crosswalks.

3.7.4.6 Design Details

Stalls for both short-term parking and kiss-and-ride waiting areas shall be 10 feet wide and preferably at a 45 degree angle and drive through where possible.

3.7.4.7 Signing and Marking

All kiss-and-ride parking spaces shall be delineated by signs or curb markings as being limited to short-term use. Refer to the Manual of Graphic Standards, Volume VI.

3.7.5 BUS FACILITIES

Bus circulation shall be given priority over automobile movements in the planning of access through each station site and shall be separate from park-and-ride circulation in all cases.

3.7.5.1 Capacity

Capacity of the bus loading/unloading areas and actual number of bus bays shall be coordinated with MDT. In certain instances it may be necessary to allow provision for future expansion of these facilities.

3.7.5.2 Location

Bus facilities shall be located as near the station as physically possible to allow direct and short access to the station entrance. These facilities shall be physically separated from other vehicular parking areas and preferably on only one side of the station.

3.7.5.3 Layout

Storage bays shall be provided beyond unloading and loading areas whenever possible.

The number of bays at any site shall allow arriving buses to unload without delay; and shall permit departing buses to occupy loading bays during short layovers so that waiting passengers may board. Generally, while there is usually one bay assigned to each major bus route, very heavily traveled routes may require two bays, or two light routes may be combined at a single bay.

3.7.5.4 Ingress and Egress

Circulation from bus entrance to loading/unloading bays shall be direct. Travel time shall not exceed two minutes. When separate from other circulation, bus entrances to station sites shall not be less than 20 feet in width for one-way circulation. If a bus entry point serves as both entrance and exit it shall not be less than two lanes, a minimum of 24 feet in width.

3.7.5.5 Circulation

Busways within the station site shall be one lane wide for one-way circulation. Enough width shall be provided to permit moving buses to pass standing and stalled vehicles.

3.7.5.6 Design Details

Bus bays shall be served from one-way lanes with a minimum width of 25 feet.

Coordinate bus bay configuration types, number of stalls, and types of buses to be accommodated by the facility with MDT. In general, all bus bays should be of sawtooth configuration, six feet deep and 65 feet long. Busways shall have a minimum inside turning radius of 30 feet. Pedestrian walks bordering the outside of bus turning areas shall be placed outside the extreme radius described by the front outer corner of the buses. Buses shall not unload or load on short radius curves.

3.7.5.7 Signing and Marking

All bus entrances, exits and loading and unloading zones shall be delineated by appropriate signage and pavement markings per the Manual of Graphic Standards, Volume VI, of this Compendium of Design Criteria.

3.7.6 ACCESSIBLE PARKING FACILITIES

Accessible parking facilities shall be provided within both the kiss-and-ride and the park-and-ride areas. They shall conform to the requirements of ADA.

3.7.6.1 Capacity

The required number of accessible parking spaces shall be as required by state and local ordinance.

3.7.6.2 Location

Accessible parking areas shall be located as close to the main station entrance as possible within the designated modal parking area. Where accessible parking spaces are located in parking garages, these spaces shall be located at the station access level.

These areas should be easily expandable without causing any major disruptions.

3.7.6.3 Layout

Parking stalls within the park-and-ride facilities shall be 90 degree stalls and preferably perpendicular to the station platform. Where possible, stalls within the kiss-and-ride facilities shall be at a 45 degree angle and pull through. Right-hand drop-off allowing direct access to the station entrance is preferable.

3.7.6.4 Circulation

Circulation to and from the accessible parking areas shall be as direct as possible within the major circulation patterns. Disabled persons should not be forced to walk or wheel behind parked cars.

3.7.6.5 Design Details

Stall size shall meet the requirements of the Miami-Dade Zoning Code for accessible and babystroller parking spaces.

Travel paths for patrons shall meet state and local ordinance and should preferably contain no longitudinal grades steeper than five percent and no cross slopes steeper than three percent. Travel paths for shall be free of gratings which would constitute a hazard to a person on crutches or with a cane.

3.7.6.6 Signing and Marking

Accessible parking space shall be identified by appropriate signing and pavement markings meeting state and local ordinance, and which restrict use of the space.

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3.8 TRAFFIC CONTROL DEVICES

Traffic control devices include signs, pavement markings and traffic signals. Design criteria for each of these devices are included in the Manual on Uniform Traffic Control Devices, U. S. Department of Transportation, which is a nationally standardized manual. All traffic control devices proposed for the Miami-Dade Transit Rapid Transit System project shall conform to the principles and criteria contained in this document, the Manual of Graphic Standards, Volume VI of this Compendium of Design Criteria, and standards of the agency having jurisdiction over the roadway.

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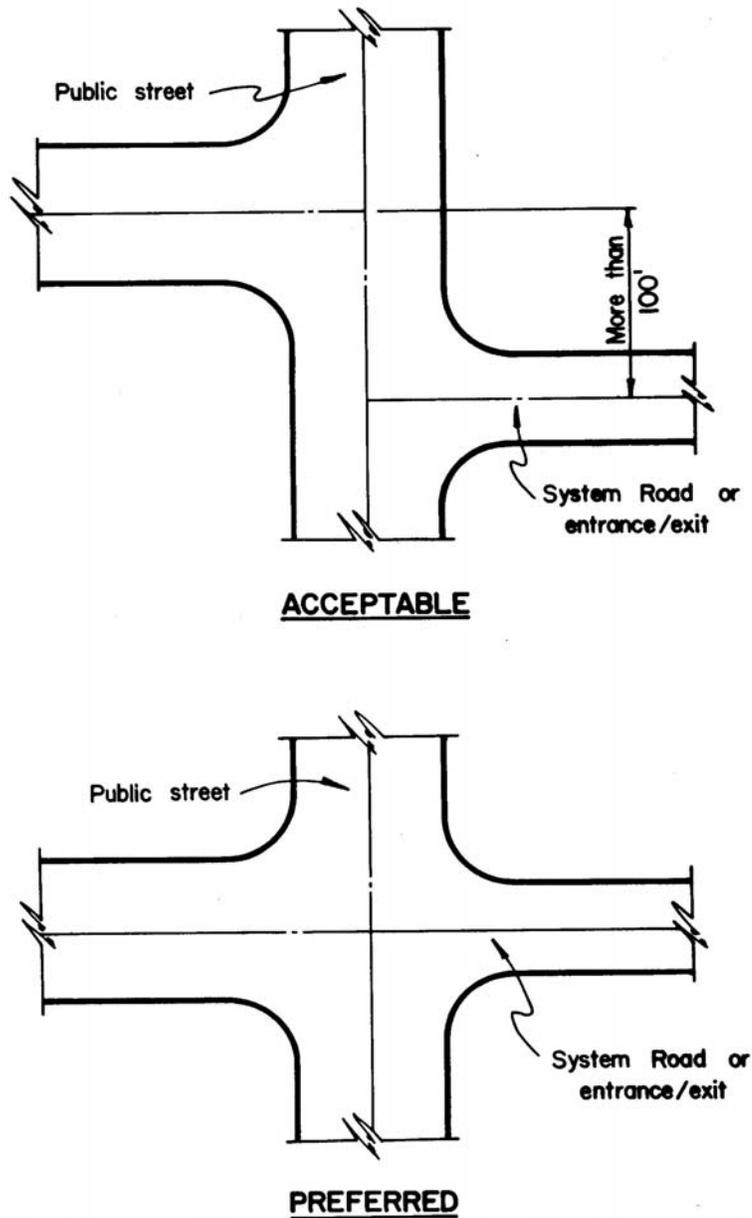


Figure 3-1 – Intersection Alignments

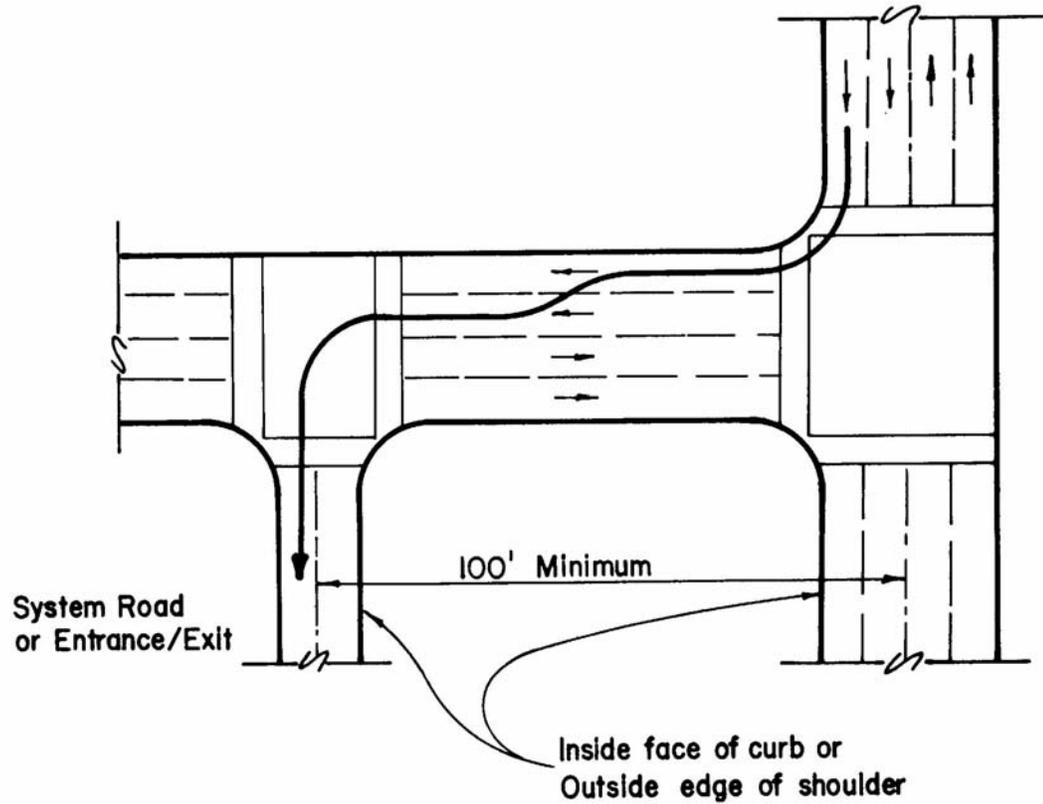


Figure 3-2 - Weaving Lengths

NOTE: Weaving length shown is for one lane of transition. Add 75' for each additional lane of transition.

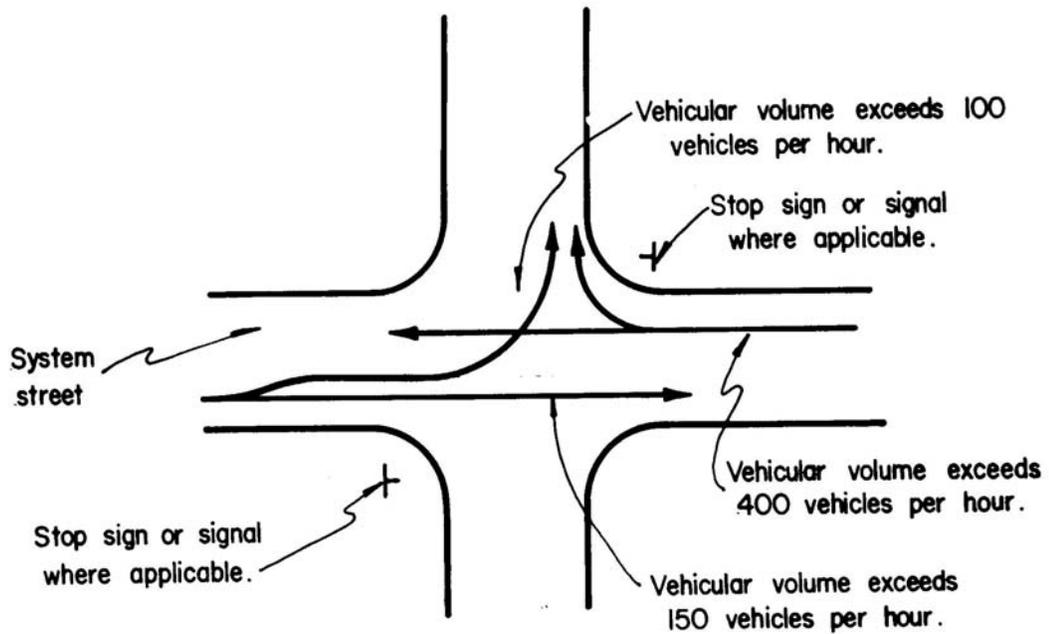
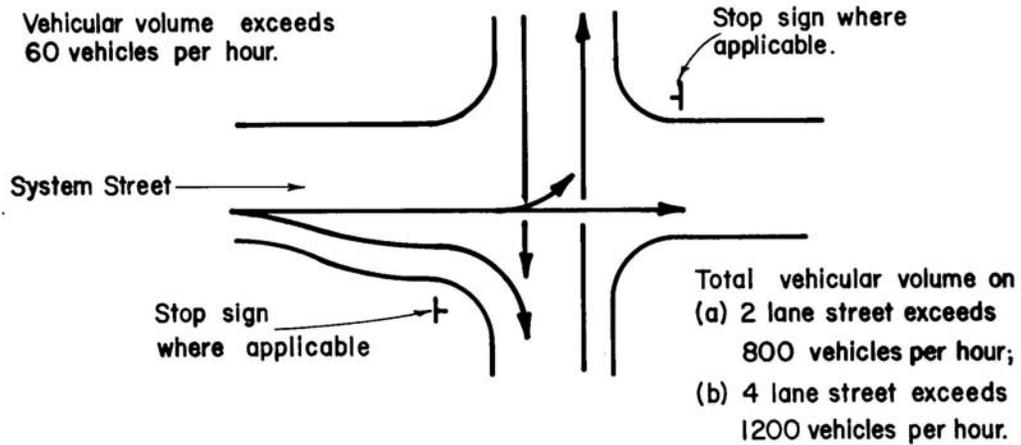
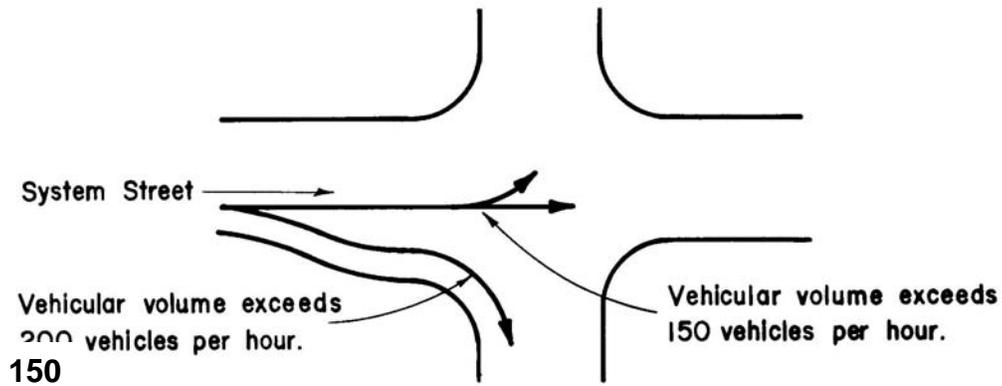


Figure 3-3 - Medium Lane Warrants

NOTE: I. Warrant based on System street having one traffic lane in each direction.



UNCONTROLLED OR STOP
CONTROLLED INTERSECTION



Assumed conditions: Semi-actuated controller, 60 second cycle and 2.5 seconds average vehicular headway.

SIGNALIZED INTERSECTION

NOTE: Warrants are based upon System streets having one traffic lane in each direction and having less traffic than the intersecting street.

Figure 3-4 - Right Turning Lane Warrants

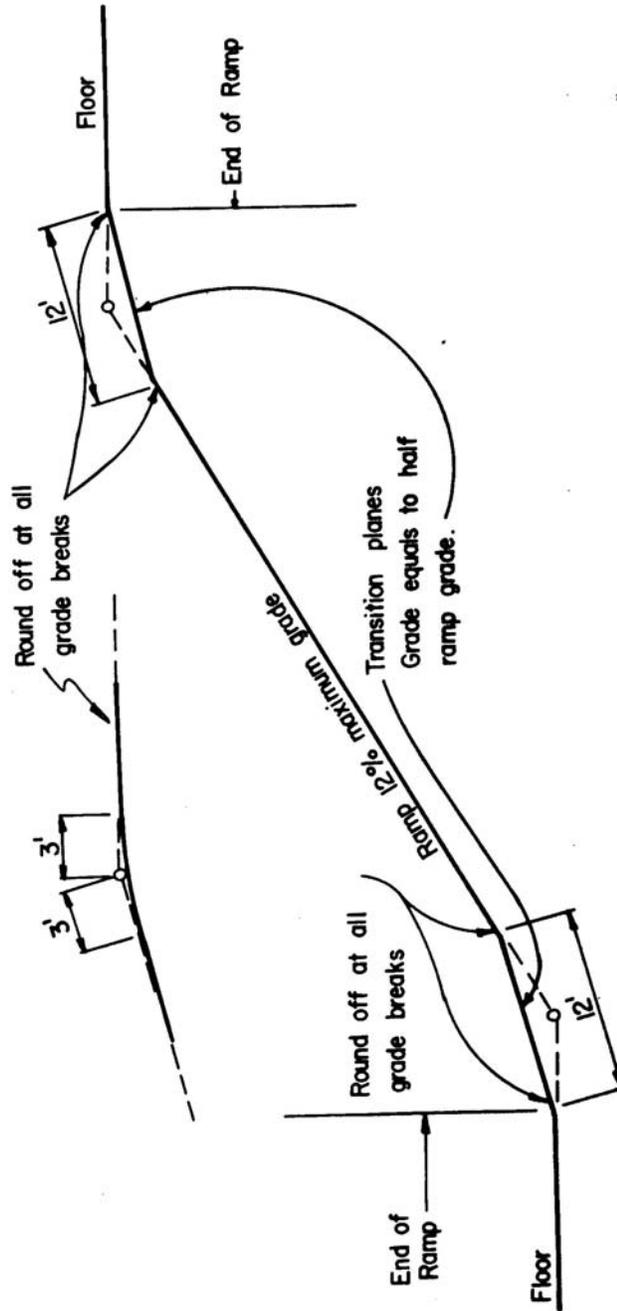
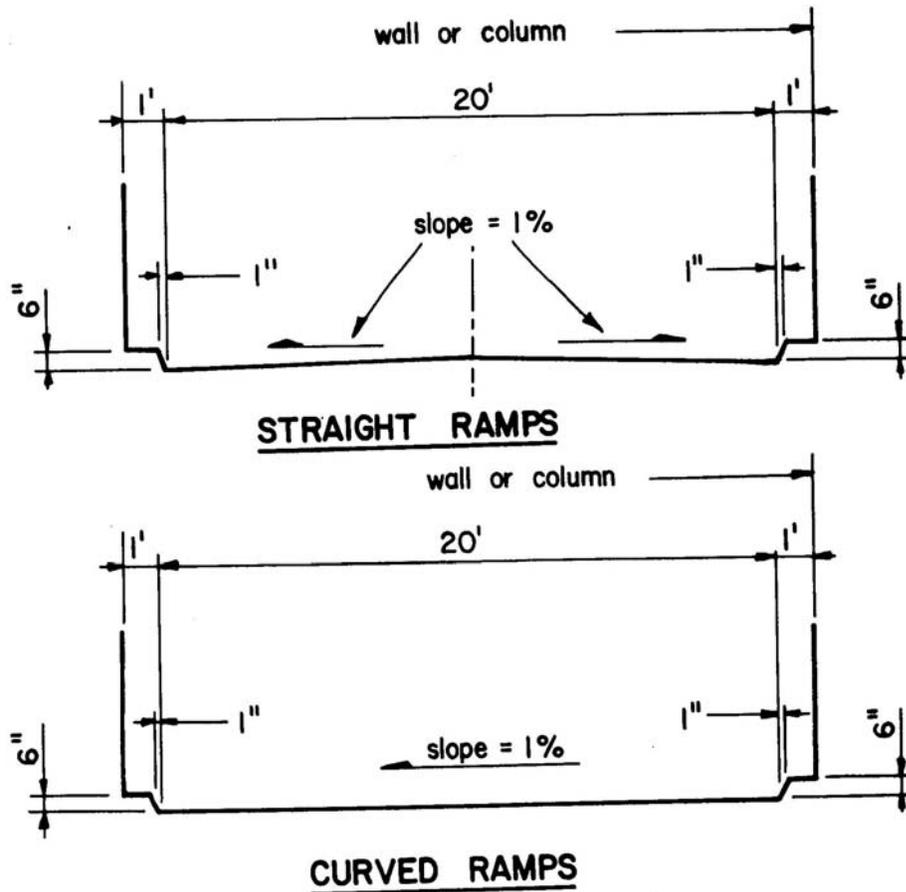


Figure 3-5 - Ramp Grade Transition



Notes :

1. Provide slope shown on straight and curved ramps for drainage purposes. Slope to inside on curved ramps.
2. Curved ramps shall not be super elevated.

Figure 3-6 - Ramp Cross Sections-Straight and Curved Ramps in Parking Structures

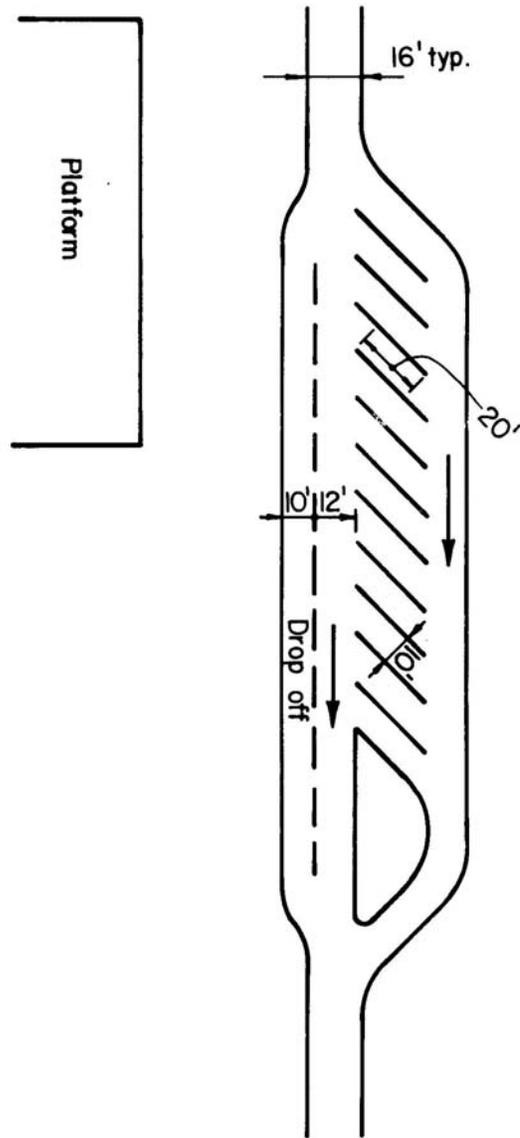


Figure 3-7 - Preferred Kiss and Ride Layout

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