Access Management Guidebook Training 2020

SIO
SYSTEMS IMPLEMENTATION OFFICE

Access Management Guidebook Training 2020

- Module 1: Introduction to Access Management
- Module 2: Driveways
- Module 3: Median and Median Openings
- Module 4: Safety, Other Design Considerations, and Permitting

Vital few


Improve Safety
Enhance Mobility
Inspire Innovation
FosterTalent

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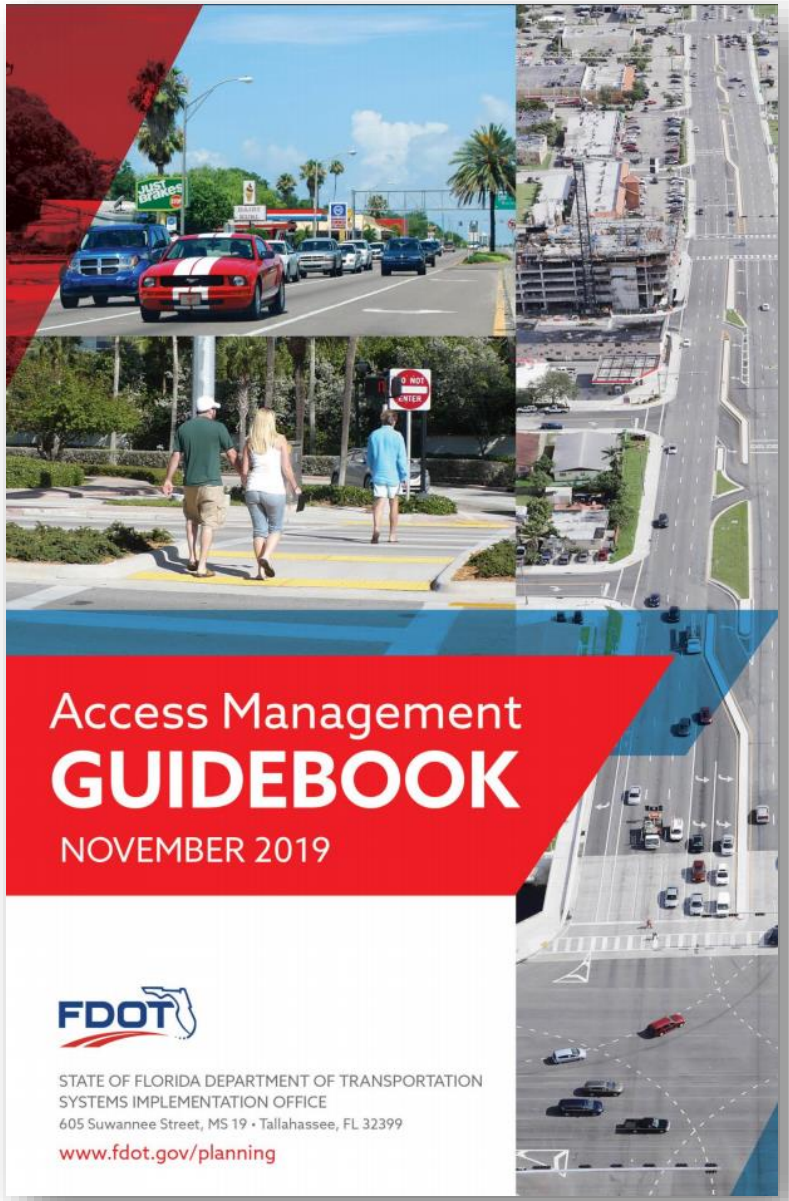
Agenda

- Introduction to the Access Management
- Driveways
- Median and Median Openings
- Sight Distance
- Integration Considerations
- Safety Benefits
- Permitting and Public Involvement



Access Management Guidebook 2019

- This Guidebook provides background by defining access management, how it is applied on Florida's roadways and best practices.
- Developed using FDOT documents as guidance:
  - Driveway Information Guide 2008
  - Median Handbook 2014
  - Complete Streets Context's Classification System
  - FDOT Design Manual (FDM)

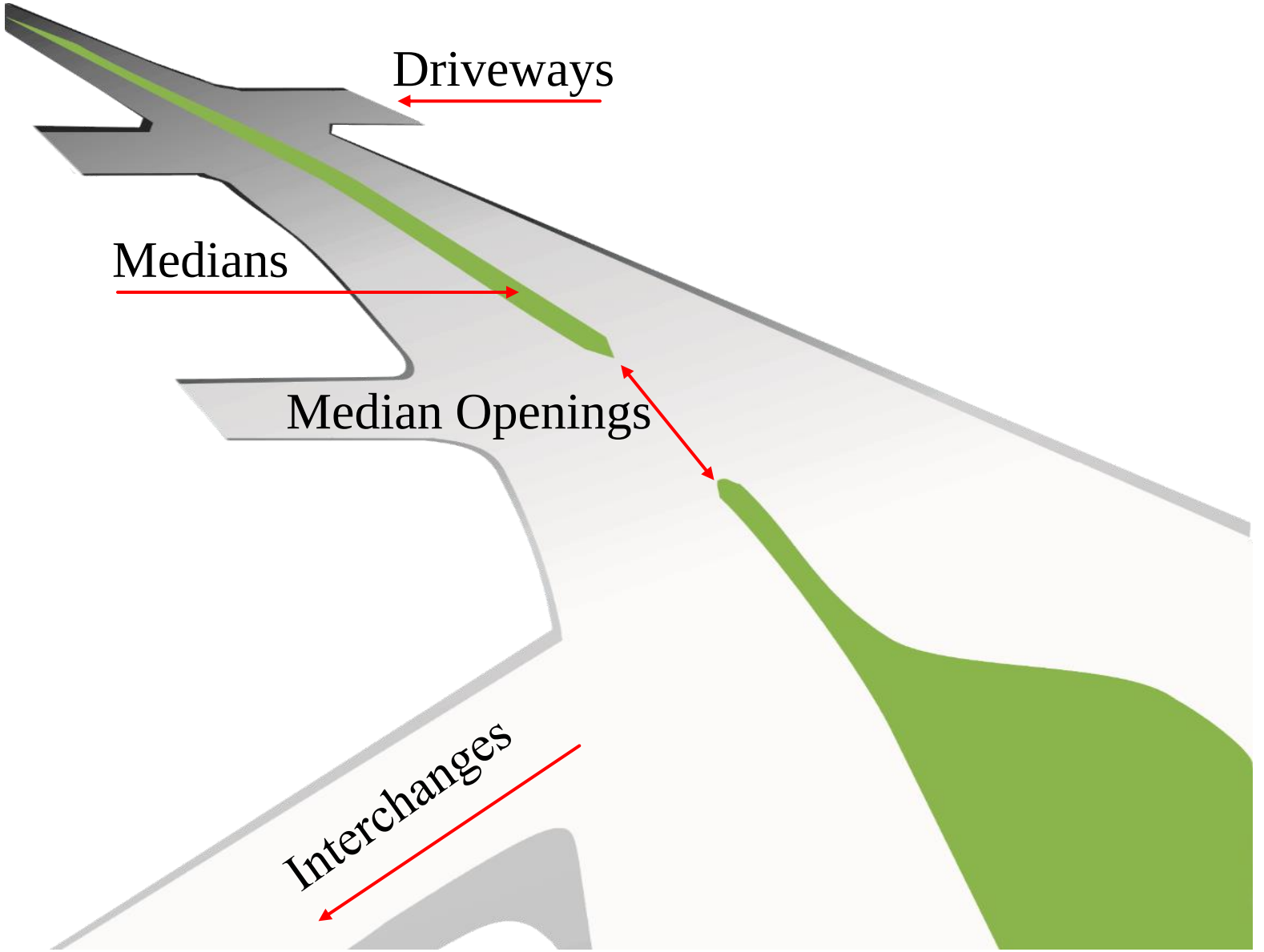
Module 1: Introduction to Access Management

Module 1: Introduction to Access Management

- What is Access Management?
- Access Management Goals
- Why do we care about Access Management?
- Functional Areas of an Intersection
- Rules and Procedures
- Access Management Classification
- Complete Streets Context Classification

What is Access Management?

Access management is the careful planning of the location, type and design of access.



Access Management Goals

Traditional Goals

Enhance mobility with reduced conflict and improved safety **(vehicular focused)**

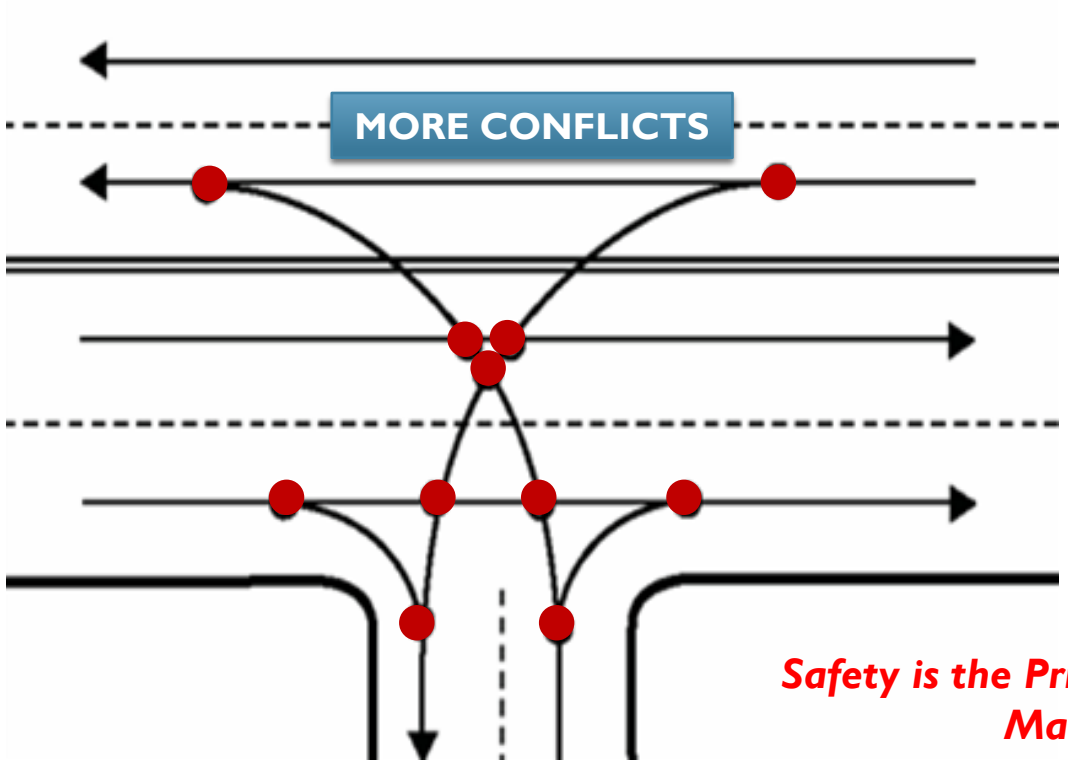
Expanded Goals

Enhance mobility with reduced conflict, enhanced safety considerations, and considerations for Pedestrians, Cyclists and Transit
(multi-modal focused)

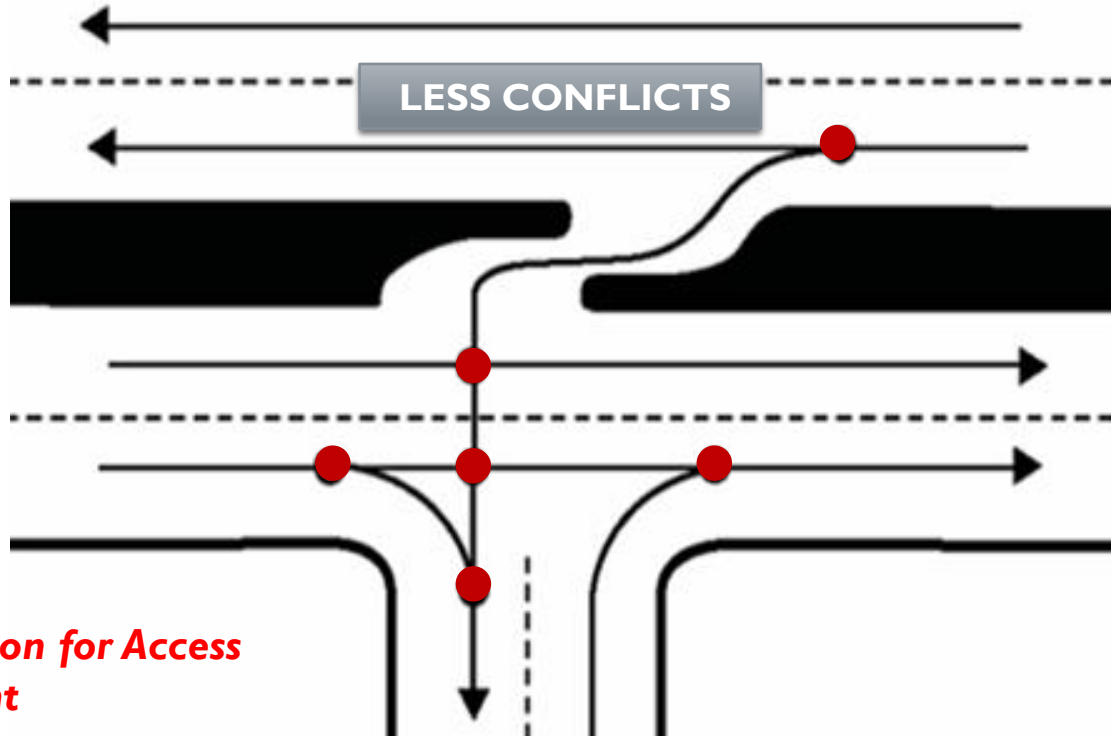
Access Management: Why do we care?

More conflicts means more crashes

Before Access Management



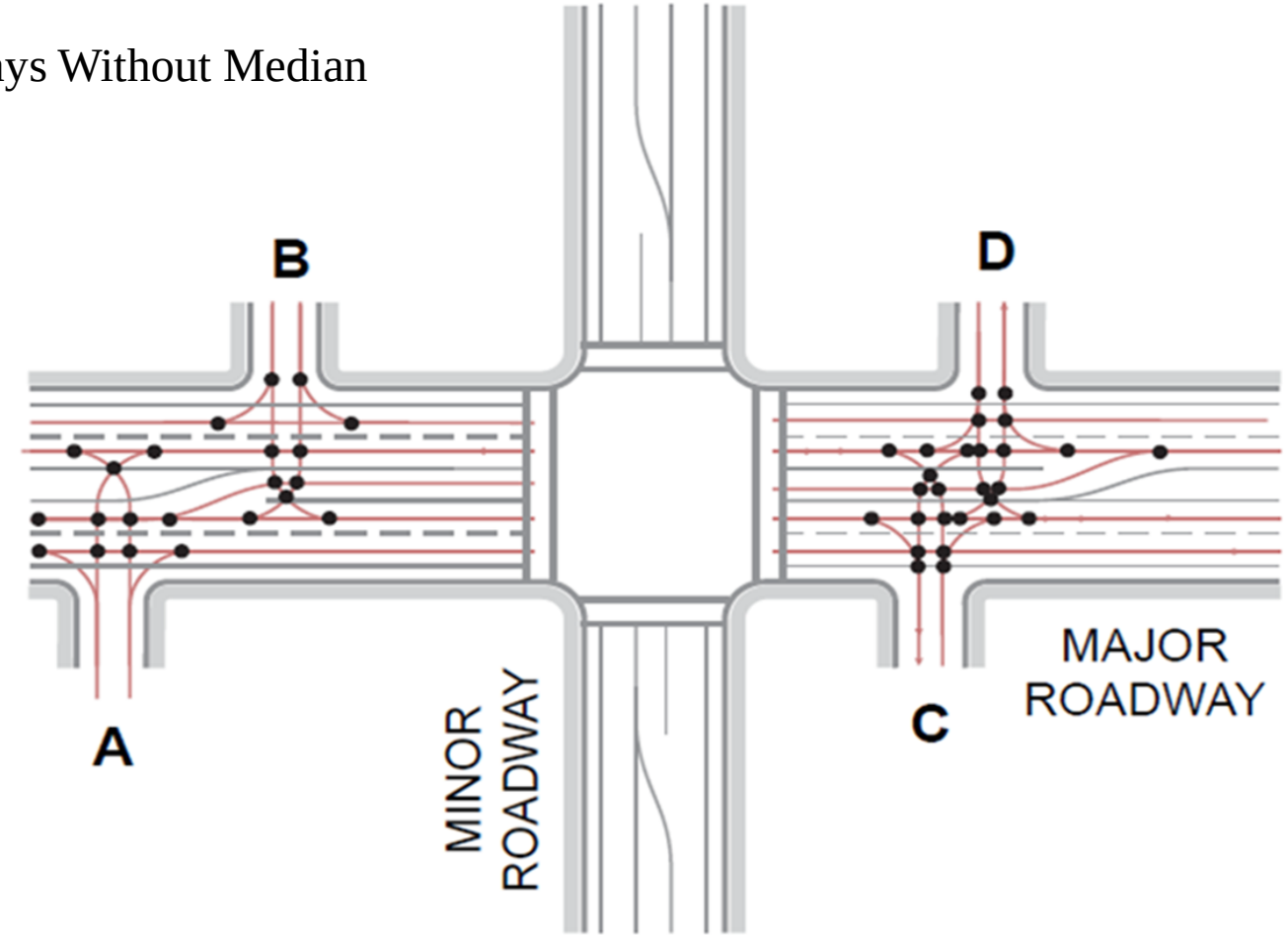
After Access Management



Safety is the Prime Reason for Access Management

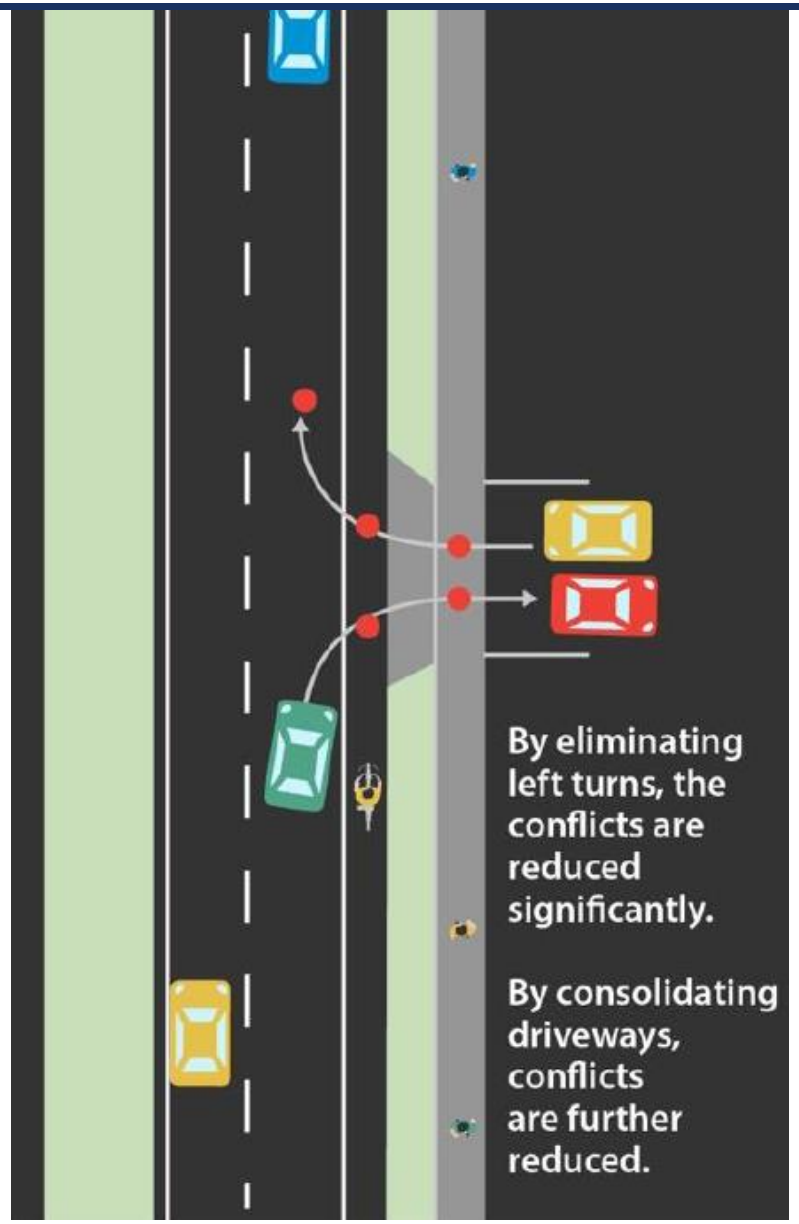
Conflict Points

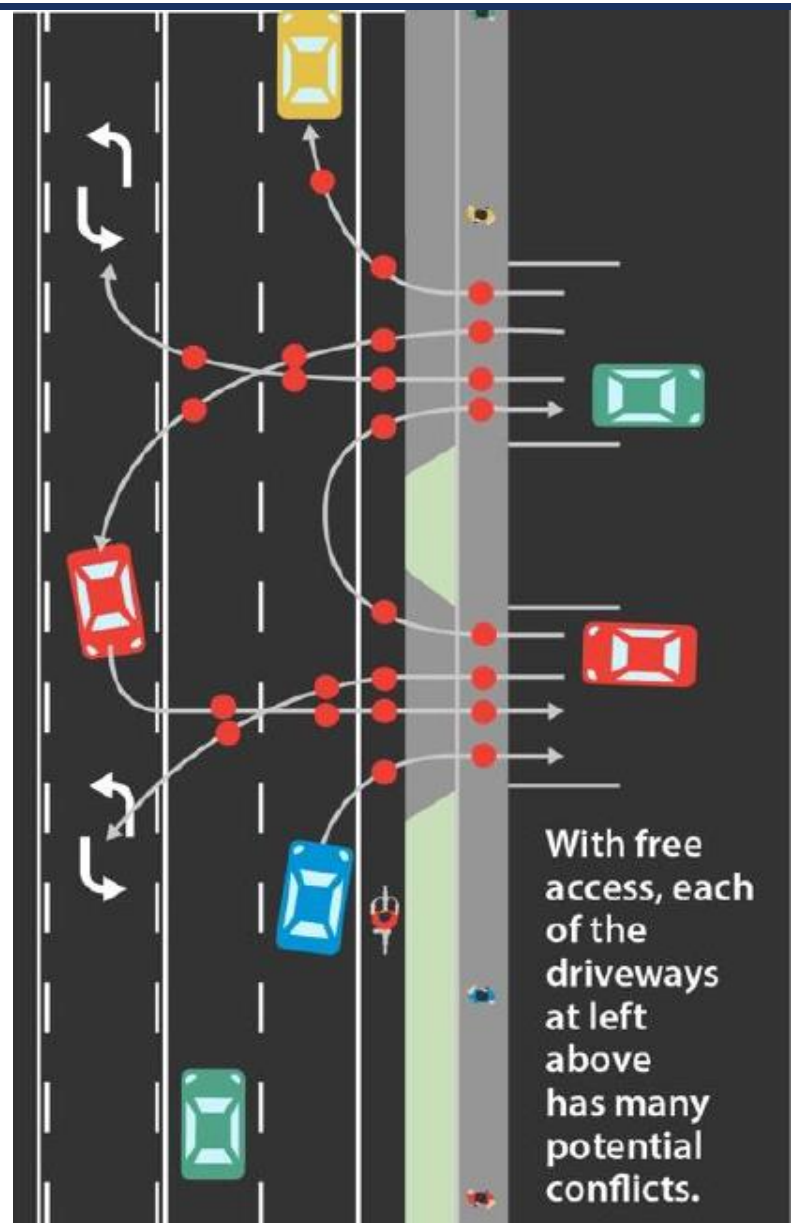
Full-Movement Driveways Without Median



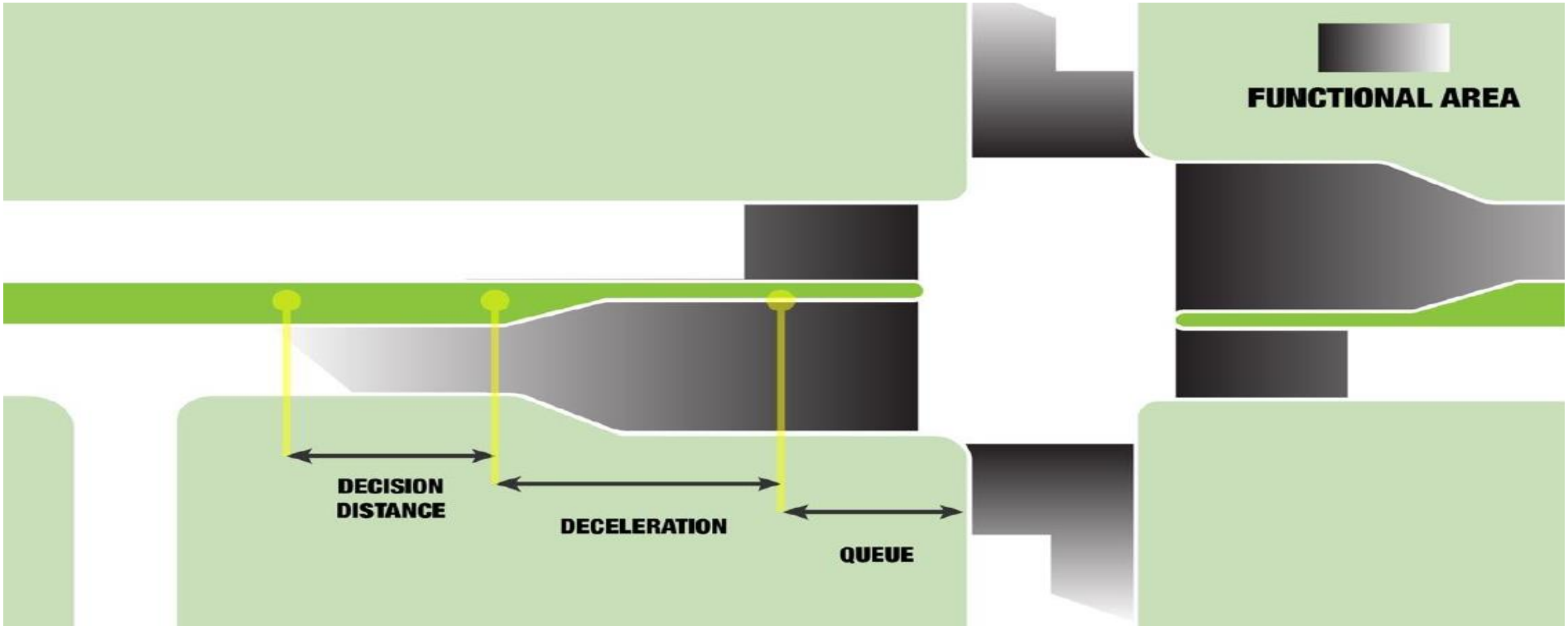
Source: Access Management in the Vicinity of Intersections (FHWA)

Conflict Points and Non-motorized Users

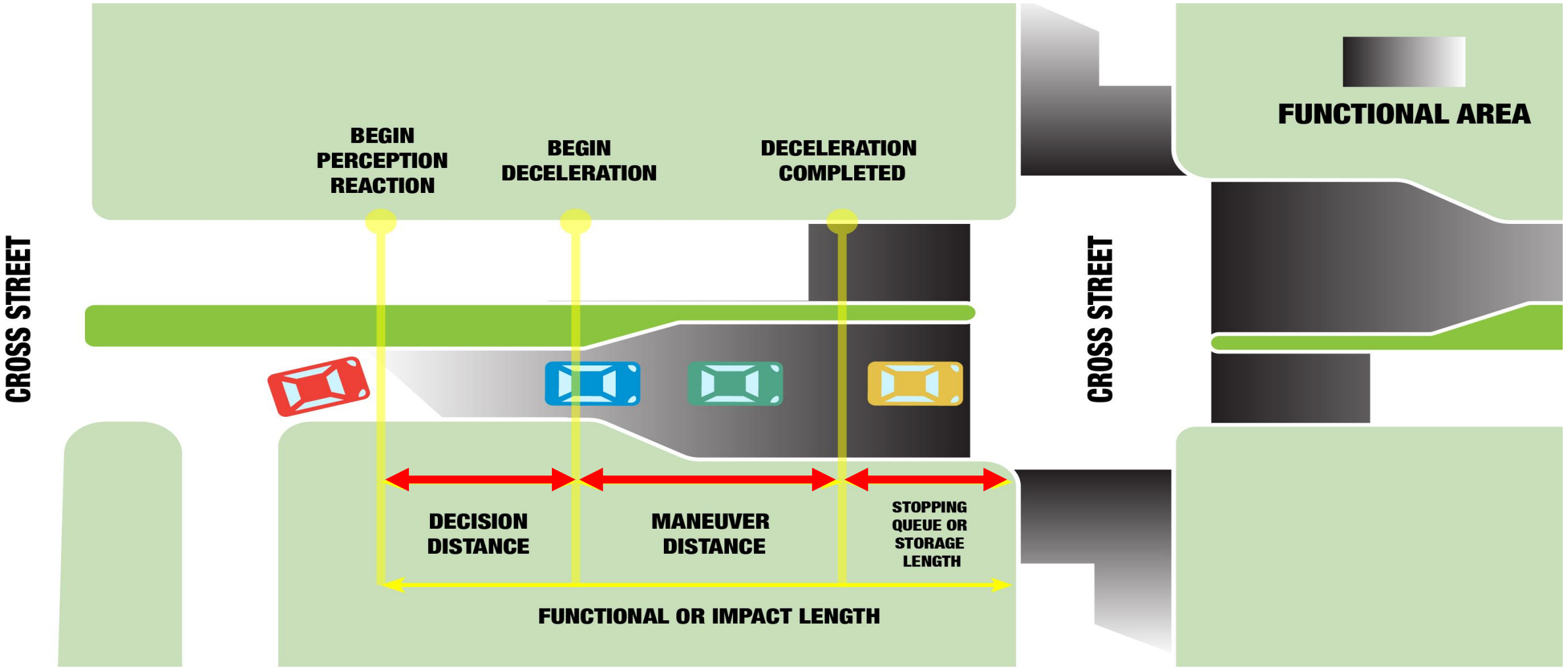




Functional Areas of an Intersection



Functional Area Diagram

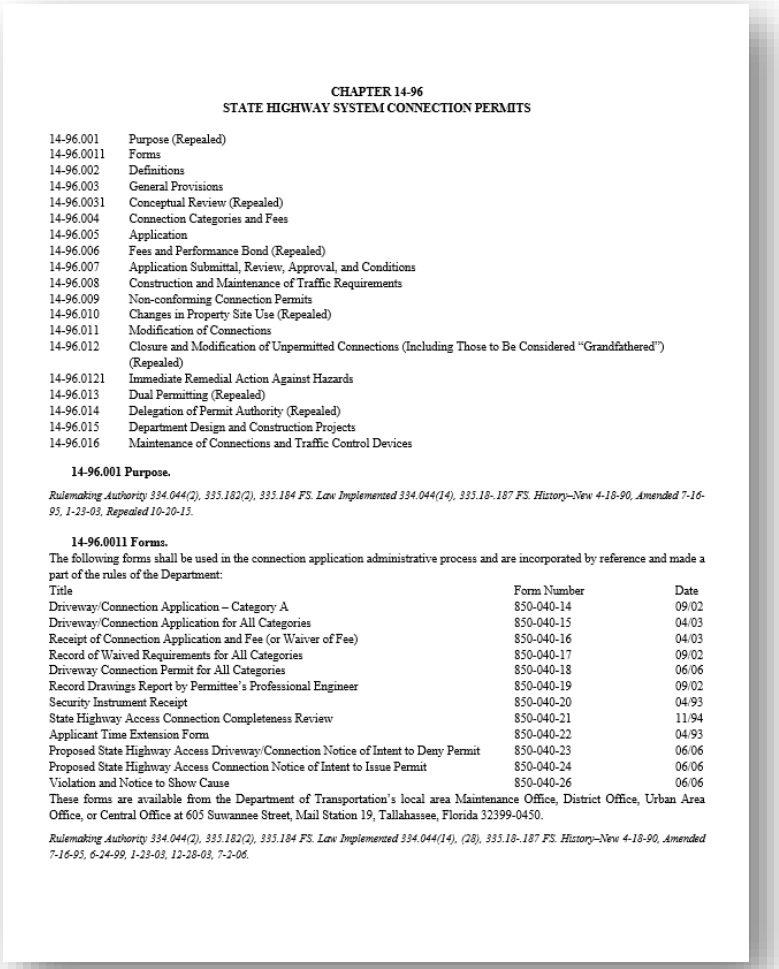


Rule 14-96

Chapter Title: State Highway System Connection Permit

- 14-96.001 Purpose (Repealed)
- 14-96.0011 Forms
- 14-96.002 Definitions
- 14-96.003 General Provisions
- 14-96.0031 Conceptual Review (Repealed)
- 14-96.004 Connection Categories and Fees
- 14-96.005 Application
- 14-96.006 Fees and Performance Bond (Repealed)
- 14-96.007 Application Submittal, Review, Approval, and Conditions
- 14-96.008 Construction and Maintenance of Traffic Requirements
- 14-96.009 Non-conforming Connection Permits
- 14-96.010 Changes in Property Site Use (Repealed)
- 14-96.011 Modification of Connections
- 14-96.012 Closure and Modification of Unpermitted Connections
- 14-96.0121 Immediate Remedial Action Against Hazards
- 14-96.013 Dual Permitting (Repealed)
- 14-96.014 Delegation of Permit Authority (Repealed)
- 14-96.015 Department Design and Construction Projects
- 14-96.016 Maintenance of Connections and Traffic Control Devices

Link: https://www.flrules.org/gateway/ChapterHome.asp?Chapter=14-97



CHAPTER 14-96
STATE HIGHWAY SYSTEM CONNECTION PERMITS

14-96.001	Purpose (Repealed)
14-96.0011	Forms
14-96.002	Definitions
14-96.003	General Provisions
14-96.0031	Conceptual Review (Repealed)
14-96.004	Connection Categories and Fees
14-96.005	Application
14-96.006	Fees and Performance Bond (Repealed)
14-96.007	Application Submittal, Review, Approval, and Conditions
14-96.008	Construction and Maintenance of Traffic Requirements
14-96.009	Non-conforming Connection Permits
14-96.010	Changes in Property Site Use (Repealed)
14-96.011	Modification of Connections
14-96.012	Closure and Modification of Unpermitted Connections (Including Those to Be Considered "Grandfathered") (Repealed)
14-96.0121	Immediate Remedial Action Against Hazards
14-96.013	Dual Permitting (Repealed)
14-96.014	Delegation of Permit Authority (Repealed)
14-96.015	Department Design and Construction Projects
14-96.016	Maintenance of Connections and Traffic Control Devices

14-96.001 Purpose.

Rulemaking Authority 334.044(2), 335.182(2), 335.184 FS. Law Implemented 334.044(14), 335.18-.187 FS. History–New 4-18-90, Amended 7-16-95, 1-23-03, Repealed 10-20-15.

14-96.0011 Forms.

The following forms shall be used in the connection application administrative process and are incorporated by reference and made a part of the rules of the Department:

Title	Form Number	Date
Driveway/Connection Application – Category A	850-040-14	09/02
Driveway/Connection Application for All Categories	850-040-15	04/03
Receipt of Connection Application and Fee (or Waiver of Fee)	850-040-16	04/03
Record of Waived Requirements for All Categories	850-040-17	09/02
Driveway Connection Permit for All Categories	850-040-18	06/06
Record Drawings Report by Permittee's Professional Engineer	850-040-19	09/02
Security Instrument Receipt	850-040-20	04/93
State Highway Access Connection Completeness Review	850-040-21	11/94
Applicant Time Extension Form	850-040-22	04/93
Proposed State Highway Access Driveway/Connection Notice of Intent to Deny Permit	850-040-23	06/06
Proposed State Highway Access Connection Notice of Intent to Issue Permit	850-040-24	06/06
Violation and Notice to Show Cause	850-040-26	06/06

These forms are available from the Department of Transportation's local area Maintenance Office, District Office, Urban Area Office, or Central Office at 605 Suwannee Street, Mail Station 19, Tallahassee, Florida 32399-0450.

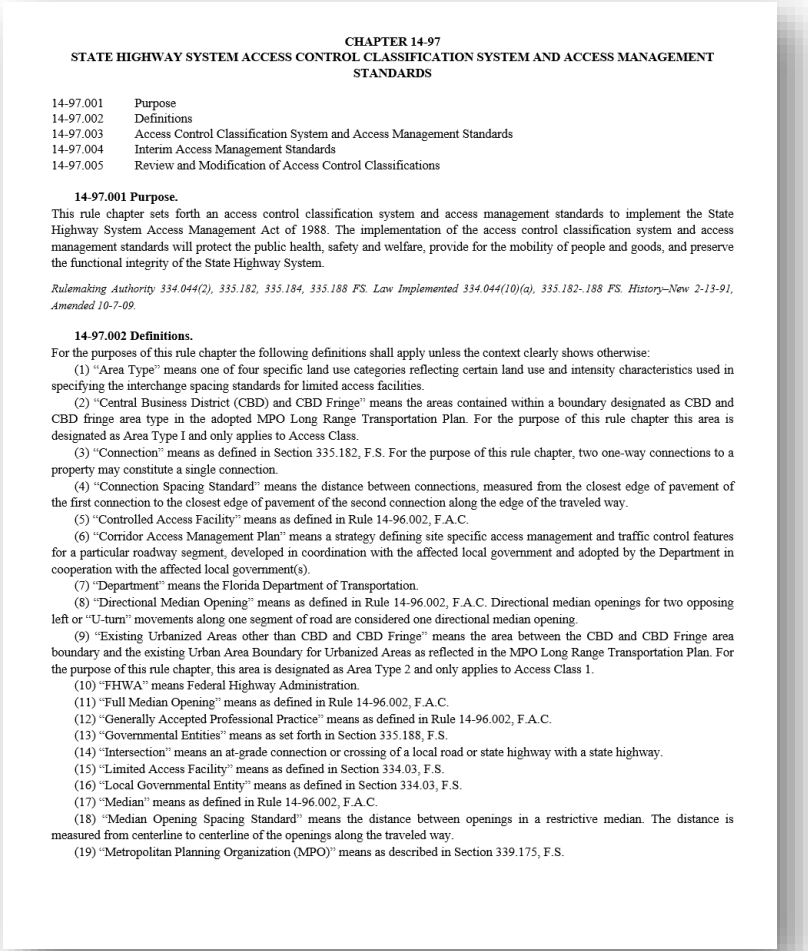
Rulemaking Authority 334.044(2), 335.182(2), 335.184 FS. Law Implemented 334.044(14), (28), 335.18-.187 FS. History–New 4-18-90, Amended 7-16-95, 6-24-99, 1-23-03, 12-28-03, 7-2-06.

Rule 14-97

Chapter Title: State Highway System Access Control Classification System and Access Management Standards

- 14-97.001 Purpose
- 14-97.002 Definitions
- 14-97.003 Access Control Classification System and Access Management Standards
- 14-97.004 Interim Access Management Standards
- 14-97.005 Review and Modification of Access Control Classifications

Link: https://www.flrules.org/gateway/ChapterHome.asp?Chapter=14-97



CHAPTER 14-97
STATE HIGHWAY SYSTEM ACCESS CONTROL CLASSIFICATION SYSTEM AND ACCESS MANAGEMENT STANDARDS

14-97.001 Purpose
14-97.002 Definitions
14-97.003 Access Control Classification System and Access Management Standards
14-97.004 Interim Access Management Standards
14-97.005 Review and Modification of Access Control Classifications

14-97.001 Purpose.
This rule chapter sets forth an access control classification system and access management standards to implement the State Highway System Access Management Act of 1988. The implementation of the access control classification system and access management standards will protect the public health, safety and welfare, provide for the mobility of people and goods, and preserve the functional integrity of the State Highway System.

Rulemaking Authority 334.044(2), 335.182, 335.184, 335.188 FS. Law Implemented 334.044(10)(a), 335.182-.188 FS. History–New 2-13-91, Amended 10-7-09.

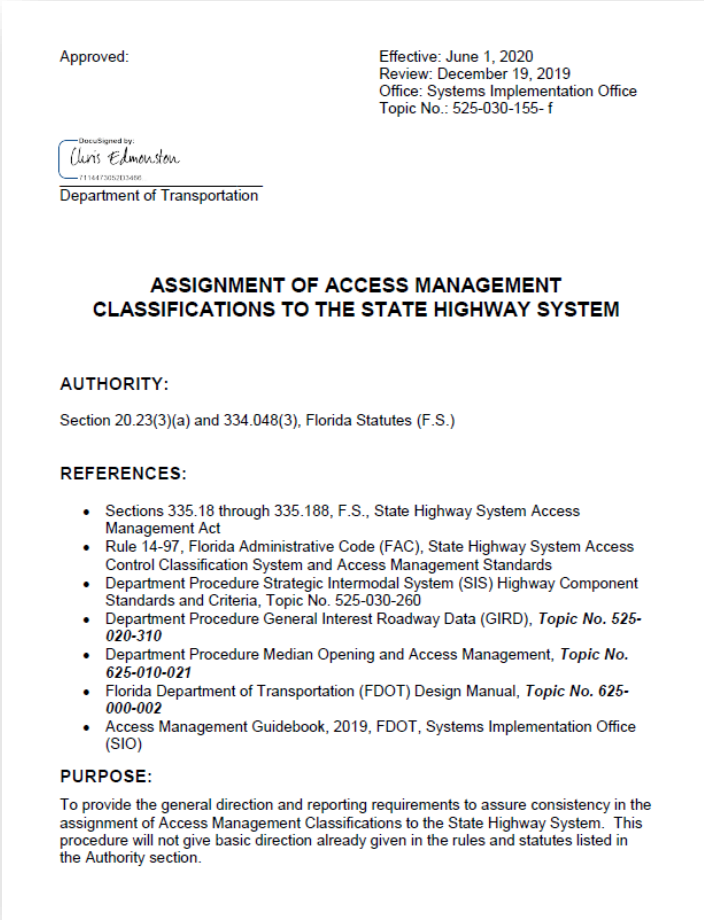
14-97.002 Definitions.
For the purposes of this rule chapter the following definitions shall apply unless the context clearly shows otherwise:
(1) "Area Type" means one of four specific land use categories reflecting certain land use and intensity characteristics used in specifying the interchange spacing standards for limited access facilities.
(2) "Central Business District (CBD) and CBD Fringe" means the areas contained within a boundary designated as CBD and CBD fringe area type in the adopted MPO Long Range Transportation Plan. For the purpose of this rule chapter this area is designated as Area Type I and only applies to Access Class.
(3) "Connection" means as defined in Section 335.182, F.S. For the purpose of this rule chapter, two one-way connections to a property may constitute a single connection.
(4) "Connection Spacing Standard" means the distance between connections, measured from the closest edge of pavement of the first connection to the closest edge of pavement of the second connection along the edge of the traveled way.
(5) "Controlled Access Facility" means as defined in Rule 14-96.002, F.A.C.
(6) "Corridor Access Management Plan" means a strategy defining site specific access management and traffic control features for a particular roadway segment, developed in coordination with the affected local government and adopted by the Department in cooperation with the affected local government(s).
(7) "Department" means the Florida Department of Transportation.
(8) "Directional Median Opening" means as defined in Rule 14-96.002, F.A.C. Directional median openings for two opposing left or "U-turn" movements along one segment of road are considered one directional median opening.
(9) "Existing Urbanized Areas other than CBD and CBD Fringe" means the area between the CBD and CBD Fringe area boundary and the existing Urban Area Boundary for Urbanized Areas as reflected in the MPO Long Range Transportation Plan. For the purpose of this rule chapter, this area is designated as Area Type 2 and only applies to Access Class 1.
(10) "FHWA" means Federal Highway Administration.
(11) "Full Median Opening" means as defined in Rule 14-96.002, F.A.C.
(12) "Generally Accepted Professional Practice" means as defined in Rule 14-96.002, F.A.C.
(13) "Governmental Entities" means as set forth in Section 335.188, F.S.
(14) "Intersection" means an at-grade connection or crossing of a local road or state highway with a state highway.
(15) "Limited Access Facility" means as defined in Section 334.03, F.S.
(16) "Local Governmental Entity" means as defined in Section 334.03, F.S.
(17) "Median" means as defined in Rule 14-96.002, F.A.C.
(18) "Median Opening Spacing Standard" means the distance between openings in a restrictive median. The distance is measured from centerline to centerline of the openings along the traveled way.
(19) "Metropolitan Planning Organization (MPO)" means as described in Section 339.175, F.S.

Access Management Classification | Topic No. 525-030-155

Title: Assignment of Access Management Classification to the State Highway System

- Effective on June 1, 2020

1. Guidelines for the classification process
2. Access management classification in the strategic intermodal system (SIS)
3. Critical data that involves existing and future conditions
4. General guidance for reclassification
5. Classification process due to transfers of roadways to the SHS and road improvements
6. Roadway characteristics inventory (RCI)



Approved:

Effective: June 1, 2020
Review: December 19, 2019
Office: Systems Implementation Office
Topic No.: 525-030-155- f

DocuSigned by:
Chris Edmonston
Department of Transportation

ASSIGNMENT OF ACCESS MANAGEMENT CLASSIFICATIONS TO THE STATE HIGHWAY SYSTEM

AUTHORITY:

Section 20.23(3)(a) and 334.048(3), Florida Statutes (F.S.)

REFERENCES:

- Sections 335.18 through 335.188, F.S., State Highway System Access Management Act
- Rule 14-97, Florida Administrative Code (FAC), State Highway System Access Control Classification System and Access Management Standards
- Department Procedure Strategic Intermodal System (SIS) Highway Component Standards and Criteria, Topic No. 525-030-260
- Department Procedure General Interest Roadway Data (GIRD), ***Topic No. 525-020-310***
- Department Procedure Median Opening and Access Management, ***Topic No. 625-010-021***
- Florida Department of Transportation (FDOT) Design Manual, ***Topic No. 625-000-002***
- Access Management Guidebook, 2019, FDOT, Systems Implementation Office (SIO)

PURPOSE:

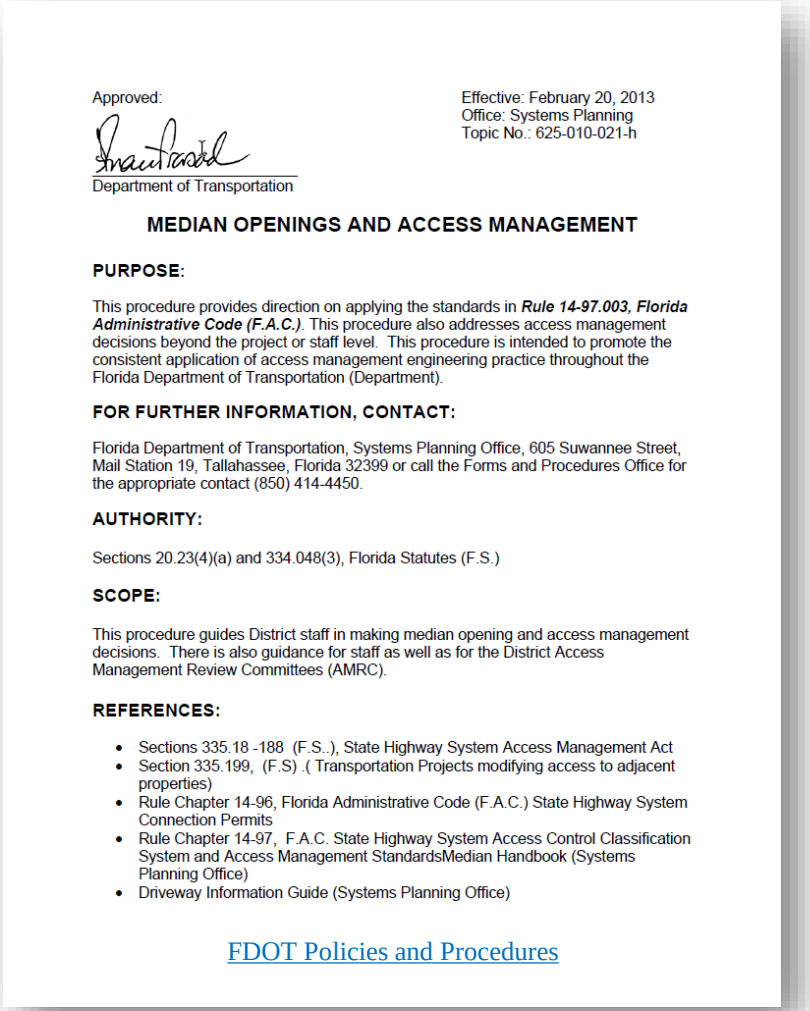
To provide the general direction and reporting requirements to assure consistency in the assignment of Access Management Classifications to the State Highway System. This procedure will not give basic direction already given in the rules and statutes listed in the Authority section.

https://fdotewp2.dot.state.fl.us/ProceduresInformationManagementSystemIntranet/Procedures/Index?viewBy=1&procType=pr

Median Openings and Access Management Procedure

FDOT Procedure No. 625-010-21

- Purpose: Provides guidance on applying the standards in F.A.C. to promote consistent application of access management practices throughout FDOT.
- It addresses the median review process, application of the standards, public comment, and considerations for review of deviations from standards.



Approved:

Department of Transportation

Effective: February 20, 2013
Office: Systems Planning
Topic No.: 625-010-021-h

MEDIAN OPENINGS AND ACCESS MANAGEMENT

PURPOSE:

This procedure provides direction on applying the standards in ***Rule 14-97.003, Florida Administrative Code (F.A.C.)***. This procedure also addresses access management decisions beyond the project or staff level. This procedure is intended to promote the consistent application of access management engineering practice throughout the Florida Department of Transportation (Department).

FOR FURTHER INFORMATION, CONTACT:

Florida Department of Transportation, Systems Planning Office, 605 Suwannee Street, Mail Station 19, Tallahassee, Florida 32399 or call the Forms and Procedures Office for the appropriate contact (850) 414-4450.

AUTHORITY:

Sections 20.23(4)(a) and 334.048(3), Florida Statutes (F.S.)

SCOPE:

This procedure guides District staff in making median opening and access management decisions. There is also guidance for staff as well as for the District Access Management Review Committees (AMRC).

REFERENCES:

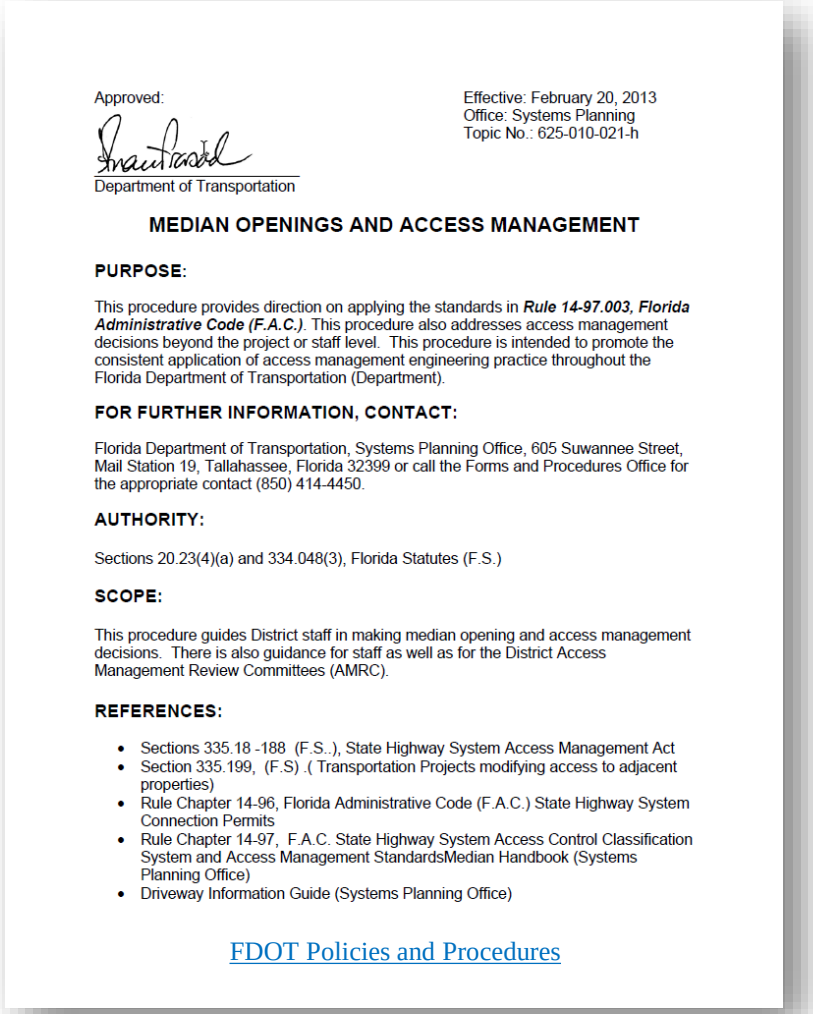
- Sections 335.18 -188 (F.S..), State Highway System Access Management Act
- Section 335.199, (F.S) .(Transportation Projects modifying access to adjacent properties)
- Rule Chapter 14-96, Florida Administrative Code (F.A.C.) State Highway System Connection Permits
- Rule Chapter 14-97, F.A.C. State Highway System Access Control Classification System and Access Management StandardsMedian Handbook (Systems Planning Office)
- Driveway Information Guide (Systems Planning Office)

FDOT Policies and Procedures

Median Openings and Access Management Procedure

Access Management Review Committee (AMRC)

- All deviations greater than 10% for full median openings must go to the AMRC for further study and recommendation.
- Factors evaluated are the project's effect on Traffic Study, Traffic Efficiency, Functional Integrity, and Context Classification of the surrounding development or use.
- For minor deviations, decisions can be made by a responsible engineer with a 10% deviation for "full" openings allowed



Approved:

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- Driveway Information Guide (Systems Planning Office)

FDOT Policies and Procedures

Access Management Classification- Rule 14-97

Table 1
Access Management Standards for Limited Access Facilities

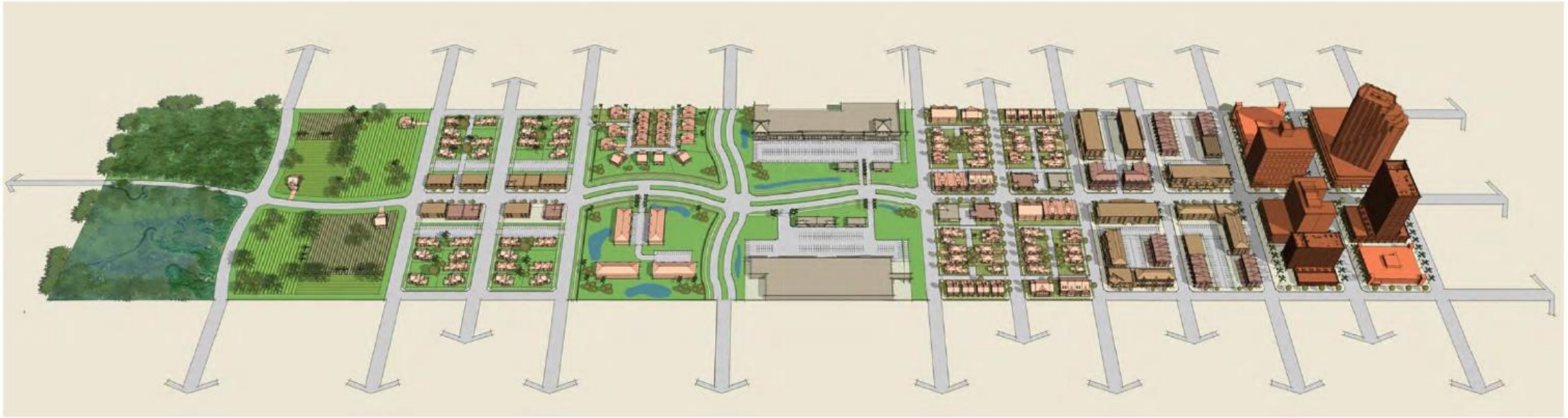
Access Class	Segment Location	Applicable Interchange Spacing Standard
1	Area Type 1 CBD & CBD Fringe for Cities in Urbanized Areas	1 Mile
	Area Type 2 Existing Urbanized Areas Other Than Area Type 1	2 Miles
	Area Type 3 Transitioning Urbanized Areas and Urban Areas Other Than Area Type 1 OR 2	3 Miles
	Area Type 4 Rural Areas	6 Miles

Table 2
Access Management Standards for Controlled Access Facilities

Access Class	Median	Median Opening Spacing Standard (feet)		Signal Spacing Standard (feet)	Connection Spacing Standard (feet)	
		Full	Directional		Posted Speed Greater than 45 MPH	Posted Speed of 45 MPH or Less
2	Restrictive	2,640	1,320	2,640	1,320	660
3	Restrictive	2,640	1,320	2,640	660	440
4	Non-Restrictive			2,640	660	440
5	Restrictive	2,640 Posted Speed Greater than 45MPH	660	2,640 Posted Speed Greater than 45MPH	440	245
		1,320 Posted Speed of 45 MPH or Less		1,320 Posted Speed of 45 MPH or Less		
6	Non-Restrictive			1,320	440	245
7	Both Median Types	660	330	1,320	125	125

Complete Streets

https://www.fdot.gov/roadway/csi/default.shtm\



C1-Natural
Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.

C2-Rural
Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.

C2T-Rural Town
Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.

C3R-Suburban Residential
Mostly residential uses within large blocks and a disconnected or sparse roadway network.

C3C-Suburban Commercial
Mostly non-residential uses with large building footprints and large parking lots within large blocks and a disconnected or sparse roadway network.

C4-Urban General
Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.

C5-Urban Center
Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of a civic or economic center of a community, town, or city.

C6-Urban Core
Areas with the highest densities and building heights, and within FDOT classified Large Urbanized Areas (population >1,000,000). Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected roadway network.

Access Management Standards For Controlled Access Facilities

Roadway Access Class	FDOT Context Classification	Median Type	Connection Spacing (feet)		Median Opening Spacing (feet)		Minimum Signal Spacing (feet)***
			≤45mph Posted	>45mph Posted	Directional	Full	
2	C1 Natural, C2 Rural	Restrictive w/Service Roads	660	1320	1,320	2,640	2,640
3	C1 Natural, C2 Rural, C2T Rural Town, C3R Suburban Residential, C3C Suburban Commercial	Restrictive	440	660	1,320	2,640	2,640
4	C2T Rural Town, C4 Urban General, C5 Urban Center, C6 Urban Core	Non-Restrictive**	440	660			2,640
5		Restrictive	245	440	660	2,640/ 1,320*	2,640/ 1,320*
6		Non-Restrictive**	245	440			1,320
7		Both Median Types**	125		330	660	1,320

*Spacing 1,320 feet when roadway speed limit is 45 mph or below

**It is recommended that additional safety/operational analysis is completed for non-restrictive medians

***Traffic signals, proposed at intervals closer than the access management standard for the designated access class, will only be approved where the need for such signal(s) is clearly demonstrated for the safety and operation of the roadway through the signal warrant process. (F.A.C. Rule Chapter: 14-97.003) Applicants requesting or requiring the addition, removal, or modification of a traffic signal for Category E, F, and G connections, must submit an Intersection Control Evaluation Form, Form 750-010-30 (F.A.C. Rule Chapter: 14-96.003). This language is in the draft version of rule 14-96.

Source: Adapted from FDM 201 - Design Controls and FDOT Context Classification

Context Classification

Table 14-Context Classifications, Medians and Median Openings, and Modal Emphasis.

CLASS	CHARACTERISTICS BY MODE	RELATIVE MEDIAN MODAL EMPHASIS BY CONTEXT CLASSIFICATION					GENERAL MEDIAN CONSIDERATIONS
		CAR	BICYCLE	WALKING	TRANSIT	TRUCKS	
C1 Natural Access Class 2,3	Motor vehicles predominant, Occasional bicycle and pedestrian activity, occasional public transportation	High	Low	Low	Low	High	• Install medians on all major four-lane highways. • Provide turn lanes at all median openings • Retrofit continuous two-way left turn lanes into restrictive medians
C2 Rural Access Class 2,3	Motor vehicles predominant, Occasional bicycle and pedestrian activity, occasional public transportation	High	Low	Low	Low	High	• Install medians on all major four-lane highways. • Provide turn lanes at all median openings • Retrofit continuous two-way left turn lanes into restrictive medians
C2T Rural Town Access Class 4,5,6	Sidewalk paved from utility strip or in some cases the curb edge to face of building, shorter block sizes, higher pedestrian volumes, often on street parking	Medium	Medium	High	Low	Medium	• Install medians on all major four-lane highways leading into the rural town. • Provide turn lanes at all median openings • Based on expected traffic and speed, consider 3-lane section through the rural town with enhancements to the pedestrian environment to ensure visibility of pedestrians. • Minimize extra driveways • Maintain sidewalks across driveway openings • Improve left turn conditions to side streets, especially parking and rear delivery entrances. • Assure safe, visible, and accessible midblock pedestrian crossings where warranted and signal spacing is greater than 660 feet • Preserve the existing street network and intersection spacing based on existing block sizes
C3R Suburban Residential Access Class 3	Bicycles and pedestrians present. Bus transit transportation is usually present. Entrances into subdivisions usually local street design	High	Medium	Medium	Medium	Medium	• Install medians on all major multi-lane highways. • Provide turn lanes at all median openings • Retrofit continuous two way left turn lane sections into restrictive medians • Assure safe, visible, and accessible midblock pedestrian crossings where warranted and signal spacing is greater than 660 feet
C3C Suburban Commercial Access Class 3	May include activity centers Bicycles and pedestrians present. Bus transit usually present	High	Medium	Medium	Medium	Medium to High	• Install medians on all major multi highways. • Provide turn lanes at all median openings • Retrofit continuous two way left turn lane sections into restrictive medians. • Assure sufficient turning radii where large vehicles are frequent • Assure safe, visible, and accessible midblock pedestrian crossings where warranted and signal spacing is greater than 660 feet
C4 General Urban Access Class 4,5,6,7	Mix of uses within small blocks, well-connected roadway network, some blocks may extend long distances, Road network usually connects to residential neighborhoods along the corridor or behind	Medium	Medium	High	Medium to High	Medium	• Install medians on all major multi highways. • Provide turn lanes at all median openings • Retrofit continuous two way left turn lane sections into restrictive medians. • Assure sufficient turning radii where large vehicles are frequent • Assure safe, visible, and accessible midblock pedestrian crossings where signal spacing is greater than 660 feet • Preserve the existing street network and intersection spacing based on existing block sizes
C5 Urban Center Access Class 4,5,6,7	Connected buildings, sidewalk paved from curb to building face, shorter blocks, high pedestrian volumes, high bicycle volumes and bike-share possible, high bus volumes, possible rail or BRT, motor vehicle traffic congested during peak hours	Medium to Low	Medium to High	High	High	Medium	• Block sizes in these sections should be sufficiently short to not require separate midblock pedestrian crossings. • Preserve the existing street network and intersection spacing based on existing block sizes
C6 Urban Core Access Class 4,5,6,7	Connected buildings, sidewalk paved from curb to building face, shorter blocks, high pedestrian volumes, high bicycle volumes and bike-share possible, high bus volumes, possible rail or BRT, motor vehicle traffic congested during peak hours	Medium to Low	Medium to High	High	High	Medium	• Block sizes in these sections should be sufficiently short to not require separate midblock pedestrian crossings. • Preserve the existing street network and intersection spacing based on existing block sizes

Context Classification

Table 15-Context Classifications, Driveways, and Modal Emphasis

CLASS	CHARACTERISTICS BY MODE	RELATIVE DRIVEWAY MODAL EMPHASIS BY CONTEXT CLASSIFICATION					GENERAL DRIVEWAY CONSIDERATIONS
		CAR	BICYCLE	WALKING	TRANSIT	TRUCKS	
C1 Natural Access Class 2,3	Motor vehicles predominant, occasional bicycle and pedestrian activity, occasional public transportation	High	Low	Low	Low	High	• Wide turning radius and width necessary for multi-unit tractor trailer when present. Extra width needed to accommodate single direction only
C2 Rural	Motor vehicles predominant, occasional bicycle and pedestrian activity, occasional public transportation	High	Low	Low	Low	High	• Wide turning radius and width necessary for the design vehicle only in one direction
C2T Rural Town	Sidewalk paved from utility strip or in some cases the curb edge to face of building, shorter block sizes, higher pedestrian volumes, often on-street parking	Medium	Medium	High	Low	Medium	• Minimize the number of driveways to create a consistent pedestrian environment. • When driveways are built, the first principle is to keep the sidewalk level across the driveway space. The second is that the flare or apron not cross the sidewalk zone. • Vehicular access should be through the side and back. • FDOT should reinforce local network connectivity for access/ accessibility (e.g. blocks and local streets).
C3R Suburban Residential	Bicycles and pedestrians present. Bus service common. Entrances into subdivisions usually of local street design	High	Medium	Medium	Medium	Medium	• Medium turning radii in neighborhoods with attention paid to the pedestrian environment through the use well marked crosswalks. • Consider the use of small sized radii, and the use of a reinforced textured raised surface to allow off-tracking of typical multi-unit tractor trailers when present.
C3C Suburban Commercial	May also include activity centers. Bicycles and pedestrians present. Bus service common.	High	Medium	Medium	Medium	Medium to High	• Wide turning radius and width necessary for multi-unit tractor trailers when present. Extra width maybe needed to accommodate two movements exiting and entering at the same time, especially in industrial areas.
C4 General Urban	Mix of uses within small blocks. Well-connected roadway network. Some blocks may extend long distances. Road network usually connects to residential neighborhoods along the corridor or behind.	Medium	Medium	High	Medium to High	Medium	• Small to medium-sized radii on driveways. • Consider the use of small sized radii, and the use of a raised reinforced textured surface to allow off-tracking to the typical multiunit tractor trailer. • FDOT should reinforce local network connectivity for access/ accessibility to support rear or side entrances and exits (e.g. blocks and local streets).
C5 Urban Center	Connected buildings, sidewalk paved from curb to building face, shorter blocks, high pedestrian volumes, high bicycle volumes and bike-share possible, high bus volumes, possible rail or BRT, motor vehicle traffic congested during peak hours	Medium to Low	Medium to High	High	High	Medium	• Minimize the number of driveways to create a consistent pedestrian environment. When driveways are built, the first principle is to keep the sidewalk level across the driveway space. The second is that the flare or apron not cross the sidewalk zone. This establishes that the driver is now entering a pedestrian environment. • Vehicular access should be through the side and back of developments. • FDOT should reinforce local network connectivity for access/ accessibility to support rear or side entrances and exits (e.g. blocks and local streets).
C6 Urban Core	Connected buildings, sidewalk paved from curb to building face, shorter blocks, high pedestrian volumes, high bicycle volumes and bike-share possible, high bus volumes, possible rail or BRT, motor vehicle traffic congested during peak hr.	Medium to Low	Medium to High	High	High	Medium	• Minimize the number of driveways to create a consistent pedestrian environment. When driveways are built, the first principle is to keep the sidewalk level across the driveway space. The second is that the flare or apron not cross the sidewalk zone. This establishes that the driver is now entering a pedestrian environment. • As much as possible, large vehicle access should be through the side and back of developments. FDOT should reinforce local network connectivity for access/ accessibility (blocks, local streets)

Module 2: Driveways

Module 2: Driveways

- Driveway definition
- Location
- Measuring between openings
- Spacing Standards
- FDM Chapters
- Driveway categories
- Driveway design
- Conflict Points

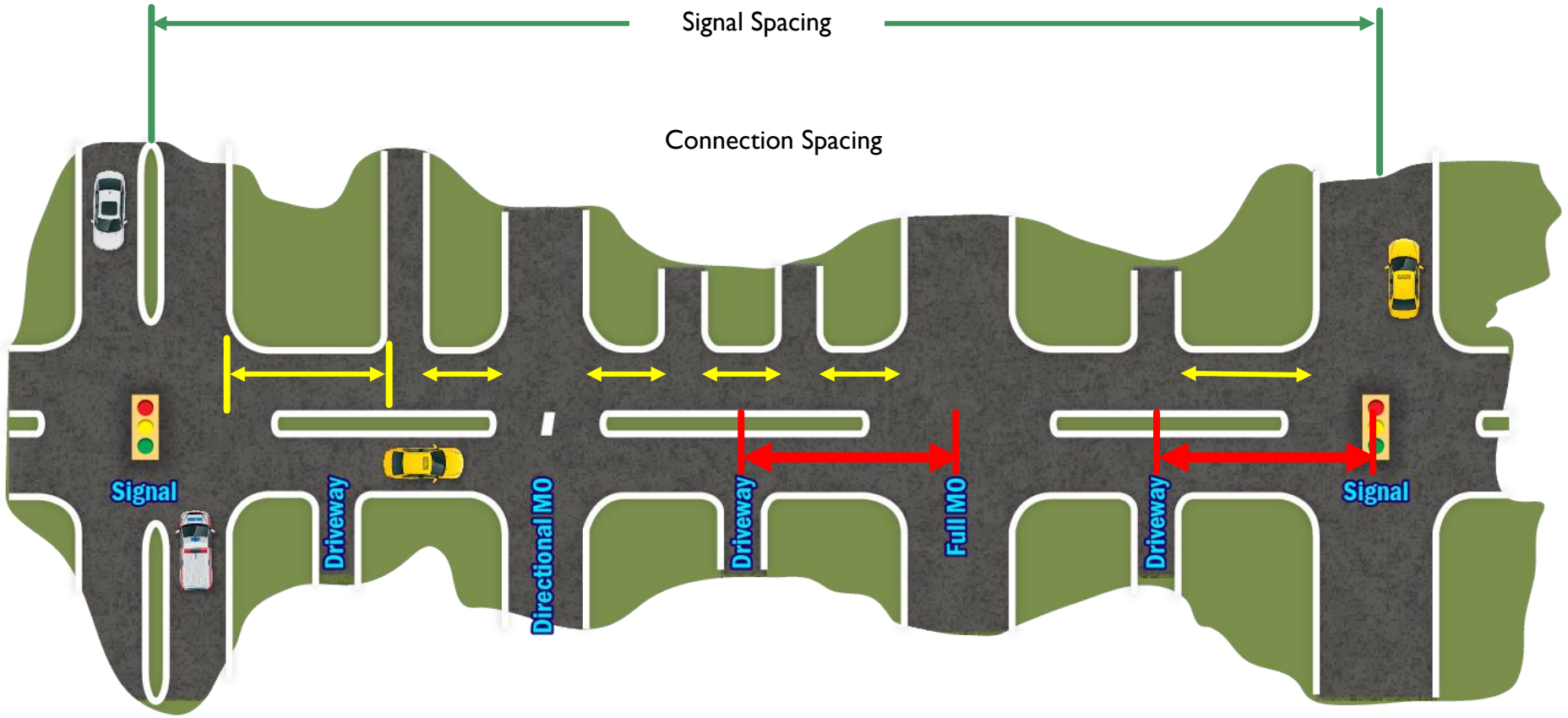
Driveways

Definition and Important points

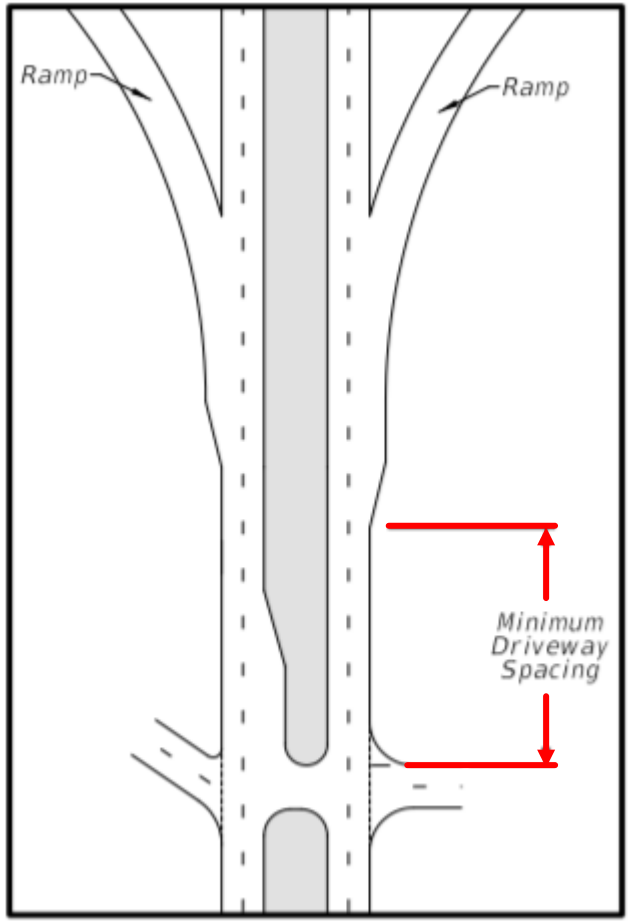
- AASHTO Definition: *"A driveway is an access constructed within a public R/W (Right-of-Way) connecting a public road with adjacent property."*
- Driveways provide a physical transition between a property and the abutting roadway.
- They should be located and design to minimize impacts on roadway traffic while providing safe access to and from developments.

Note: FDOT manuals, handbooks and guides, driveways are at times referred to as "connection(s)" or "turnouts".

Measuring Spacing Between Openings



Driveways Location near Interchange Ramps



Provide adequate connection spacing along the crossroad at an interchange for the following:

- To minimize spillback on the ramp and crossroad approaches to the ramp terminal
- Provide adequate distance for crossroad weaving
- Provide space for merging maneuvers
- Provide space for storage of turning vehicles at access connections on the crossroad

Rule 14-97 requires the following minimum driveway spacing from the ramp taper furthest from the interchange:

- 440 feet on roadways with posted speeds ≤ 45 mph
- 660 feet on roadways with posted speeds > 45 mph
- 1,320 feet on Access Class 2 Facilities with posted speeds > 45 mph

Driveway Spacing Standards

Sources:

- F.A.C Rule 14-97.003
- FDM 201
- FDOT Context Classification

Roadway Access Class	FDOT Context Classification	Connection Spacing *(feet)*		Minimum Signal Spacing *(feet)****
		≤45mph Posted	>45mph Posted	
2	C1 Natural, C2 Rural	660	1320	2,640
3	C1 Natural, C2 Rural, C2T Rural Town, C3R Suburban Residential, C3C Suburban Commercial	440	660	2,640
4	C2T Rural Town, C4 Urban General, C5 Urban Center, C6 Urban Core	440	660	2,640
5		245	440	2,640/ 1,320*
6		245	440	1,320
7		125		1,320

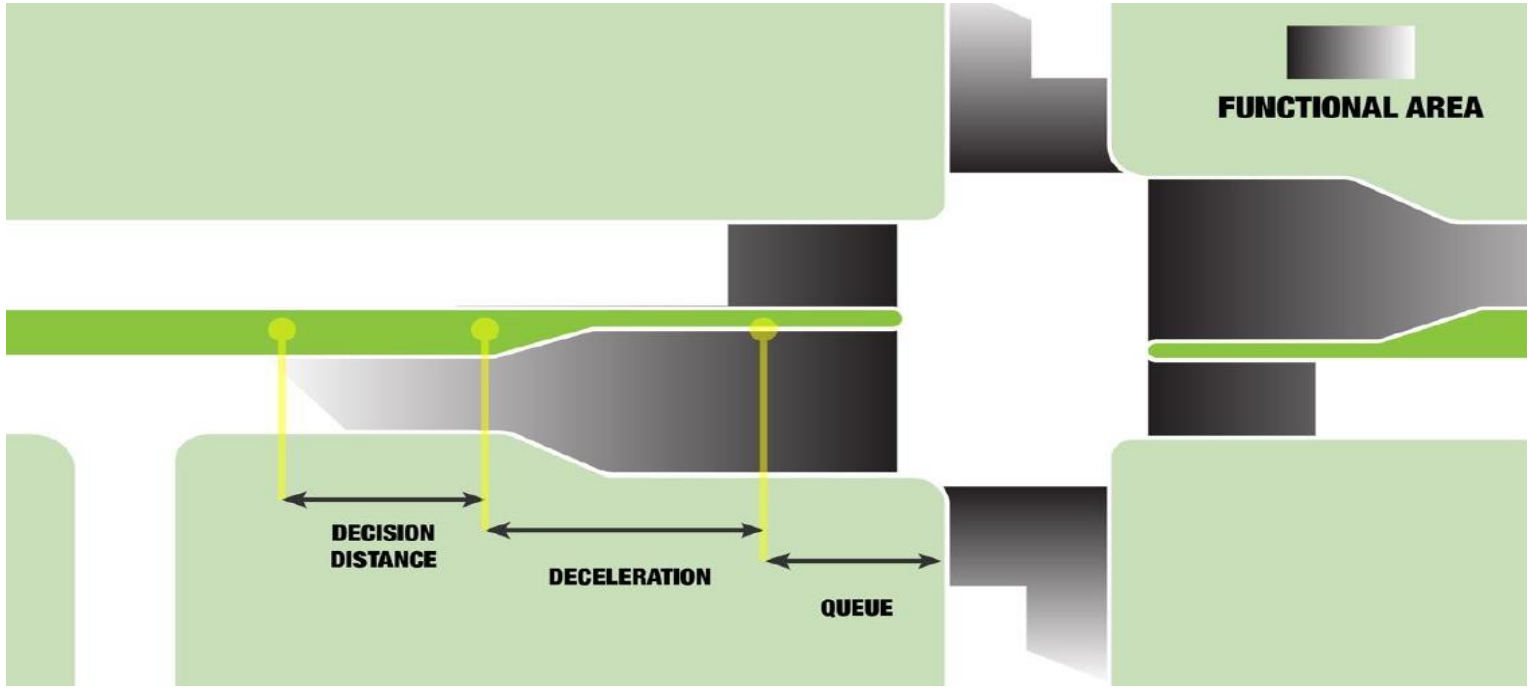
**Spacing 1,320 feet when roadway speed limit is 45 mph or below*

***It is recommended that additional safety/operational analysis is completed for non-restrictive medians*

****Traffic signals, which are proposed at intervals closer than the access management standard for the designated access class, will only be approved where the need for such signal(s) is clearly demonstrated for the safety and operation of the roadway and approved through the signal warrant process. (F.A.C Rule Chapter: 14-97.003) Applicants requesting or requiring the addition, removal, or modification of a traffic signal for Category E, F, and G connections, must submit an Intersection Control Evaluation Form, Form 750-010-30 (F.A.C. Rule Chapter: 14-96.003). This language is in the draft version of rule 14-96.*

Driveways Location

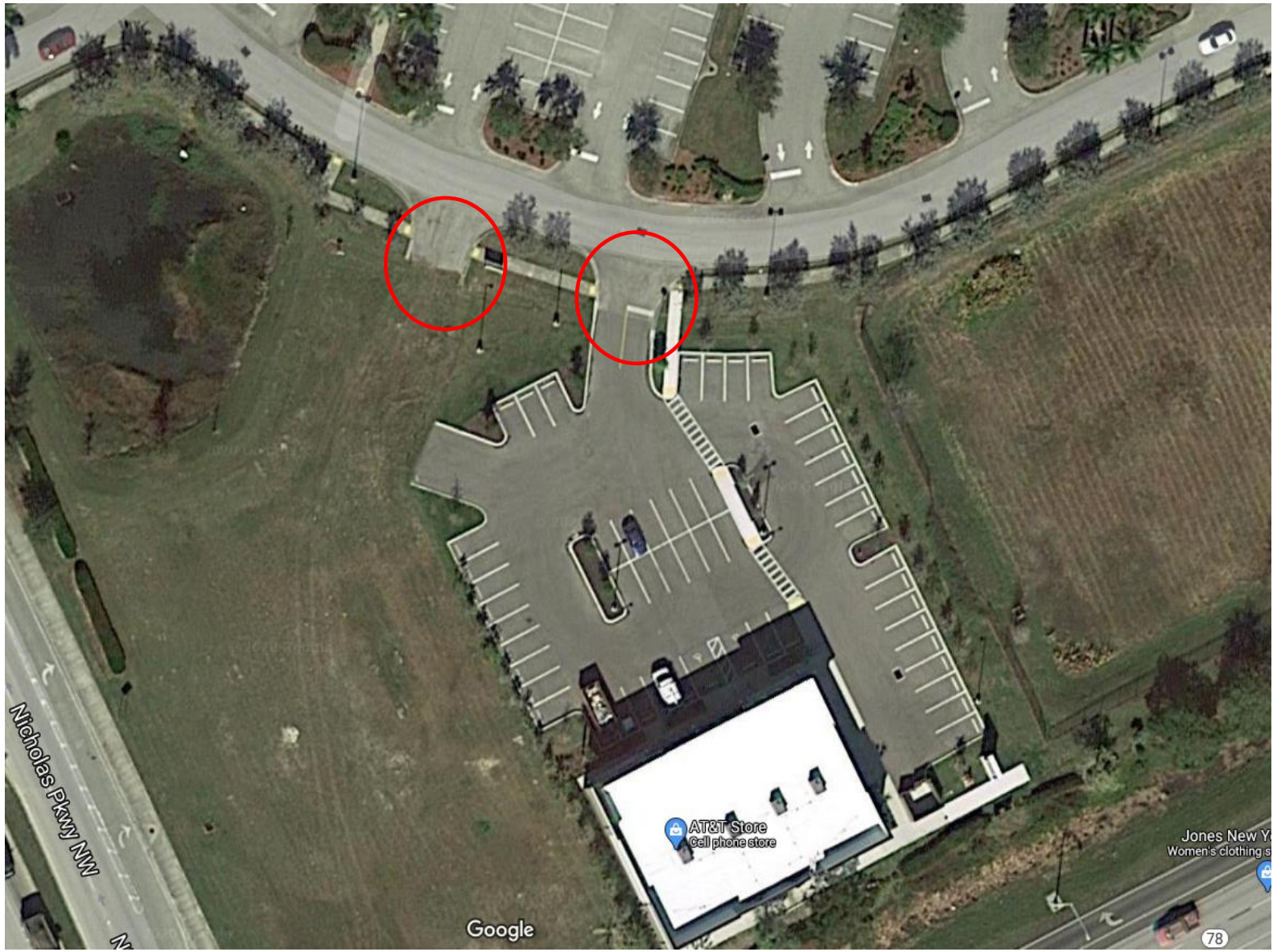
- It is critical to locate the driveways in areas where they will not interfere with other elements.
- Some areas where driveways should be restricted are at
  - Intersection functional area
  - Signalized intersections
  - Limited access interchange ramps
  - Other driveways and median openings
  - Roundabouts.



Example: Multiple Driveways, One Property

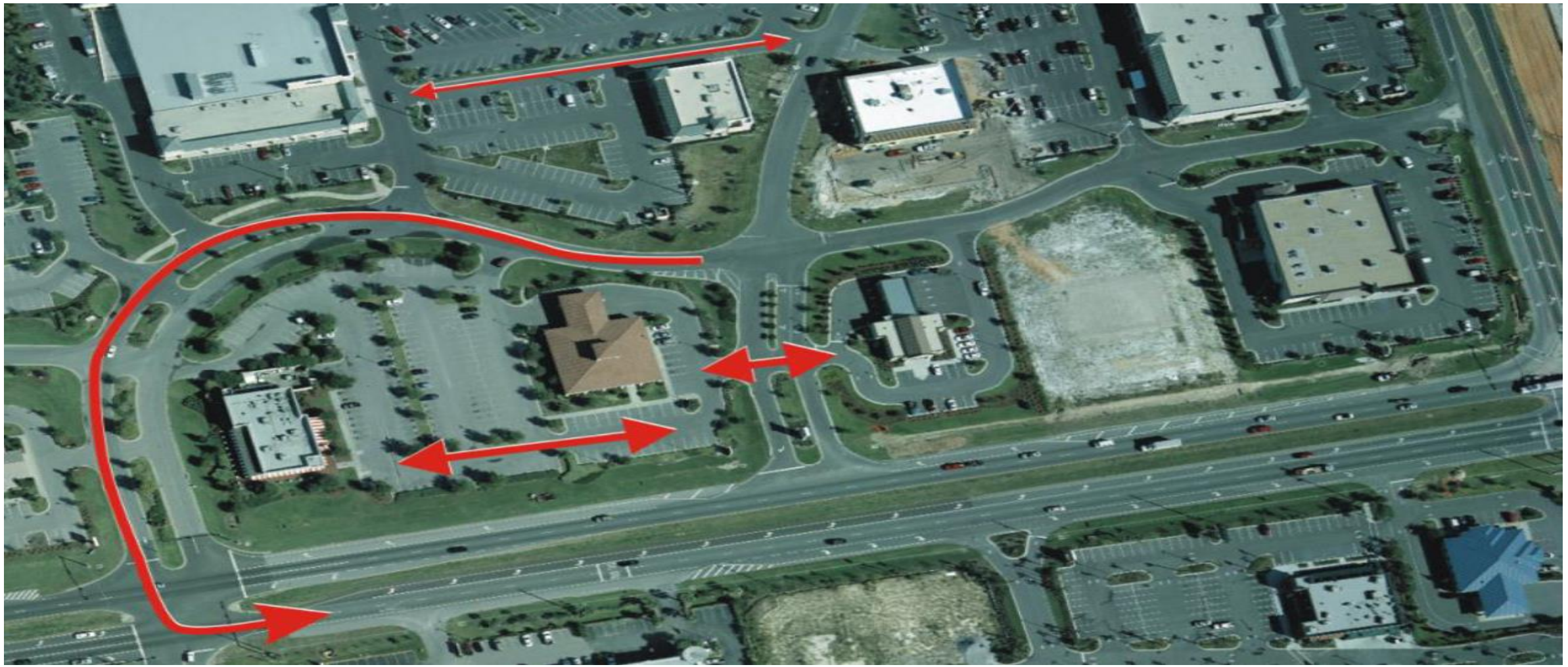
Future development with internal driveways

Future development with internal driveways



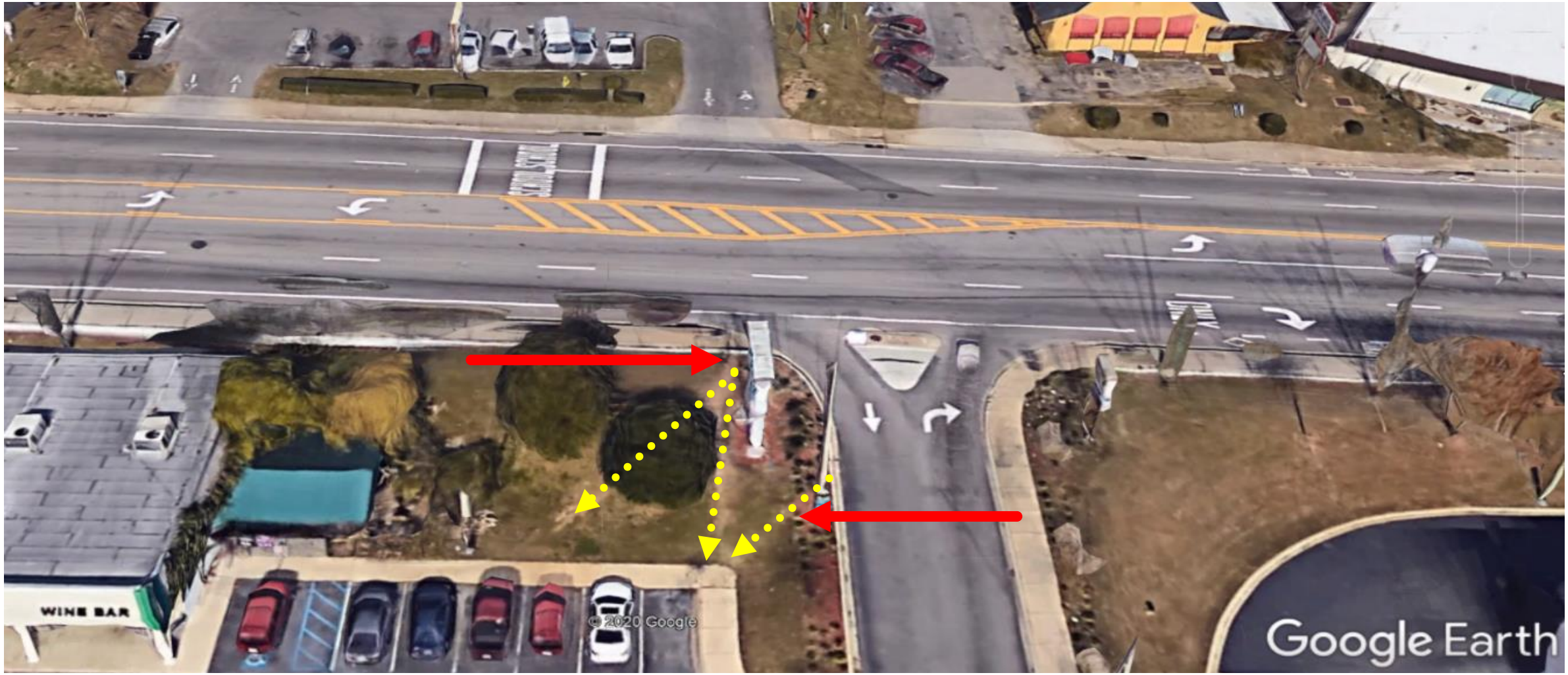
Future development with internal driveways

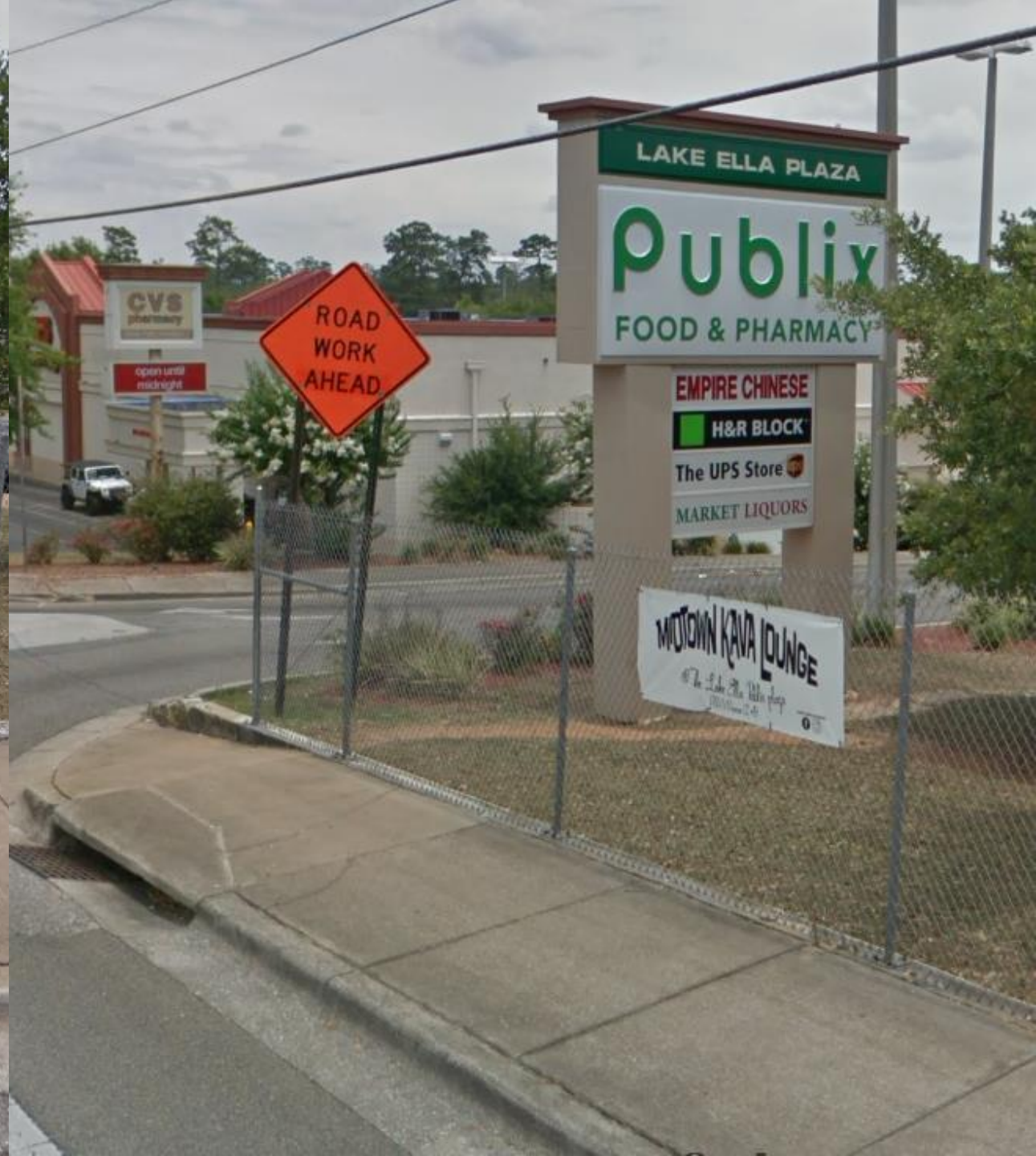
Shared Driveways and Internal Site Connections



Driveways Are For Pedestrians Too

W. Tharpe Street




LAKE ELLA PLAZA
Publix
FOOD & PHARMACY
CVS pharmacy
open until midnight
ROAD WORK AHEAD
EMPIRE CHINESE
H&R BLOCK
The UPS Store
MARKET LIQUORS
MIDTOWN KAVA LOUNGE

FDM 214 and Pedestrians Accommodations

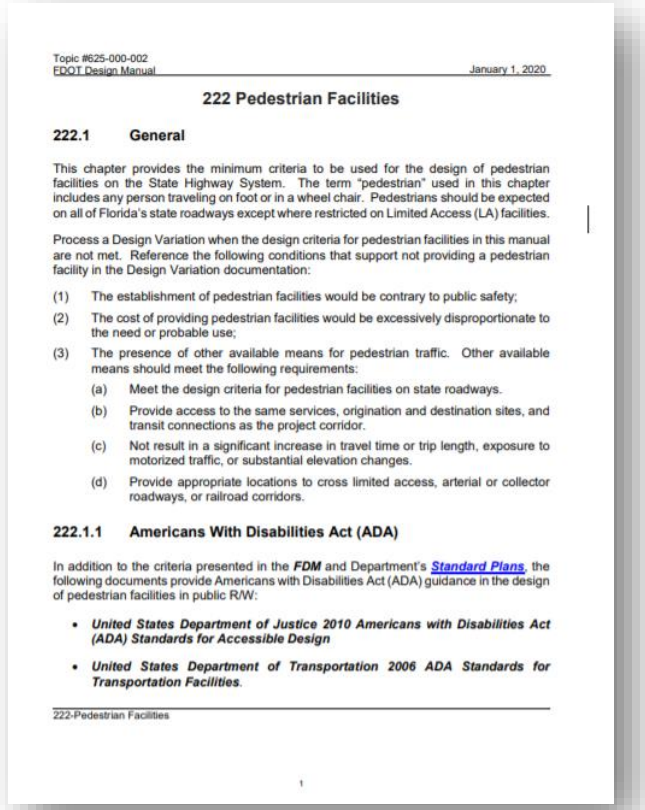
- Pedestrians may be impacted due to larger driveway openings (e.g., higher vehicle entry speeds, increased crossing time).
- The minimum radii will reduce the distance for Pedestrians to cross the driveway.
- Vehicles can wait in a right-turn lane for pedestrians to cross the driveway without impeding the flow of through traffic.
- Provide a minimum 4-foot-wide crossing with a maximum cross slope of 2% for unsignalized radial return driveways where sidewalk is required or provided.

Other FDM references:

- Additional requirements for crosswalks is in FDM 222.2.3.
- Additional requirements for pedestrian facilities are in FDM 222 and the Standard Plans, Indexes 522-001 and 522-002

FDM 222 Pedestrians Facilities and Driveways

- Include sidewalk curb ramps at all intersections and driveways with curbed returns (Section 222.2.2)
- New and reconstructed Driveways are to be in compliance with Standard Plans, Index 330-001 and 522-003 (Section 222.2.2.1)
- For crosswalks located at signalized intersections or driveways, cross slope may exceed 2% but not greater than 5% (Section 222.2.3)
- Detectable warning signs are required on sidewalks at commercial driveways with a stop sign, yield sign, or traffic signal (Section 222.3)
- Detectable warnings should not be placed where sidewalk intersects urban flared driveways or on sidewalks that run continuously through residential driveways (Section 222.3)
- A pedestrian drop-off hazard is a steep or abrupt downward slope that can be hazardous to pedestrians. When the pedestrian drop-off hazard cannot be eliminated consider maintain drive's line of sight at intersections and driveways (section2 22.4)



Topic #625-000-002
FDOT Design Manual January 1, 2020

222 Pedestrian Facilities

222.1 General

This chapter provides the minimum criteria to be used for the design of pedestrian facilities on the State Highway System. The term "pedestrian" used in this chapter includes any person traveling on foot or in a wheel chair. Pedestrians should be expected on all of Florida's state roadways except where restricted on Limited Access (LA) facilities.

Process a Design Variation when the design criteria for pedestrian facilities in this manual are not met. Reference the following conditions that support not providing a pedestrian facility in the Design Variation documentation:

(1) The establishment of pedestrian facilities would be contrary to public safety;

(2) The cost of providing pedestrian facilities would be excessively disproportionate to the need or probable use;

(3) The presence of other available means for pedestrian traffic. Other available means should meet the following requirements:

(a) Meet the design criteria for pedestrian facilities on state roadways.

(b) Provide access to the same services, origination and destination sites, and transit connections as the project corridor.

(c) Not result in a significant increase in travel time or trip length, exposure to motorized traffic, or substantial elevation changes.

(d) Provide appropriate locations to cross limited access, arterial or collector roadways, or railroad corridors.

222.1.1 Americans With Disabilities Act (ADA)

In addition to the criteria presented in the ***FDM*** and Department's ***Standard Plans***, the following documents provide Americans with Disabilities Act (ADA) guidance in the design of pedestrian facilities in public R/W:

- ***United States Department of Justice 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design***
- ***United States Department of Transportation 2006 ADA Standards for Transportation Facilities.***

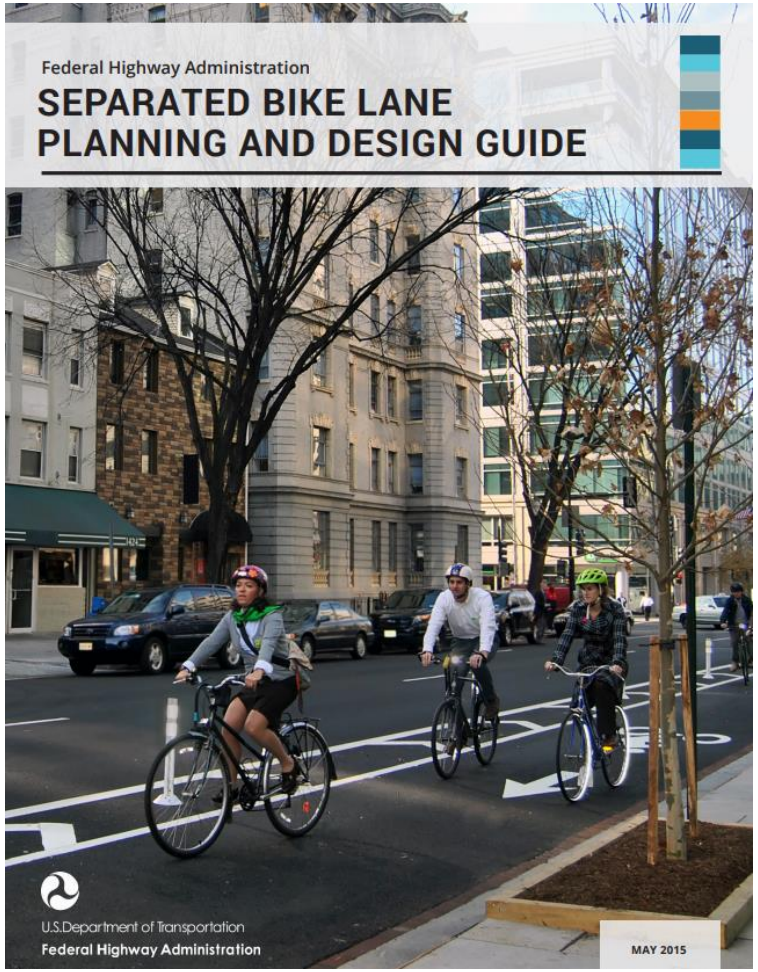
222-Pedestrian Facilities

FDM 223 Bicycle Facilities and Driveways

- Intersections and Driveways (223.2.4.5)
  - FHWA Separate Bike Lane Planning Design Guide
- See the Traffic Engineering Manual (TEM) for more information on traffic operation tools.

https://www.fdot.gov/traffic/trafficservices/studies/tem/tem.shtm

https://www.fdot.gov/roadway/fdm/default.shtm



Driveway Categories

- FDOT defines driveways into seven main categories: A, B, C, D, E, F, and G.

Driveway Category Criteria

Seven categories based on vehicles trips per day or trips per hour that they are meant to serve.

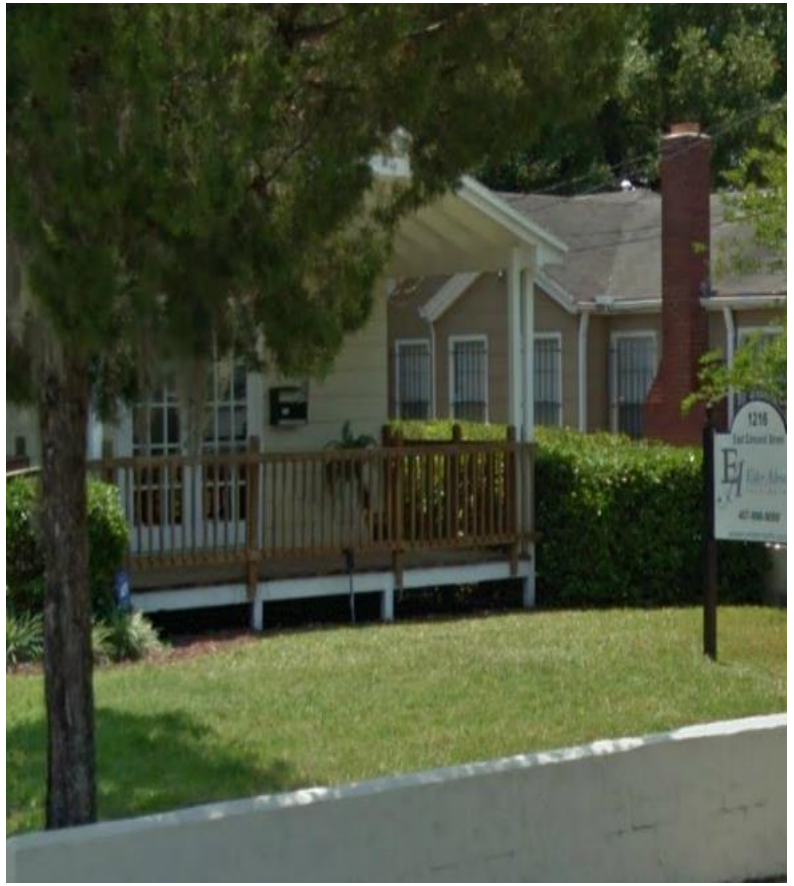
Driveway Category	Vehicle Trips/Day	Vehicle Trips/Hour	Typical Land Uses
A	1 – 20	1 – 5	1 or 2 single family homes
B	21 – 600	6 – 60	3 to 60 housing or apartment units. Small office in converted home.
C	601 – 1,200	61 – 120	Small "Strip" shopping center (20-75,000 sq. ft.) Gas station/ convenience market
D	1,201 – 4,000	121 – 400	150,000 ft shopping center Grocery/drugstore with 10-15 smaller stores
E	4,001 – 10,000	401 – 1,000	Local Mall Wholesale Club
F	10,001 – 30,000	1,001 – 3,000	Regional Mall (Outlet)
G	30,001+	3,001	Large Regional Mall

Driveway Category A

- 1-20 Trips per day
- Examples:
  - 1 or 2 single family homes

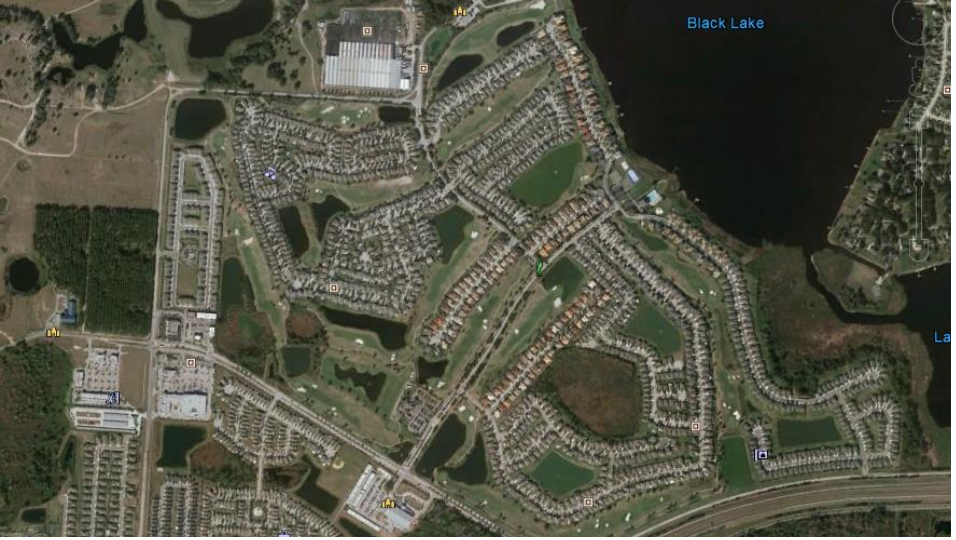
Driveway Category B

- 21-600 Trips per day
- Study should be done on driveway access points
- Adjacent intersections may need a study
- Driveways are 2-way and between 24’ – 36’



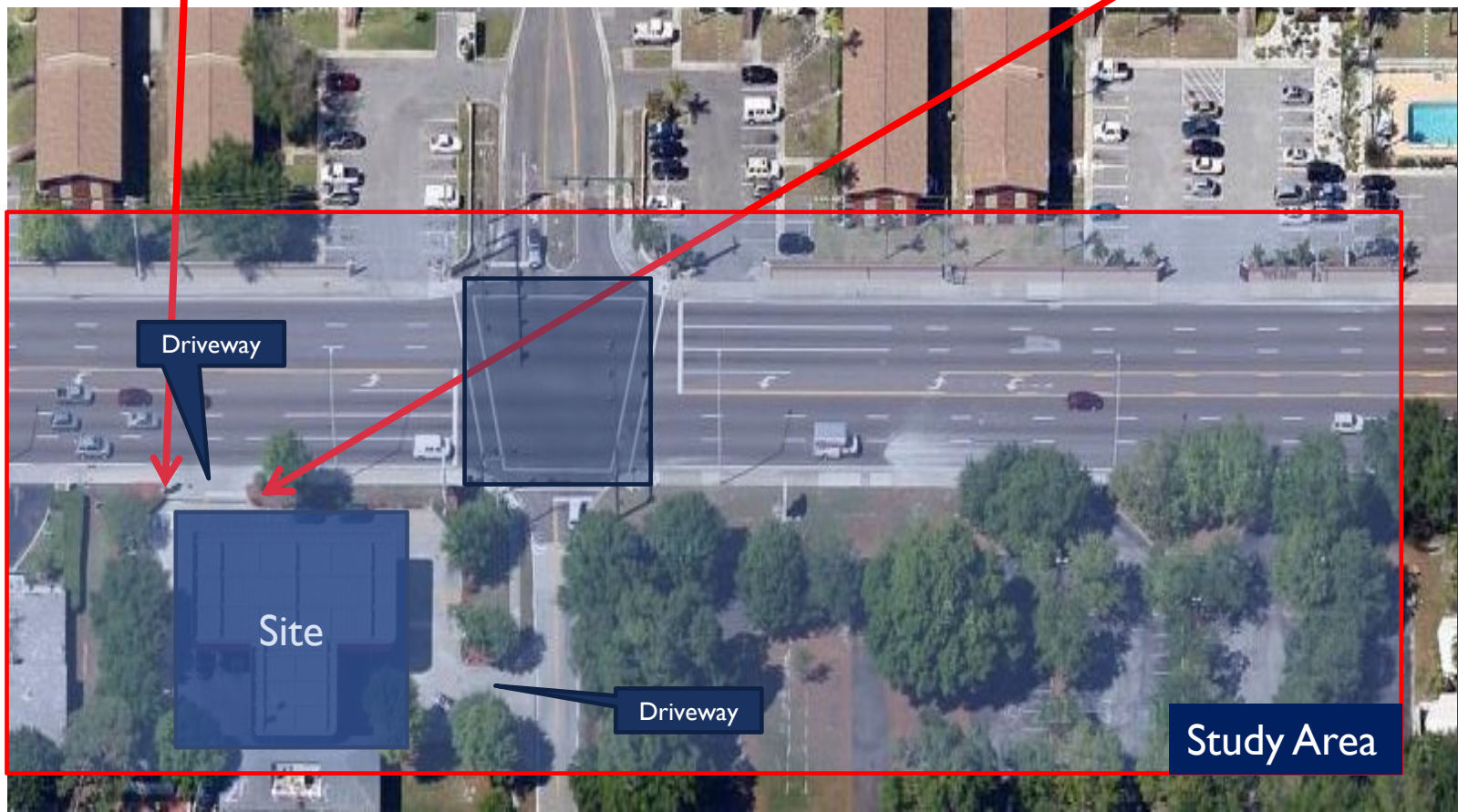
Driveway Category C

- 601-1200 Trips per day
- Study should be done on driveway access points and adjacent intersections
- Further intersections may need to be evaluated in location specific areas
- Driveways are 2-way and between 24’ – 36’



Driveway Category D

- 1201-4000 Trips per day
- Driveway movements need to be evaluated
- Assess impacts on nearby intersections
- Further intersections may need to be evaluated in location specific areas

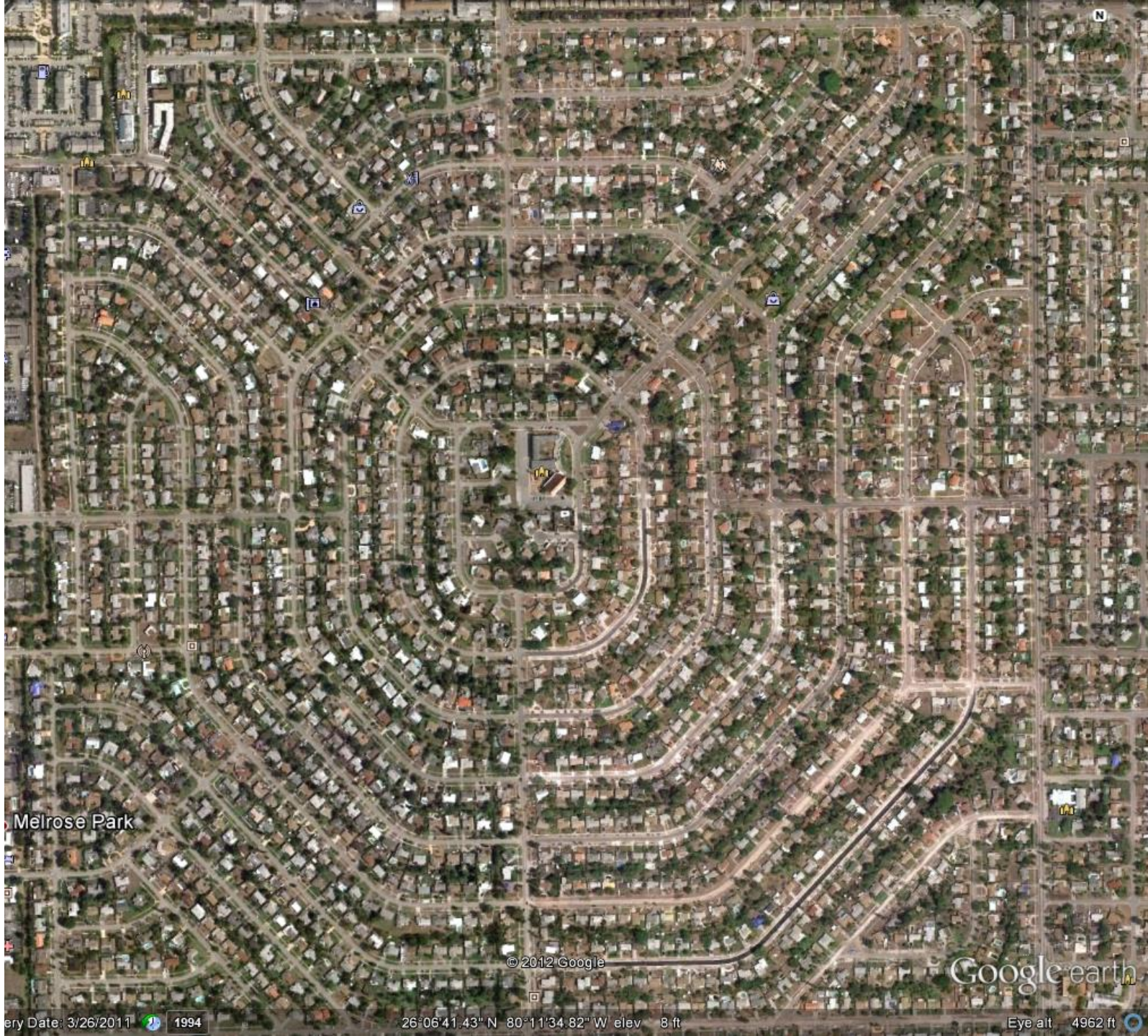


Driveway Category E

- 4001-10000 Trips per day
- Driveway movements need to be evaluated
- Assess impacts on several nearby intersections
- Driveways are designed as full intersections

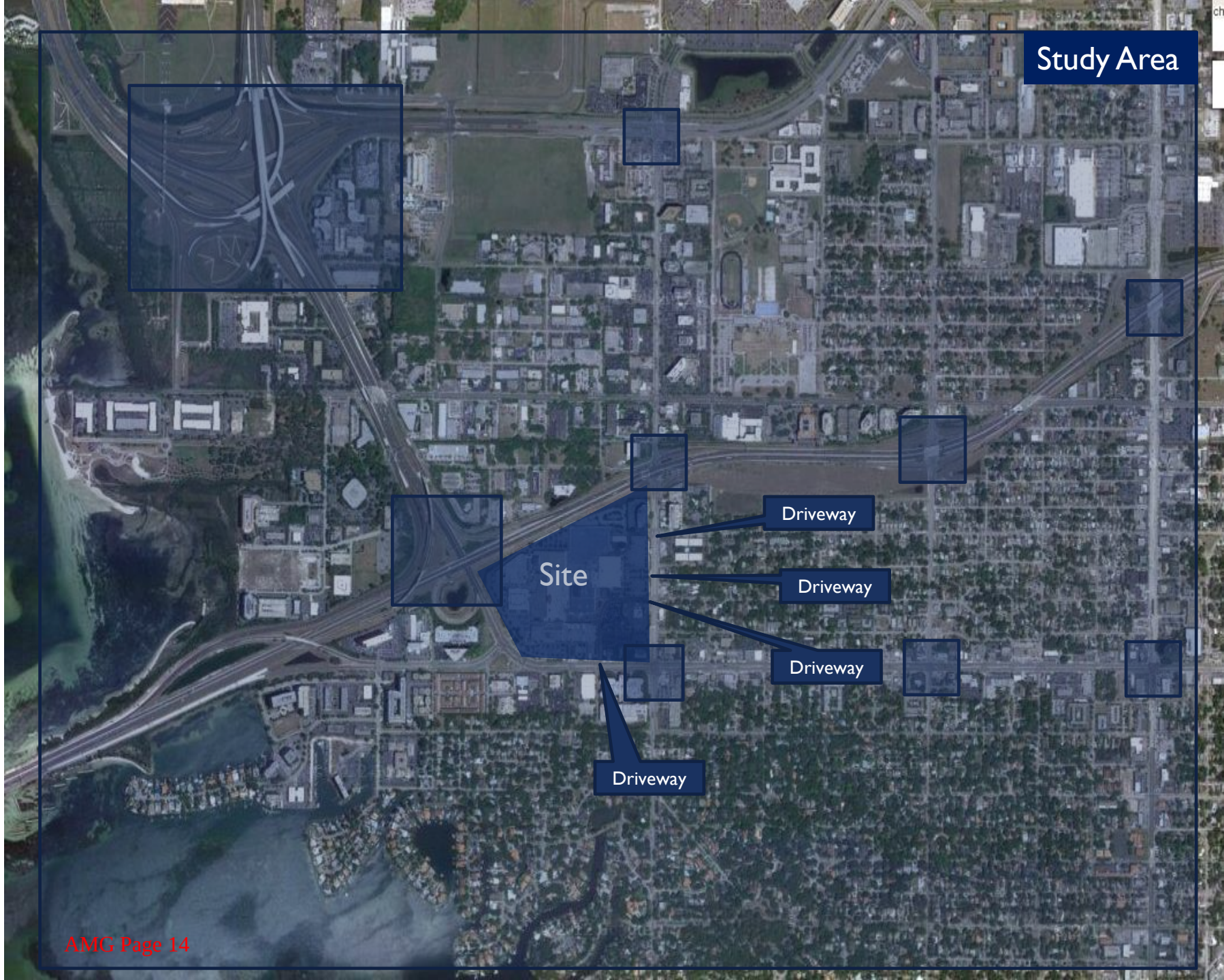
Driveway Category F

- 10001-30000 Trips per day
- Driveway movements need to be evaluated
- Assess impacts on several nearby intersections
- Includes regional and long-range impacts



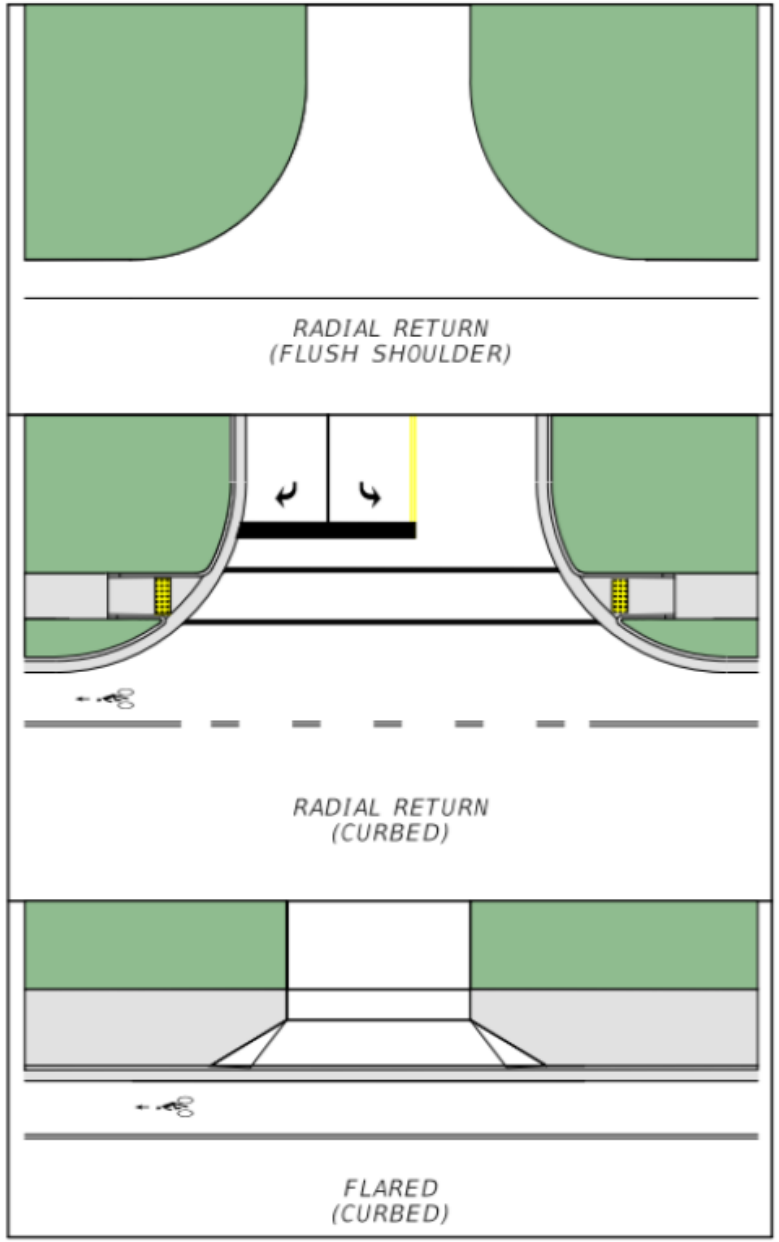
Driveway Category G

- Over 30000 Trips per day
- wide range of facilities
- Includes regional and long-range impacts



Driveway Design and Roadway Types

- Considerations to determine which type of driveway is needed:
  - Design speed of roadway
  - Driveway traffic volume
  - Entry and exit movements
  - Available R/W
  - Design Vehicle
  - Non-motorized users
  - Context classification



Source: FDM 214 – Driveways (Figure 214.2.1)

Driveway Type Guidance

- Two types of driveways
  - Flared Design
    - Traffic volume does not exceed 600 vehicle trips/day.
    - Category A and B
  - Radial Return Design
    - Traffic volume exceed 600 vehicle trips/day
    - Categories C and D

Element Description	Connection Category		
	A	B 2-Way	C and D 2-Way
Curbed Roadways	Flared	Flared	Radius
Flush Shoulder Roadways	Radius	Radius	Radius

Notes:

1. Connection Categories A, B, C, and D are defined in ***FDM 214.1.1.***
2. Small radii may be used in lieu of flares for curbed roadways with Category B Connections when approved by the Department.

Flush Shoulder Roadway (Radial Return)

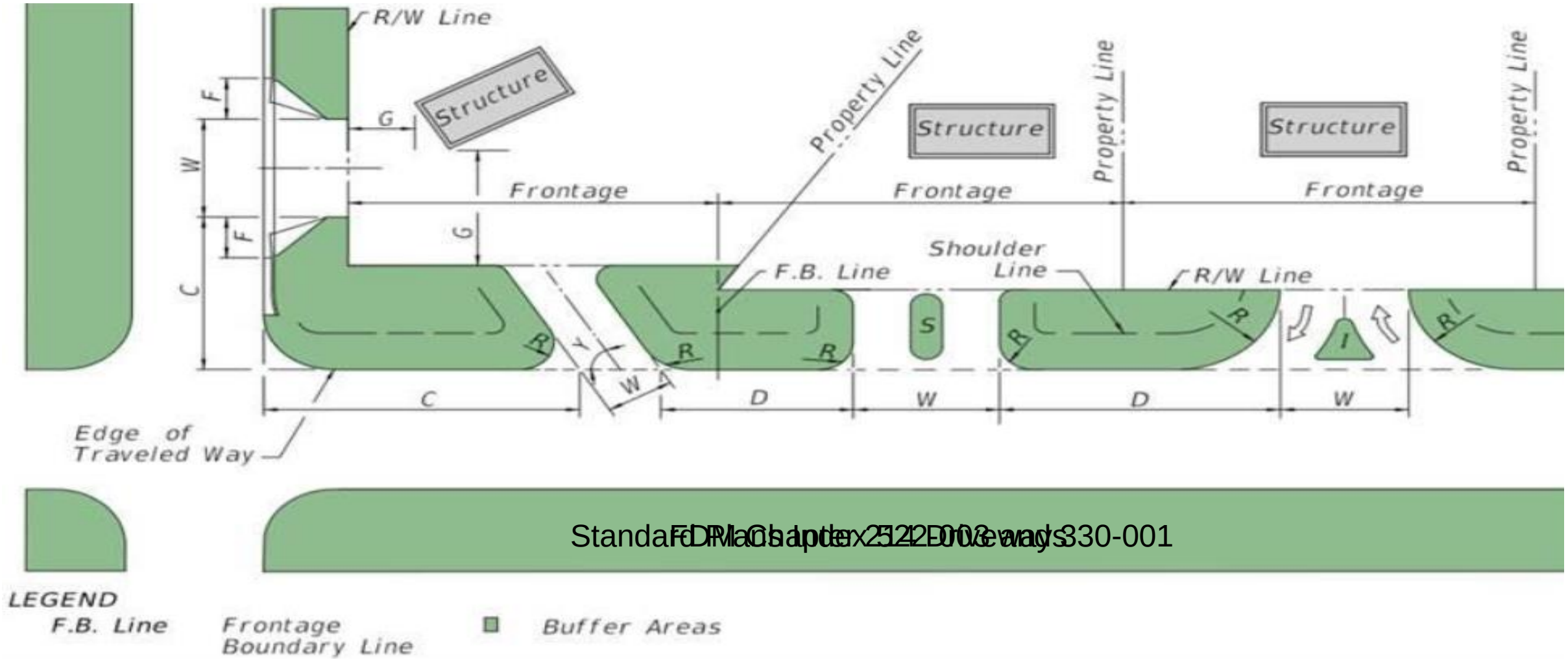
Curbed Roadway (Radial Return)

Curbed Roadway (Flared Return)

Driveway Dimensions

- The final design of driveways is influenced by
  - Design speed
  - Number of vehicles per day
  - Roadway classification
  - FDOT context classification
- Other requirements for driveways are discussed within FDM 214 Driveways and Standard Plans, Index 522-003 and 330-001.

Driveway Dimensions



Standard FDM Chapter 212 Driveways 330-001

Design Elements

- Radius (R)
- Flare (F)
- Driveway Connection Width (W)
- Driveway Connection Spacing (D)
- Corner Clearance (C)
- Angle (Y)
- Setback (G)
- Driveway Location
- Driveway Length
- Driveway Traffic Separators (S)
- Channelizing Islands (I)

Driveway Dimensions

Curbed Roadways

Element	Description	Connection Category		
		A	B	C & D
			Two-Way	Two-Way
C & D	Corner Clearance and Driveway Connection Spacing	See connection spacing in FDM Tables 201.3.2 and 201.3.3		
F	Flare (Drop Curb)	10' Min	10' Min	N/A
G	Setback	12' Min., All categories.		
R	Radial Returns (Radius)	N/A	See Note 1	25' Min 50' Std 75' Max
S	Driveway Traffic Separator or Median	N/A	4'-22' Wide	4'-22' Wide
W	Connection Width	12' Min 24' Max	24' Min 36' Max	24' Min 36' Max
Y	Angle of Driveway	60° - 90°		

Note 1: Small radii may be used in lieu of flares for curbed roadways in Connection Category B when approved by the Department.

Flush Shoulder Roadways

Element	Description	Connection Category		
		A	B	C & D
			Two-Way	Two-Way
C & D	Corner Clearance and Driveway Connection Spacing	See connection spacing in FDM Tables 201.3.2 and 201.3.3		
F	Flare (Drop Curb)	N/A		
G	Setback	12' Min., All categories.		
R	Radial Returns (Radius)	15' Min 25' Std 50' Max	25' Min 50' Std 75' Max	25' Min 50' Std (Or 3-centered curves)
S	Driveway Traffic Separator or Median	N/A	4'-22' Wide	4'-22' Wide
W	Connection Width	12' Min 24' Max	24' Min 36' Max	24' Min 36' Max
Y	Angle of Driveway	60° - 90°		

Note 1: Small radii may be used in lieu of flares for curbed roadways in Connection Category B when approved by the Department.

Driveway Dimensions

Curbed Roadways

Element	Description	Connection Category		
		A	B	C & D
			Two-Way	Two-Way
C & D	Corner Clearance and Driveway Connection Spacing	See connection spacing in FDM Tables 201.3.2 and 201.3.3		
F	Flare (Drop Curb)	10' Min	10' Min	N/A
G	Setback	12' Min., All categories.		
R	Radial Returns (Radius)	N/A	See Note 1	25' Min 50' Std 75' Max
S	Driveway Traffic Separator or Median	N/A	4'-22' Wide	4'-22' Wide
W	Connection Width	12' Min 24' Max	24' Min 36' Max	24' Min 36' Max
Y	Angle of Driveway	60° - 90°		

Note 1: Small radii may be used in lieu of flares for curbed roadways in Connection Category B when approved by the Department.

Flush Shoulder Roadways

Element	Description	Connection Category		
		A	B	C & D
			Two-Way	Two-Way
C & D	Corner Clearance and Driveway Connection Spacing	See connection spacing in FDM Tables 201.3.2 and 201.3.3		
F	Flare (Drop Curb)	N/A		
G	Setback	12' Min., All categories.		
R	Radial Returns (Radius)	15' Min 25' Std 50' Max	25' Min 50' Std 75' Max	25' Min 50' Std (Or 3-centered curves)
S	Driveway Traffic Separator or Median	N/A	4'-22' Wide	4'-22' Wide
W	Connection Width	12' Min 24' Max	24' Min 36' Max	24' Min 36' Max
Y	Angle of Driveway	60° - 90°		

Note 1: Small radii may be used in lieu of flares for curbed roadways in Connection Category B when approved by the Department.

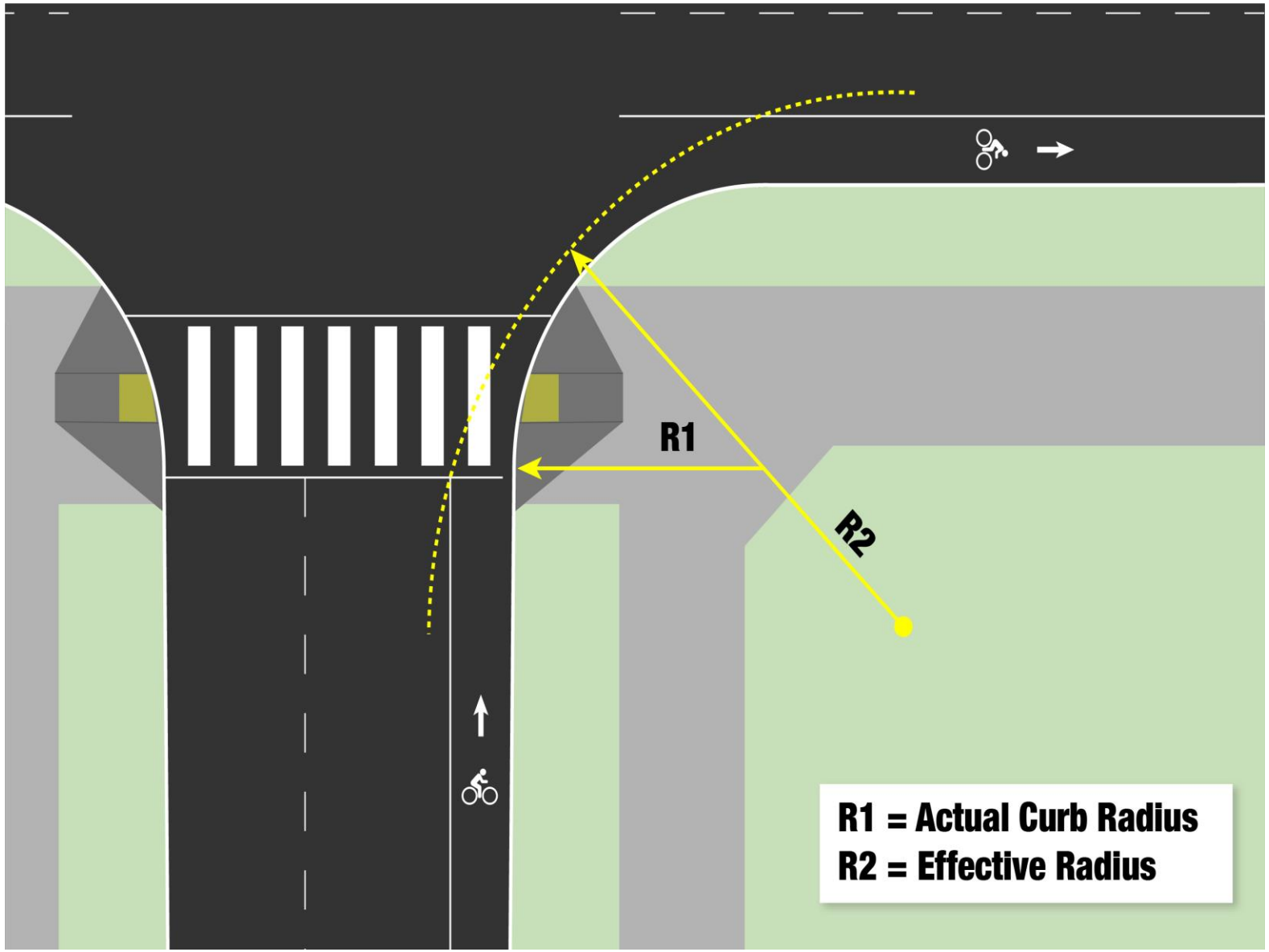
Driveway Dimensions

Curbed Roadways

Flush Shoulder Roadways

Effective Radius

- Possible accommodation of both non-motorized users and large vehicles.
- Shortens pedestrian crossing distance can reduce R/W requirements.



Effective Radius

- It is important to ensure that large vehicles can be accommodated while safely providing for non-motorized users.

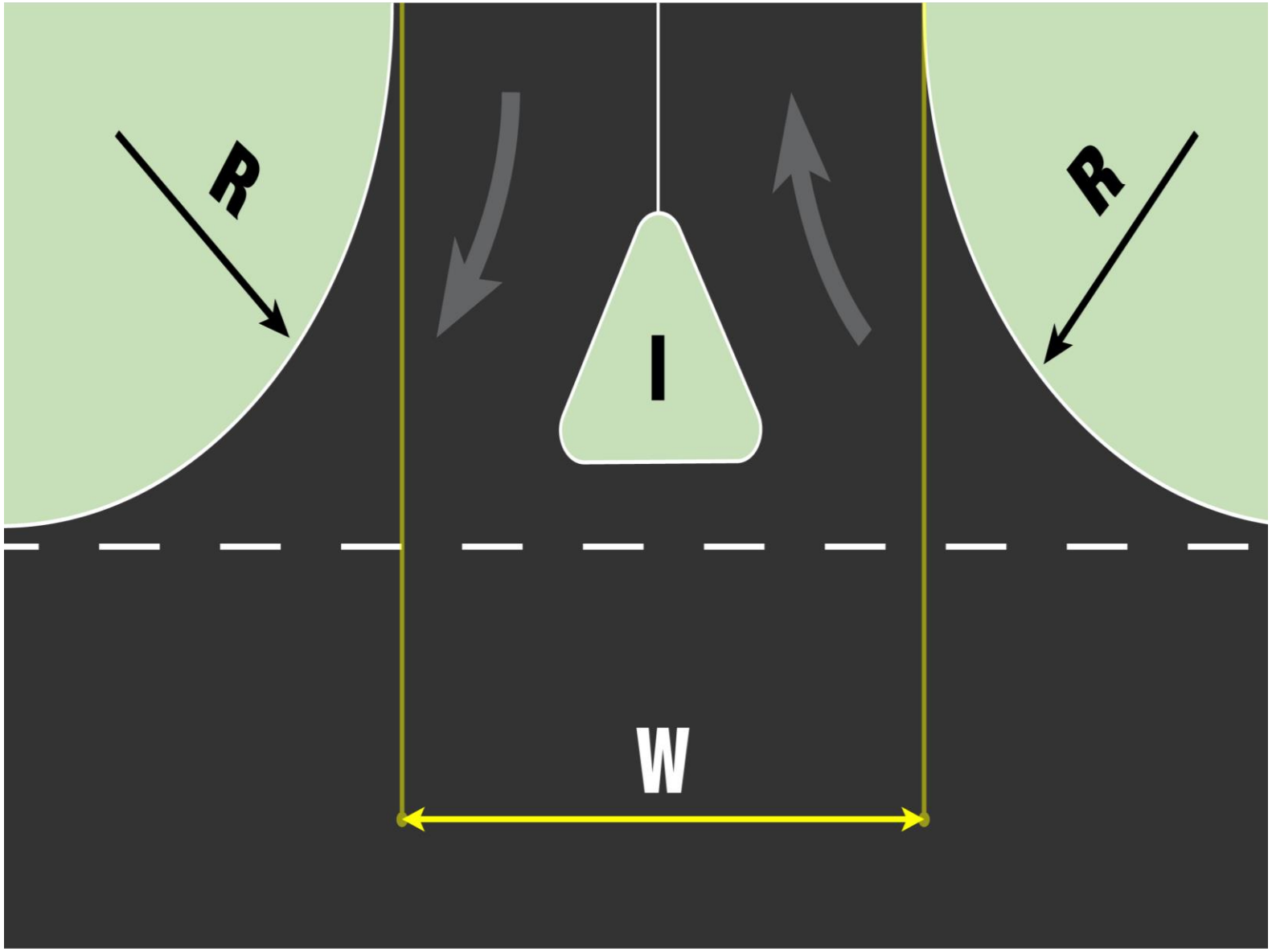
Number of Trucks or Buses Per Hour	Operation to Design for:	Design Vehicle
Commercial and Office Uses		
≤ 2	Simultaneous 2-way	P-Vehicle or a Standard Passenger Vehicle*
≥ 3	Simultaneous 2-way**	Single Unit vehicle (typical FedEx or UPS Truck)
Industrial Uses		
	Simultaneous 2-way	Typical multi-unit tractor trailer
Other Uses		
Truck stop	Simultaneous 2-way***	Largest Vehicle****
Transit Center/ Bus Terminals	Simultaneous 2-way	Largest Bus
Recreational with RVs and trailers	Simultaneous 2-way	Motor Home w/ Trailer
** A standard passenger car (P vehicle) can enter while another standard passenger car (P vehicle) is waiting to exit.*		
*** A standard delivery Single Unit truck (SU vehicle) can enter when a standard passenger car (P vehicle) is waiting to exit.*		
**** Designed so that larger vehicles can off-track through the driveway*		
***** Interstate semi-trailer and turnpike double trailer will be the design vehicle in many states, especially in the vicinity of freeway interchanges.*		

Source: Adapted from Transportation and Land Development, 2002, Stover (pages 7-12)

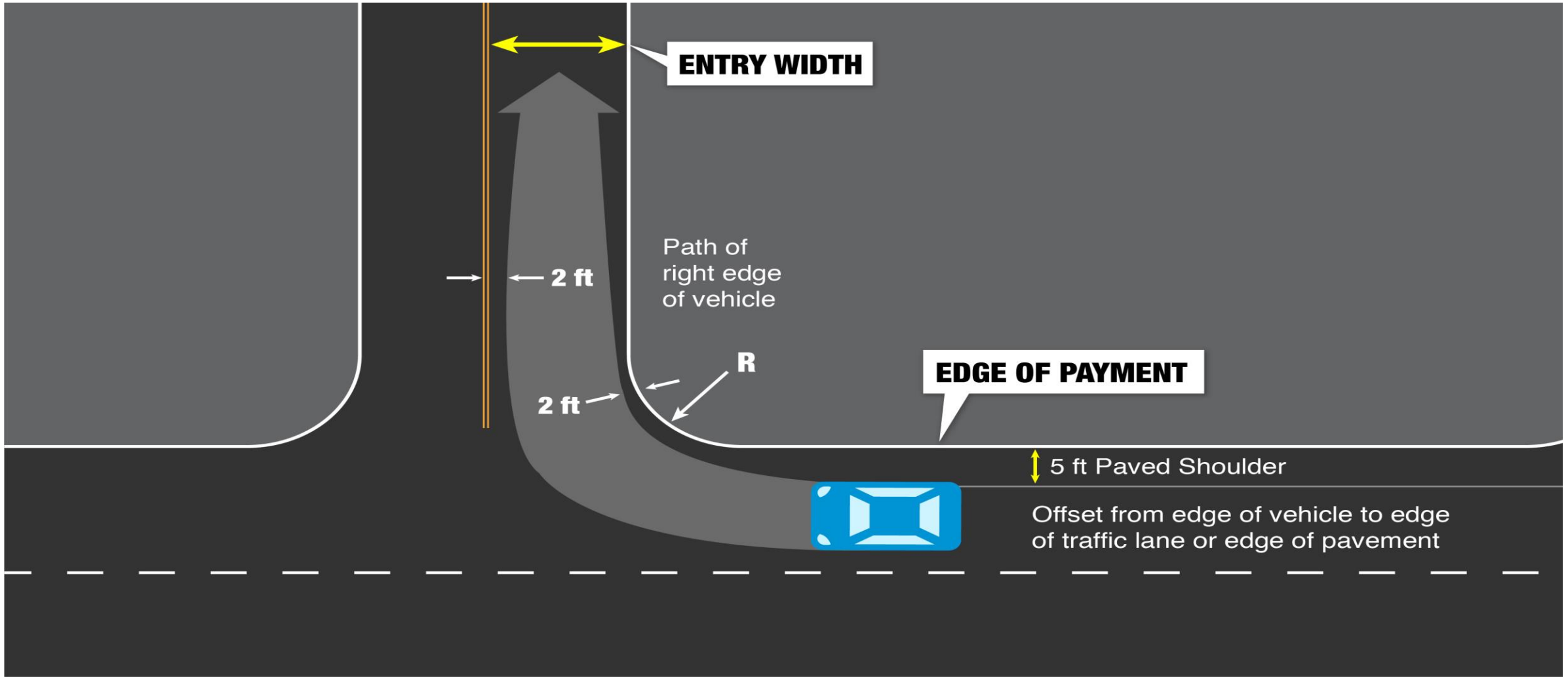
Driveway Width

- Goal: serve the entry and exit movements separately.

- Larger width
  - Vehicles entering at a high speeds
  - Potentially reducing Roadway congestion and crashes
- Small Width
  - Force vehicles to slow
  - Possible collisions



Driveway Width and Radius



Driveway Width and Curb Radius

- NCHRP Report 659 provides detailed guidance on the interaction of driveway width and radius.
- These dimensions do not consider the presence of an offset between the outer edge of the traveled way and the end of the driveway, i.e., the driveway threshold.

Category	Description of Common Applications	Driveway Width	Driveway Curb Radius (in ft.)		
			Higher speed road	Moderate speed road	Lower speed road
STANDARD DRIVEWAYS					
Very high intensity	Urban activity center, with almost constant driveway use during hours of operation.	Many justify two lanes in, two to three lanes out. Refer to street design guides.	30–50	25–40	NA
Higher Intensity	Medium-size office or retail (e.g., community shopping center) with frequent driveway use during hours of operation.	One entry lane, 12–13 ft. wide Two exit lanes, 11–13 ft. wide.	25–40	20–35	NA
Medium intensity	Smaller office or retail, with occasional driveway use during hours of operation. Seldom more than one exiting vehicle at any time.	Two lanes, 24–26 ft total width	20–35	15–30	NA
Lower intensity	Single-family or duplex residential, other types with low use, on lower speed/volume roadways. May not apply to rural residential.	May be related to the width of the garage, or driveway parking. Single lane: 9–12 ft Double: 16–20 ft	15–25	10–15	5–10
SPECIAL SITUATION DRIVEWAYS					
Central Business District	Building faces are close to the street.	Varies greatly, depending on use	NA	20–25	10–15
Farm or ranch; Field	A mix of design vehicles; some may be very low volume.	Min. 16 ft, desirable 20 ft. Affected by widths of field machinery.	30–40	20–30	NA
Industrial	Driveways are often used by large vehicles.	Minimum 26 ft	50–75	40–60	40–60

NOTES:

1. *These widths do not include space for a median or a parallel bike lane or sidewalk.*
2. *Additional width may be needed if the driveway has a curved horizontal alignment.*
3. *For a flare/taper design, use the radius as the dimension of the triangular legs.*
4. *For industrial or other driveways frequented by heavy vehicles, consider either a simple curve with a taper or a 3-centered curve design.*
5. *For connection angles greatly different than 90 degrees, check the radius design with turning templates. For connection corners at which a turn is prohibited, a very small radius is appropriate*
6. *Driveways crossing an open ditch should have a minimum 2 ft shoulder on each side.*
7. *(Source: Statewide Urban Design and Specifications, Iowa State U., Ames, IA (October 21, 2008) p. 4.)*
8. *If the roadway has a usable shoulder, a somewhat smaller radius may perform acceptably.*

Source: NCHRP Report 659 Exhibit 5-24 Driveway width and curb radius guidelines

Driveway Width-One way

NCHRP 659 Guidance:

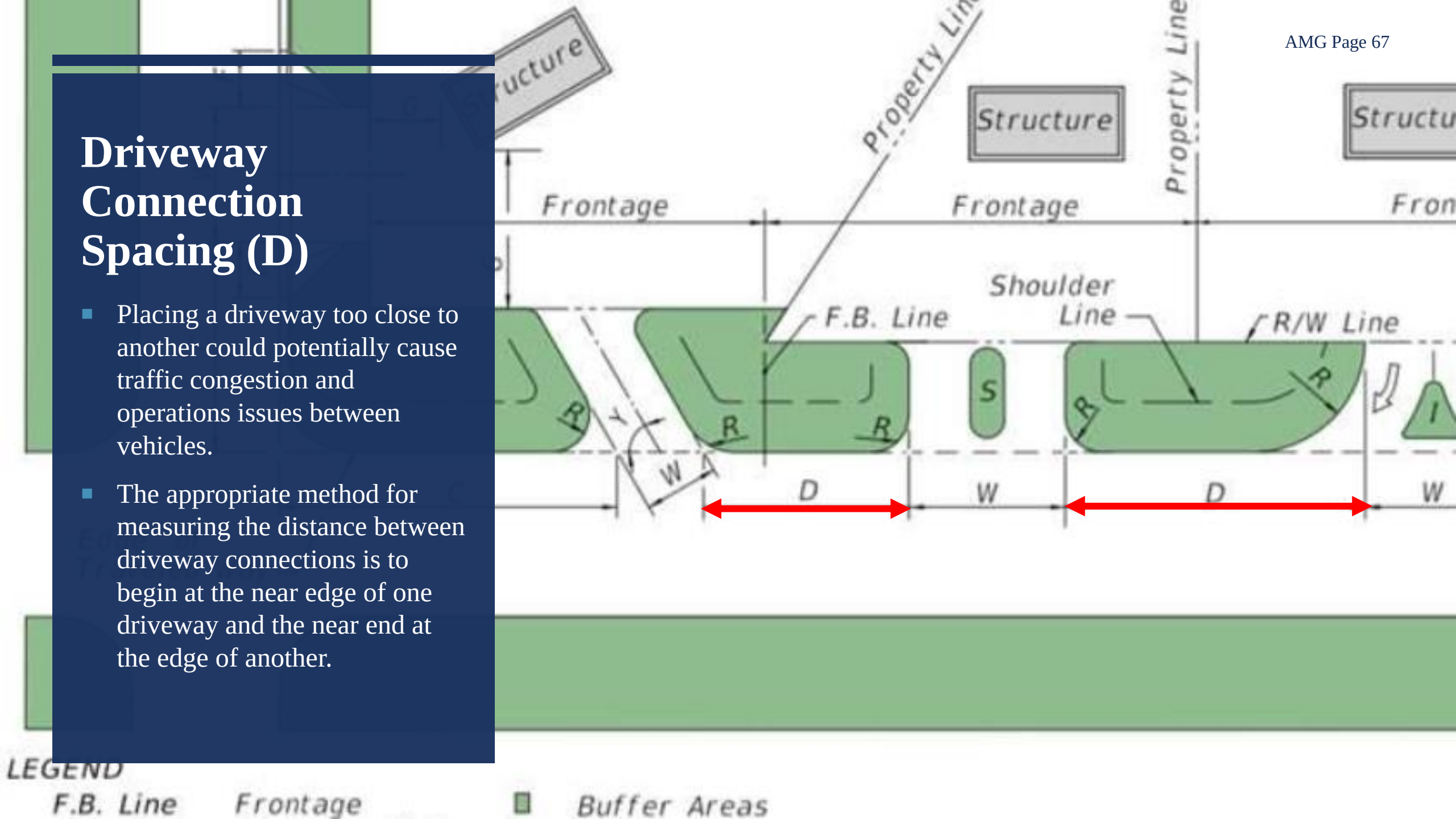
Only a small fraction of driveways operate in a one-way mode. Information on which to base guidance for the design of one-way driveways is limited and, as Table 20 shows, current agencies' standards differ considerably. Structured studies of one-way driveway design elements would be helpful.

Agency	Source	Category	Width for one-way
Missouri	940.16 (5/13/09)	Driveway	20–30 ft
New Jersey	C-11 (6/20/07)	Driveway	20–23 ft
New York	608-03 (1/8/09)	Minor Commercial	12–24 ft; 16 ft normal
Utah	12.1.1601.10	Driveway	12–32 ft

Source: Adapted from NCHRP Report 659

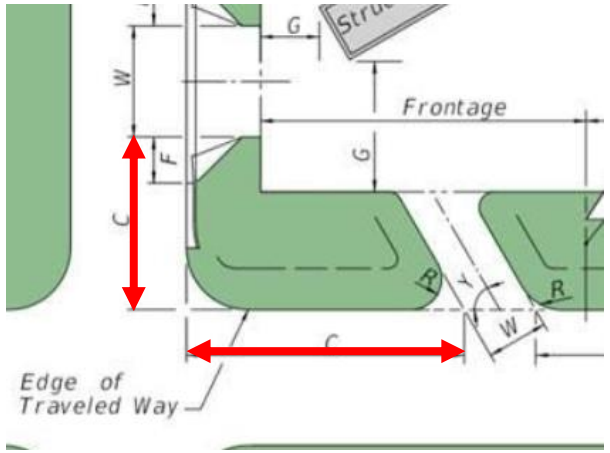
Driveway Connection Spacing (D)

- Placing a driveway too close to another could potentially cause traffic congestion and operations issues between vehicles.
- The appropriate method for measuring the distance between driveway connections is to begin at the near edge of one driveway and the near end at the edge of another.



Corner Clearance

- Corner clearance design criterion is described as the distance from one connection to an intersection.
- Guidance governing the distance between a driveway and intersection is based on roadway access classification (1-7) and the speed limit
- The minimum corner clearance guidance can be found within *F.A.C. Rule Chapter: 14-97.003(1)(i)*



Roadway Access Class	FDOT Context Classification	Median Type	Connection Spacing (feet)		Median Opening Spacing (feet)		Minimum Signal Spacing (feet)***
			≤45mph Posted	>45mph Posted	Directional	Full	
2	C1 Natural, C2 Rural	Restrictive w/Service Roads	660	1320	1,320	2,640	2,640
3	C1 Natural, C2 Rural, C2T Rural Town, C3R Suburban Residential, C3C Suburban Commercial	Restrictive	440	660	1,320	2,640	2,640
4	C2T Rural Town, C4 Urban General, C5 Urban Center, C6 Urban Core	Non-Restrictive**	440	660			2,640
5		Restrictive	245	440	660	2,640/ 1,320*	2,640/ 1,320*
6		Non-Restrictive**	245	440			1,320
7		Both Median Types**	125		330	660	1,320

*Spacing 1,320 feet when roadway speed limit is 45 mph or below

**It is recommended that additional safety/operational analysis is completed for non-restrictive medians

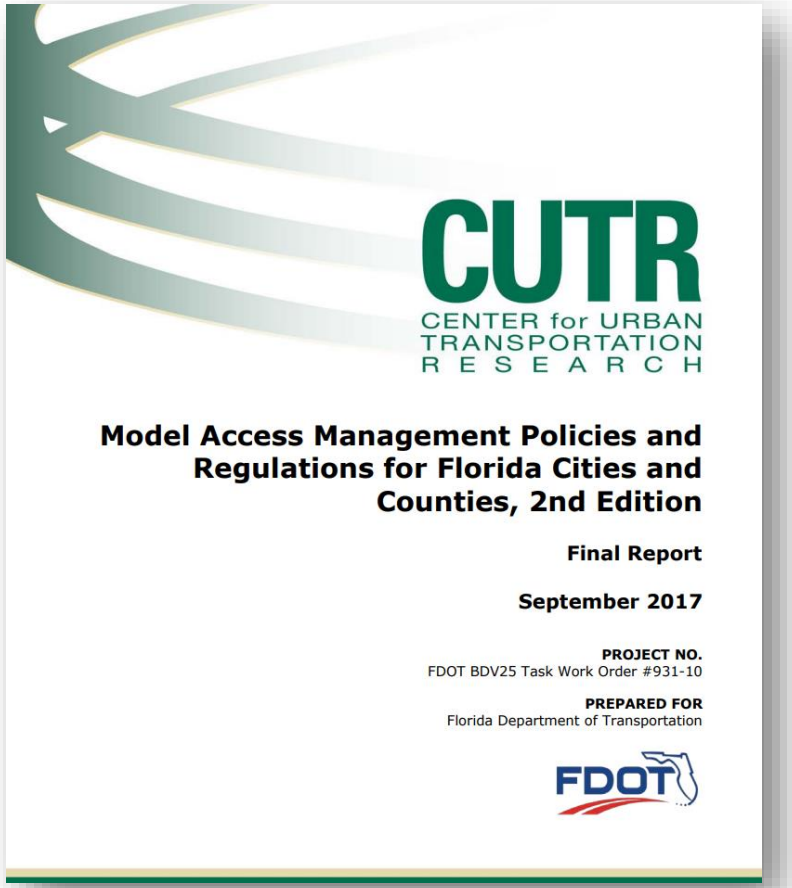
***Traffic signals, proposed at intervals closer than the access management standard for the designated access class, will only be approved where the need for such signal(s) is clearly demonstrated for the safety and operation of the roadway through the signal warrant process. (F.A.C. Rule Chapter: 14-97.003) Applicants requesting or requiring the addition, removal, or modification of a traffic signal for Category E, F, and G connections, must submit an Intersection Control Evaluation Form, Form 750-010-30 (F.A.C. Rule Chapter: 14-96.003). This language is in the draft version of rule 14-96.

Source: Adapted from FDM 201 - Design Controls and FDOT Context Classification

Corner Clearance

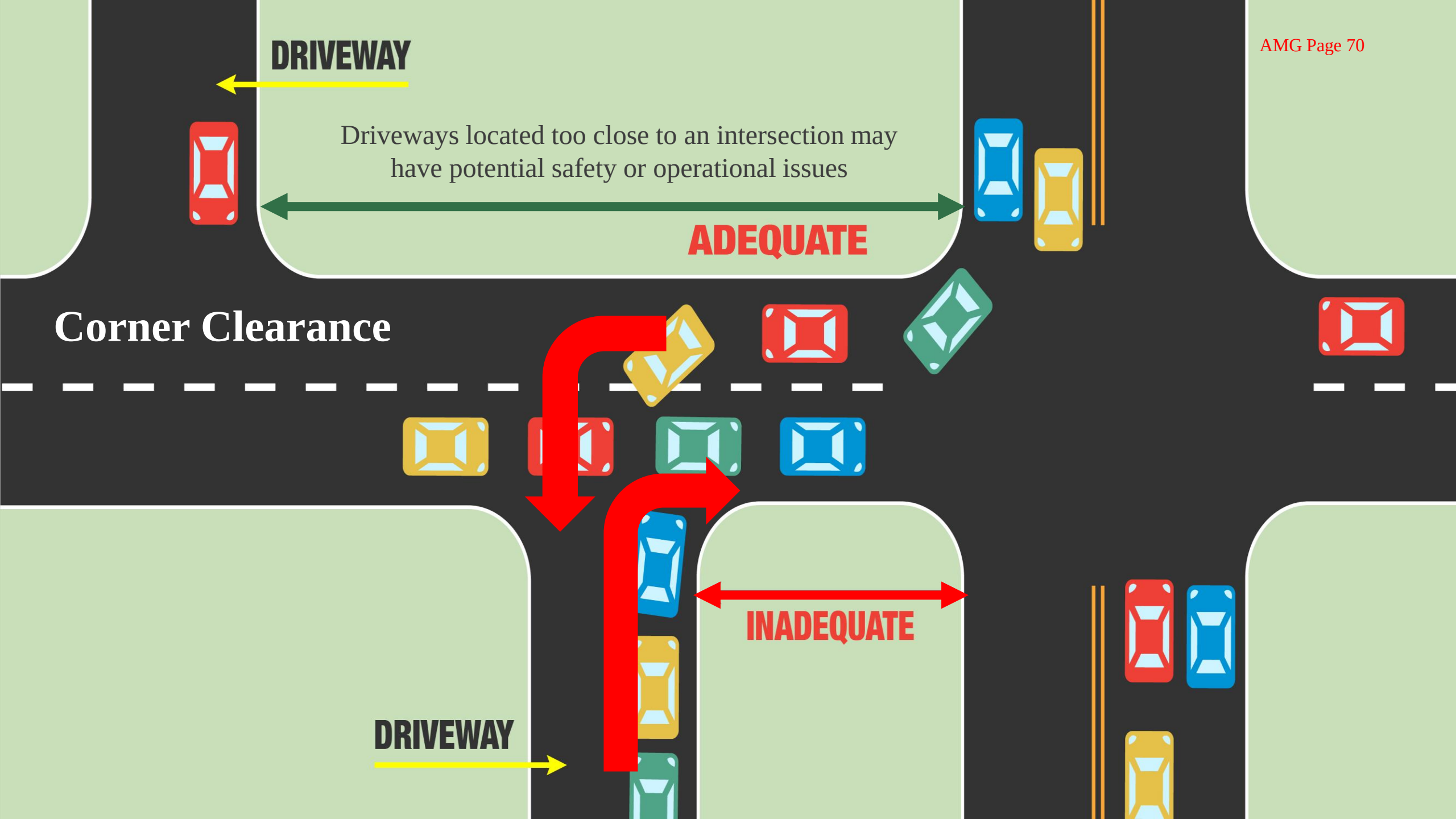
A CUTR report suggests that reviewing agencies consider the following regulatory strategies:

- Require that the access connection be located as far from the intersection as possible
- Limit driveway movements to right-in/right-out only and require construction of a non-traversable median or flexible pylon as conditions of the permit, if necessary, to limit the movements
- Limit the maximum driveway volume (vehicles per hour and vehicles per day) as a condition of the permit



https://www.cutr.usf.edu/wp-content/uploads/2018/01/Model-Regulations-Final-Report.pdf

Corner Clearance



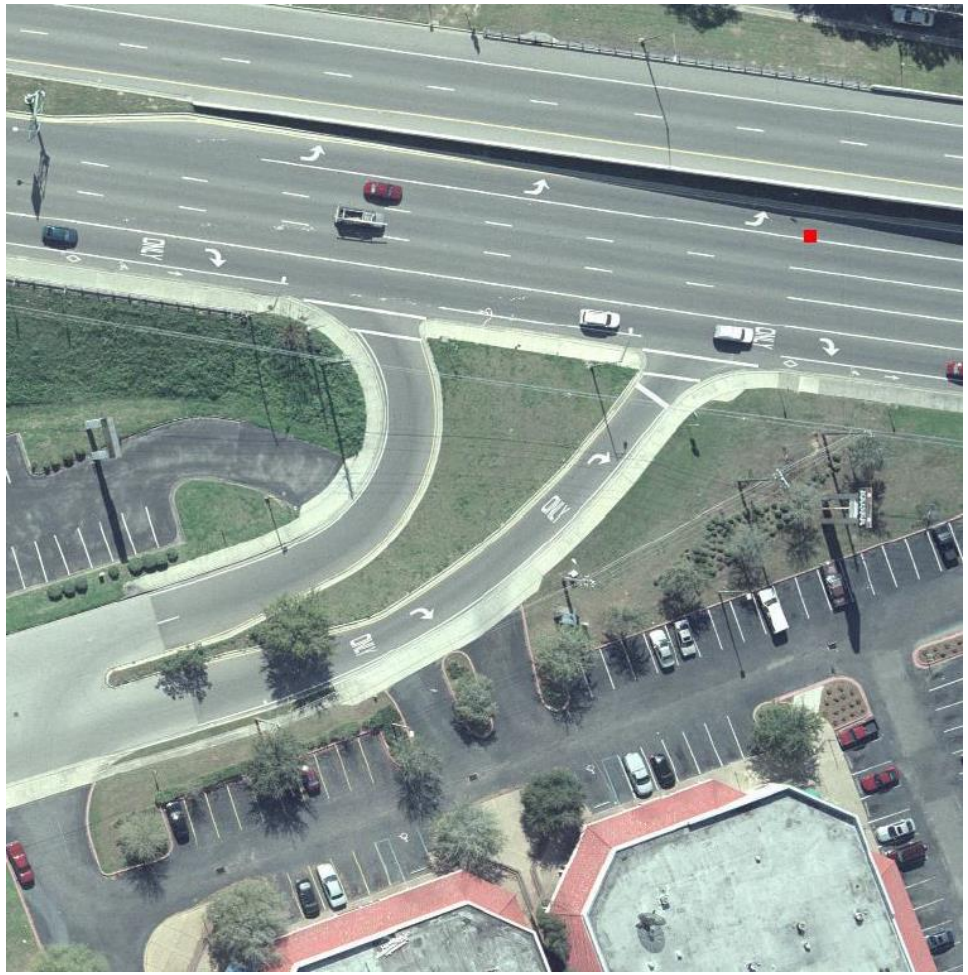
Channelizing Islands

When to consider:

- A large pavement area which may confuse drivers
- Right-in/right-out driveways where movements may be unclear
- The driveway is expected to have a signal in the future
- The driveway has two or more entrance lanes

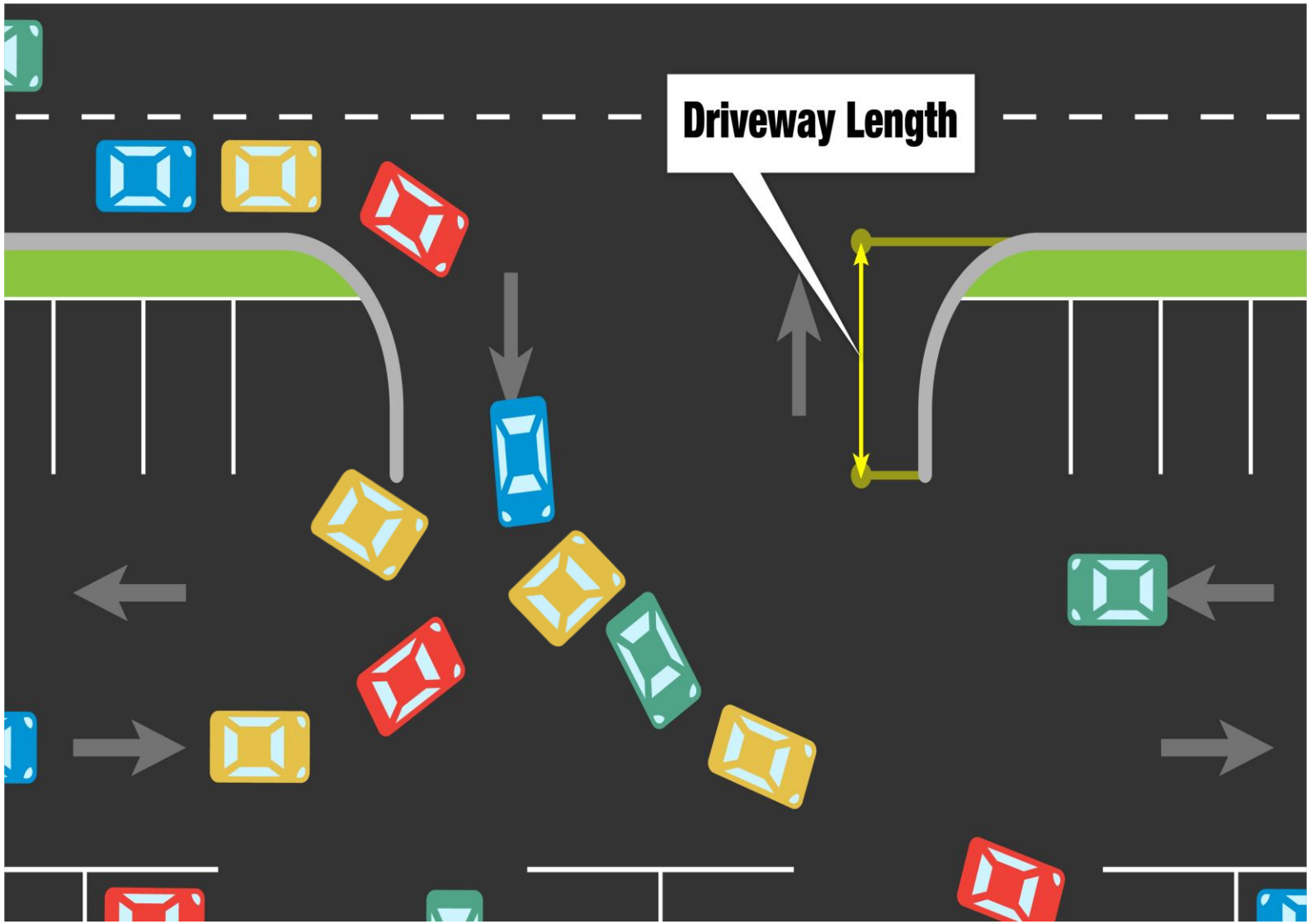
What to consider:

- Context Classification



Driveway Length

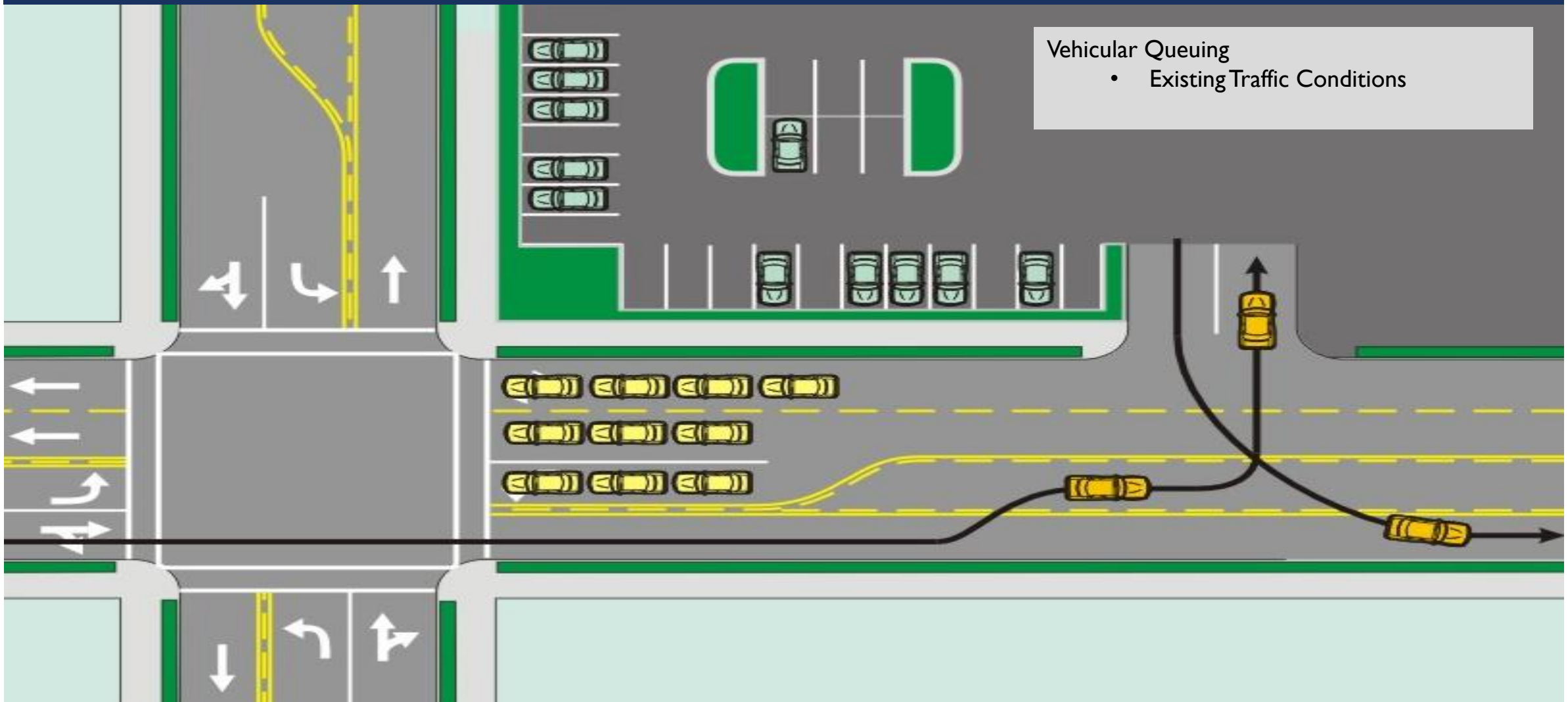
- What to consider
  - Land use
  - Type of control
  - Numbers of lanes
  - R/W
  - Coordination with the Property owner and local government.



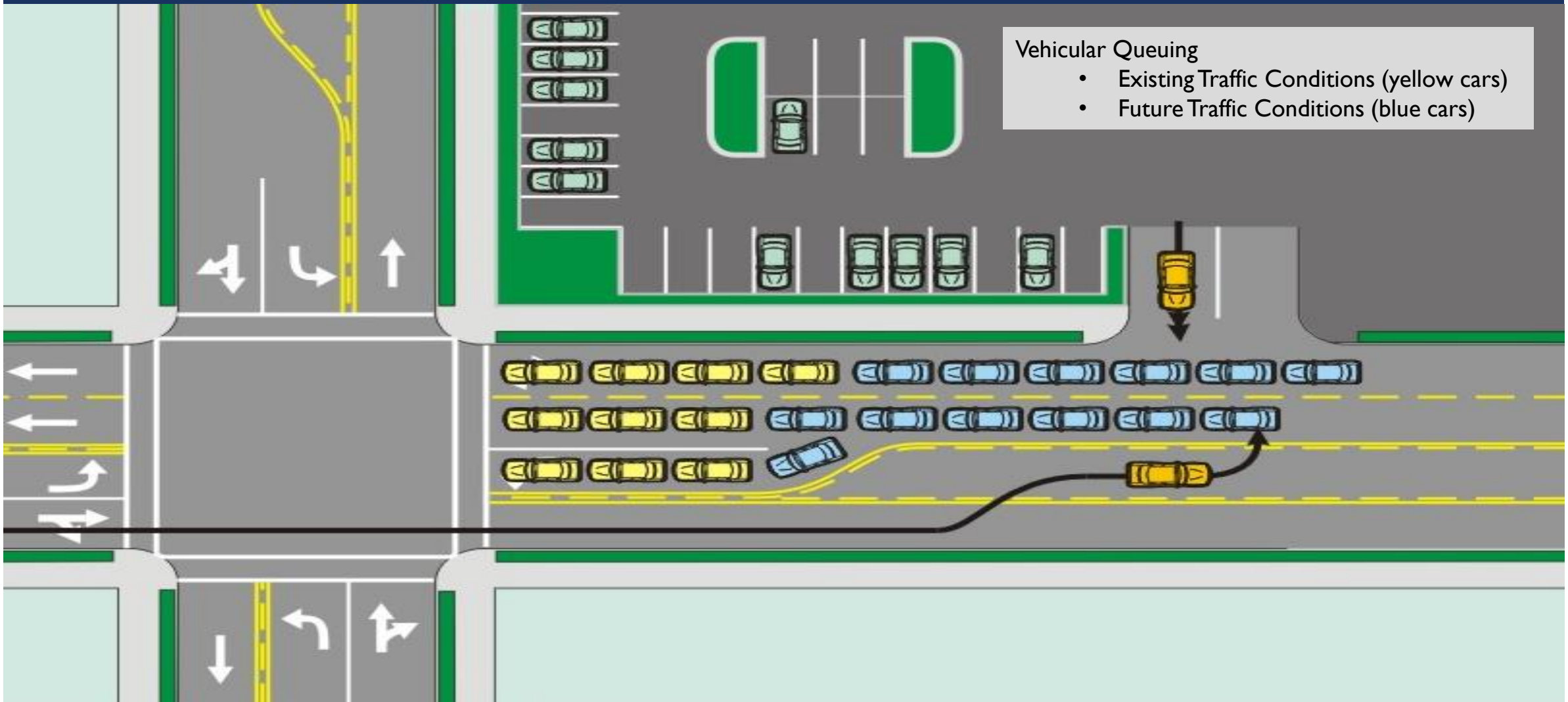
Driveways Grades

- Maximum grades
  - 10% Commercial
    - Reconstruction Projects 10% can be exceeded with the District Design Engineer approval
  - 28% Residential
- Resources
  - FDM 214 Driveways
  - Standard Plans Index 522-003

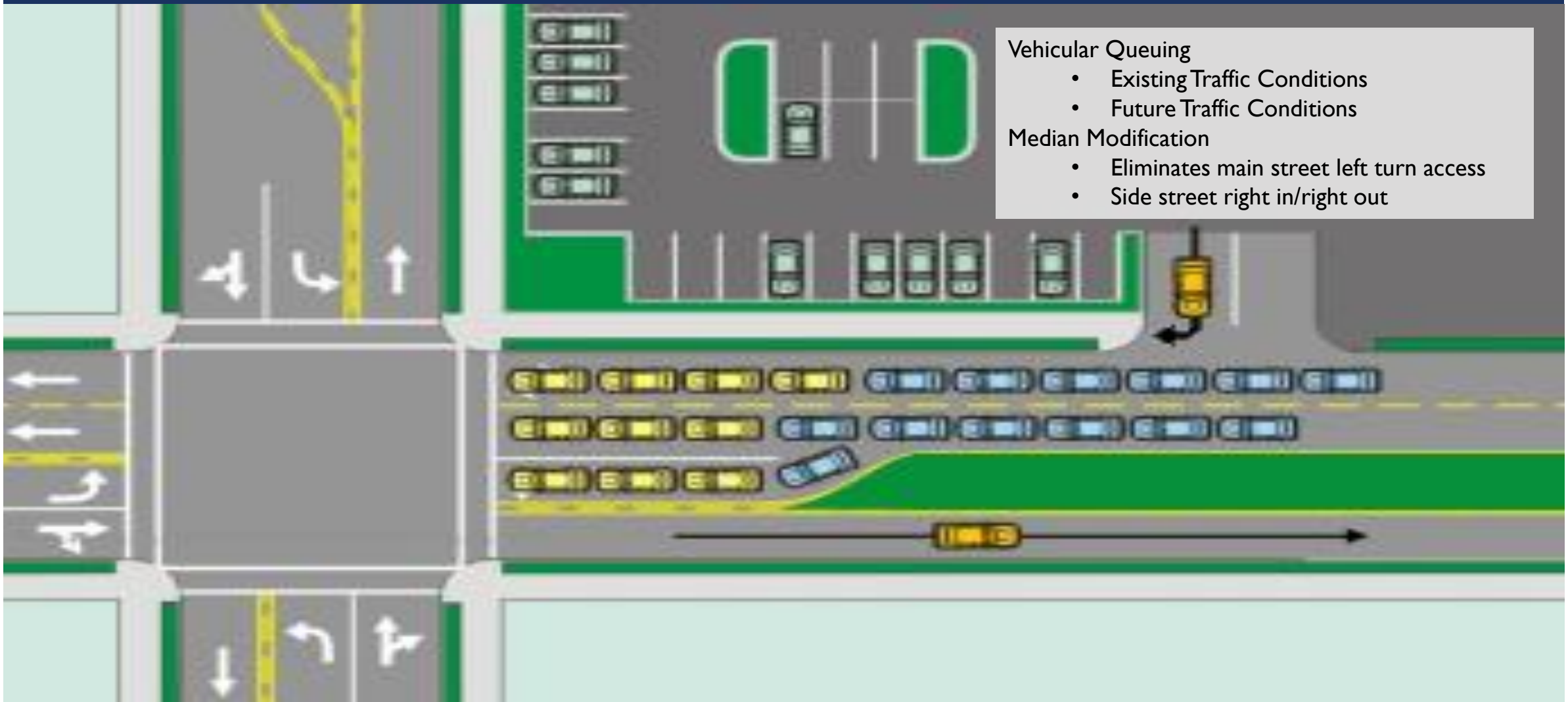
Separating Conflicts



Separating Conflicts



Separating Conflicts



Vehicular Queuing
- Existing Traffic Conditions
- Future Traffic Conditions

Median Modification
- Eliminates main street left turn access
- Side street right in/right out

Module 3: Median and Median Openings

Module 3: Median and Median Openings

- Median Opening Types
- Standards for spacing
- Location
- Median Treatments
- Turn Lanes and U-turns

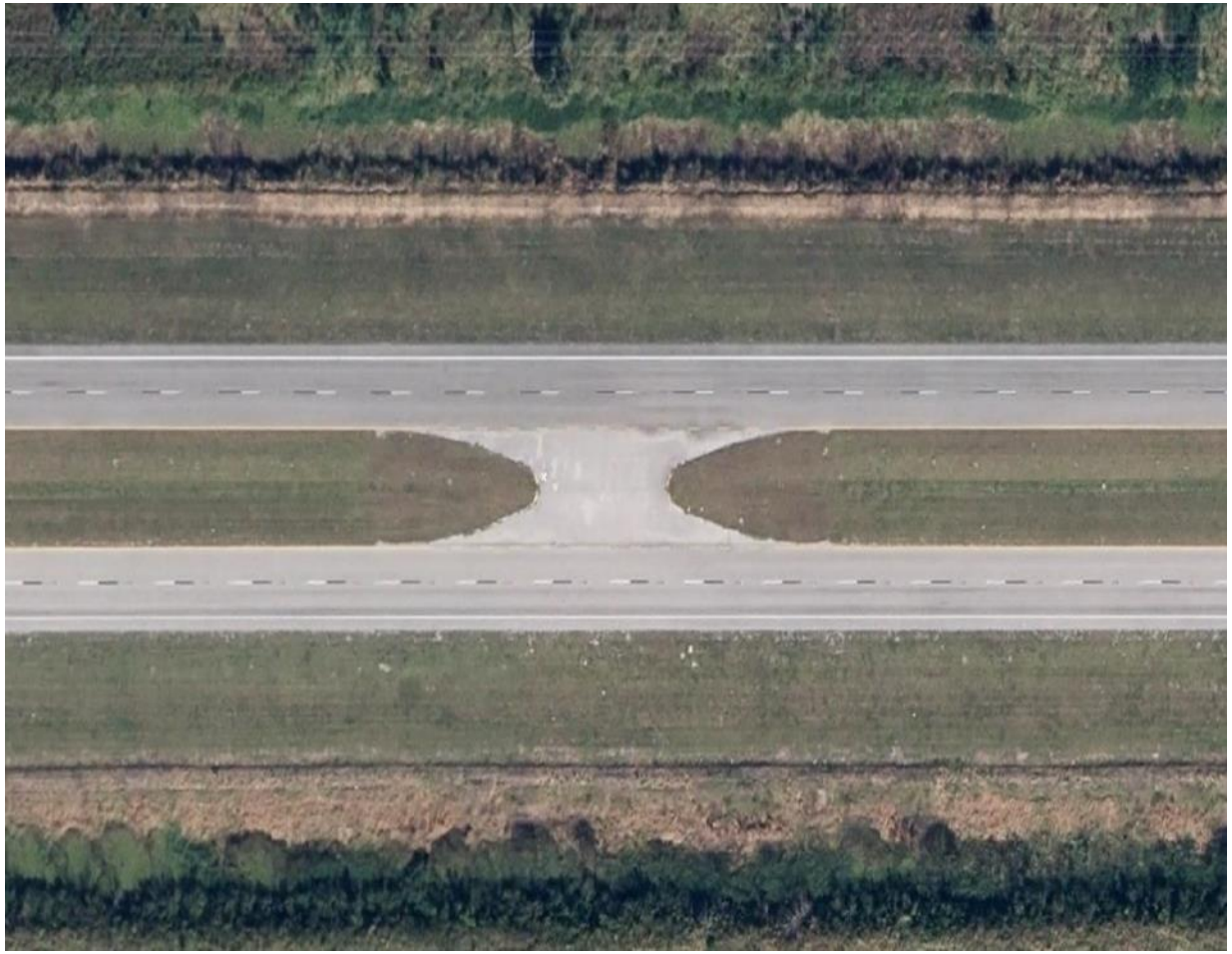
Medians and Median Openings

- Medians should be installed whenever possible on multi-lane arterial roadways.
- Medians allow vehicular traffic to move more freely on a roadway.
- Medians provide safety benefits to those traveling on the roadway, as well as non-motorized users and can improve the overall aesthetics of an area.
- The design and placement of median openings is essential in managing access and minimizing conflicts.

Median Openings Types

Full Median Opening

- Provide fewer restrictions for vehicles and allow for a range of vehicular movements to occur
- Usually located at:
  - Signalized intersections or those expected to be signalized
  - Intersections that conform to the adopted median opening spacing interval or are separated from neighboring median openings
  - Divided roadways where the traffic patterns allow left turns and crossing maneuvers from the intersecting access connection to be made with little delay
  - Locations with adequate sight distance



Median Openings Types

Directional Median Opening

- Designed to restrict certain traffic movements
- The main characteristic of a directional median opening is that vehicular traffic from the cross streets cannot conduct left turns or cross the arterial.
- The only movements allowed are right turns onto the arterials

Directional Opening at US 98

Roadway Access Class	FDOT Context Classification	Median Type	Connection Spacing (feet)		Median Opening Spacing (feet)		Minimum Signal Spacing (feet)***
			≤45mph Posted	>45mph Posted	Directional	Full	
2	C1 Natural, C2 Rural	Restrictive w/Service Roads	660	1320	1,320	2,640	2,640
3	C1 Natural, C2 Rural, C2T Rural Town, C3R Suburban Residential, C3C Suburban Commercial	Restrictive	440	660	1,320	2,640	2,640
4	C2T Rural Town, C4 Urban General, C5 Urban Center, C6 Urban Core	Non-Restrictive**	440	660			2,640
5		Restrictive	245	440	660	2,640/ 1,320*	2,640/ 1,320*
6		Non-Restrictive**	245	440			1,320
7		Both Median Types**	125		330	660	1,320

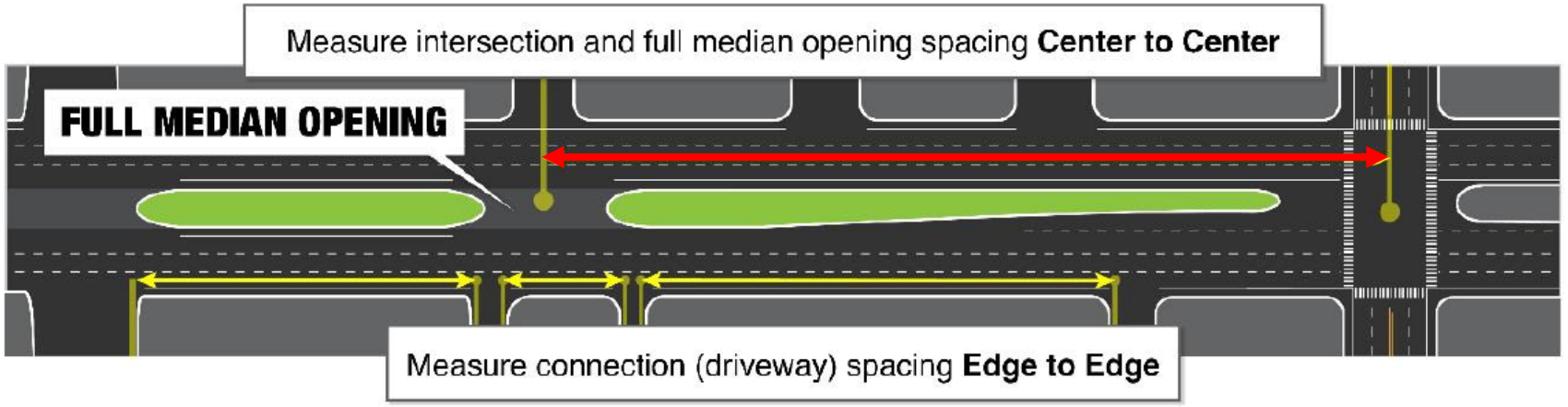
Spacing 1,320 feet when roadway speed limit is 45 mph or below

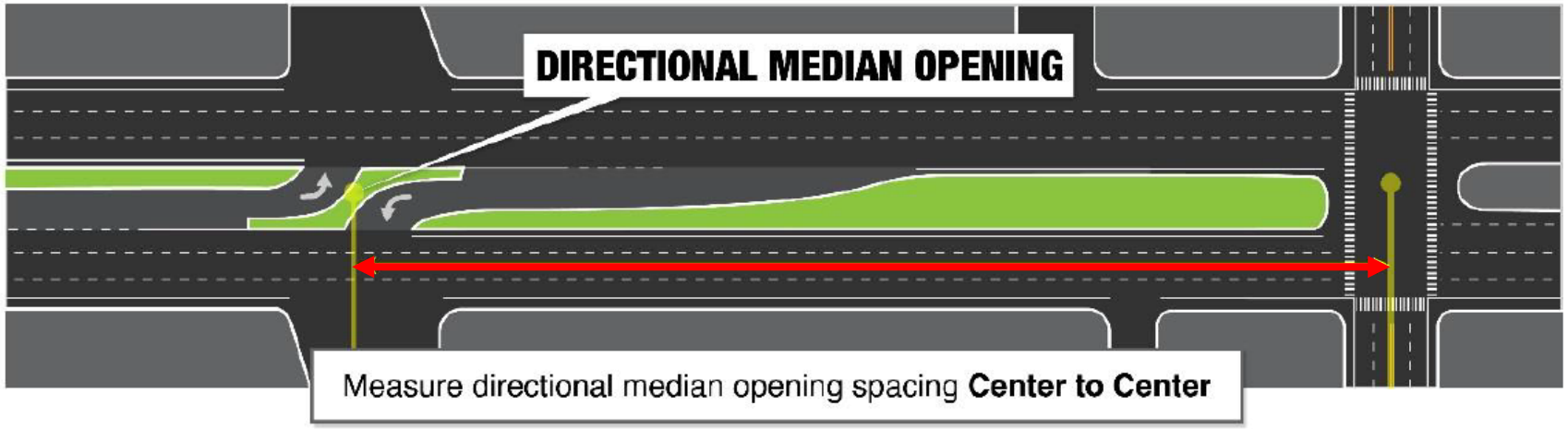
***It is recommended that additional safety/operational analysis is completed for non-restrictive medians*

****Traffic signals, proposed at intervals closer than the access management standard for the designated access class, will only be approved where the need for such signal(s) is clearly demonstrated for the safety and operation of the roadway through the signal warrant process. (F.A.C. Rule Chapter: 14-97.003) Applicants requesting or requiring the addition, removal, or modification of a traffic signal for Category E, F, and G connections, must submit an Intersection Control Evaluation Form, Form 750-010-30 (F.A.C. Rule Chapter: 14-96.003). This language is in the draft version of rule 14-96.*

Standards for Controlled Access Facilities

Measuring Spacing Between Openings





Median Opening Spacing Standards

- The F.*A.C. Rule Chapter: 14-97.003* regulates median opening spacing and provides recommended distances.

Roadway Access Class	FDOT Context Classification	Median Type	Median Opening Spacing (feet)		Minimum Signal Spacing (feet)***
			Directional	Full	
2	C1 Natural, C2 Rural	Restrictive w/Service Roads	1,320	2,640	2,640
3	C1 Natural, C2 Rural, C2T Rural Town, C3R Suburban Residential, C3C Suburban Commercial	Restrictive	1,320	2,640	2,640
4	C2T Rural Town, C4 Urban General, C5 Urban Center, C6 Urban Core	Non-Restrictive**			2,640
5		Restrictive	660	2,640/ 1,320*	2,640/ 1,320*
6		Non-Restrictive**			1,320
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**Spacing 1,320 feet when roadway speed limit is 45 mph or below*

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Median Openings Location

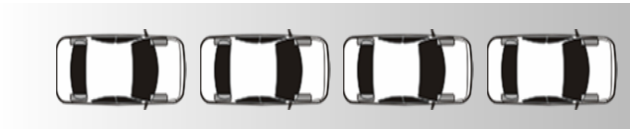
- The basic concept used in median opening location and design is avoidance of unnecessary conflicts which result in crashes.
- Before median opening placement is determined, it is important to know what speed, maneuvering distances, and storage length the project requires.
  - Follow the spacing criteria in *F.A.C. Rule Chapter: 14-97*
  - Median openings should not encroach on the functional area of another median opening or intersection

Queue Storage Lengths

As measured or projected by traffic study, or

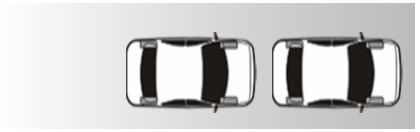
Estimated as follows when traffic volume is low

4 cars urban minimum



100 ft.

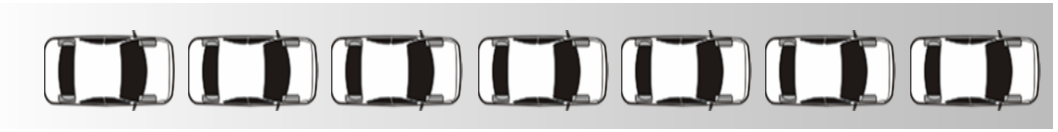
2 cars rural or small town

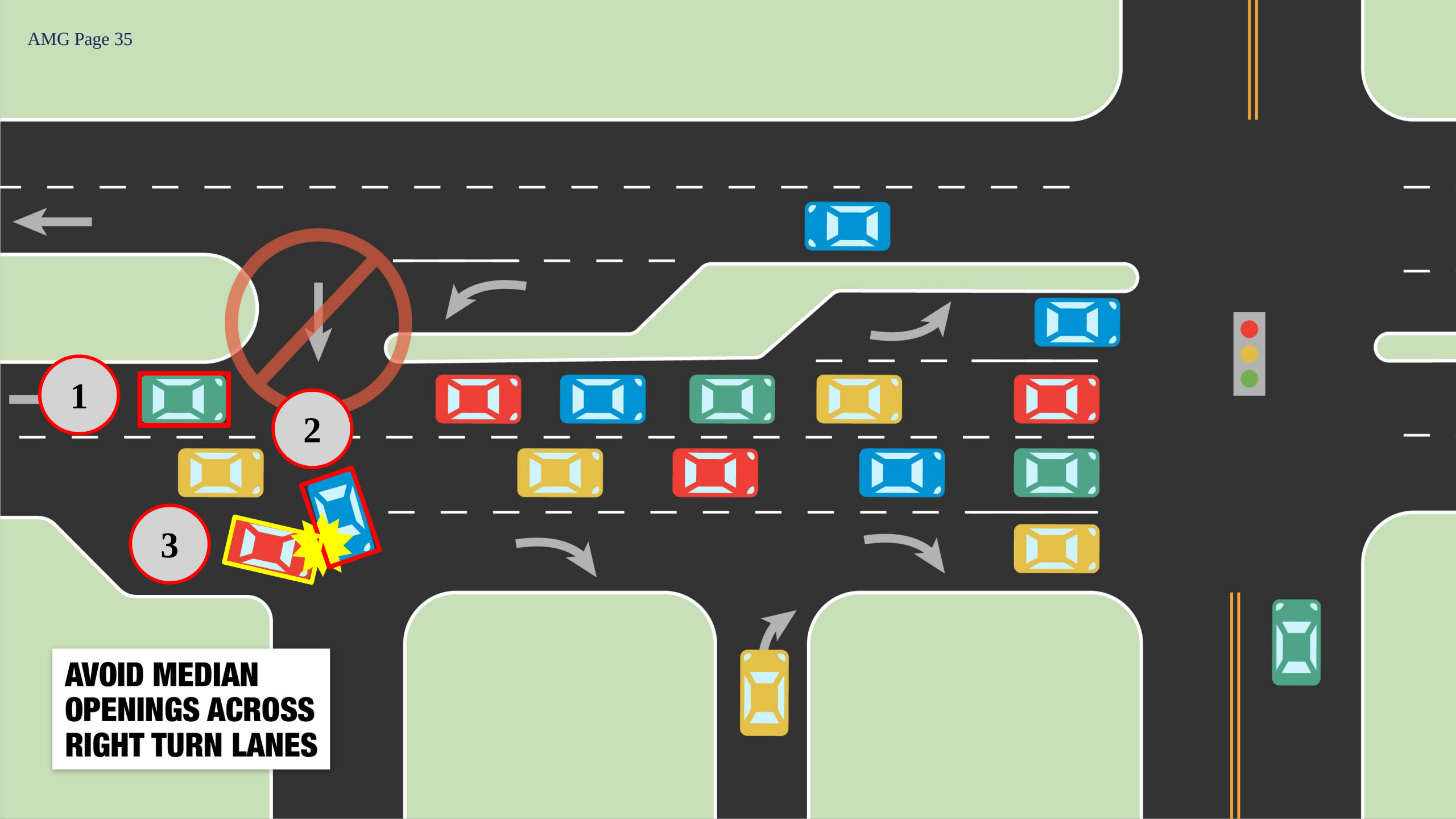


50 ft.

Unless it serves a major generator

(large discount store, shopping center, etc.)

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2
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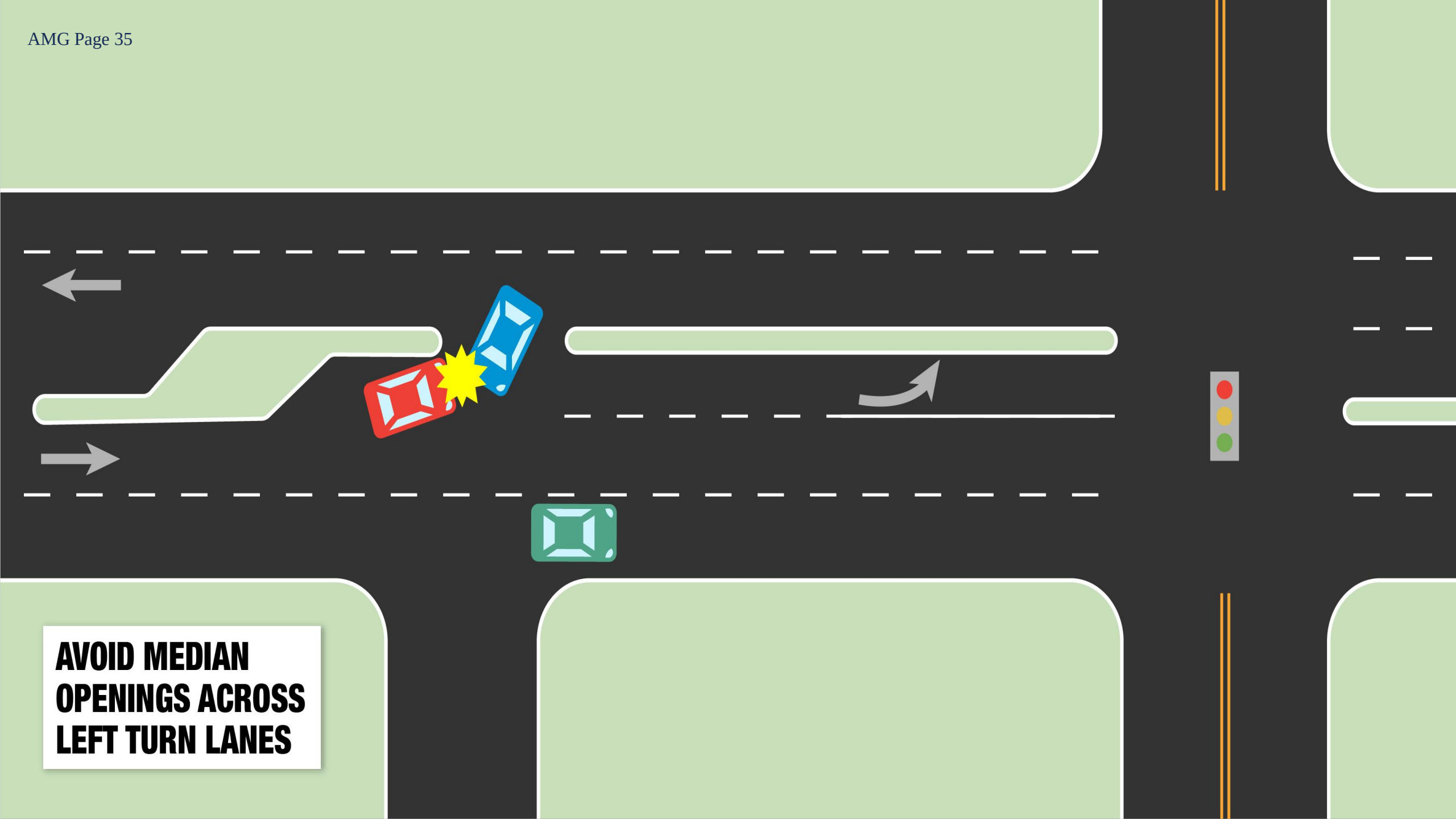
AVOID MEDIAN OPENINGS ACROSS RIGHT TURN LANES


AVOID MEDIAN
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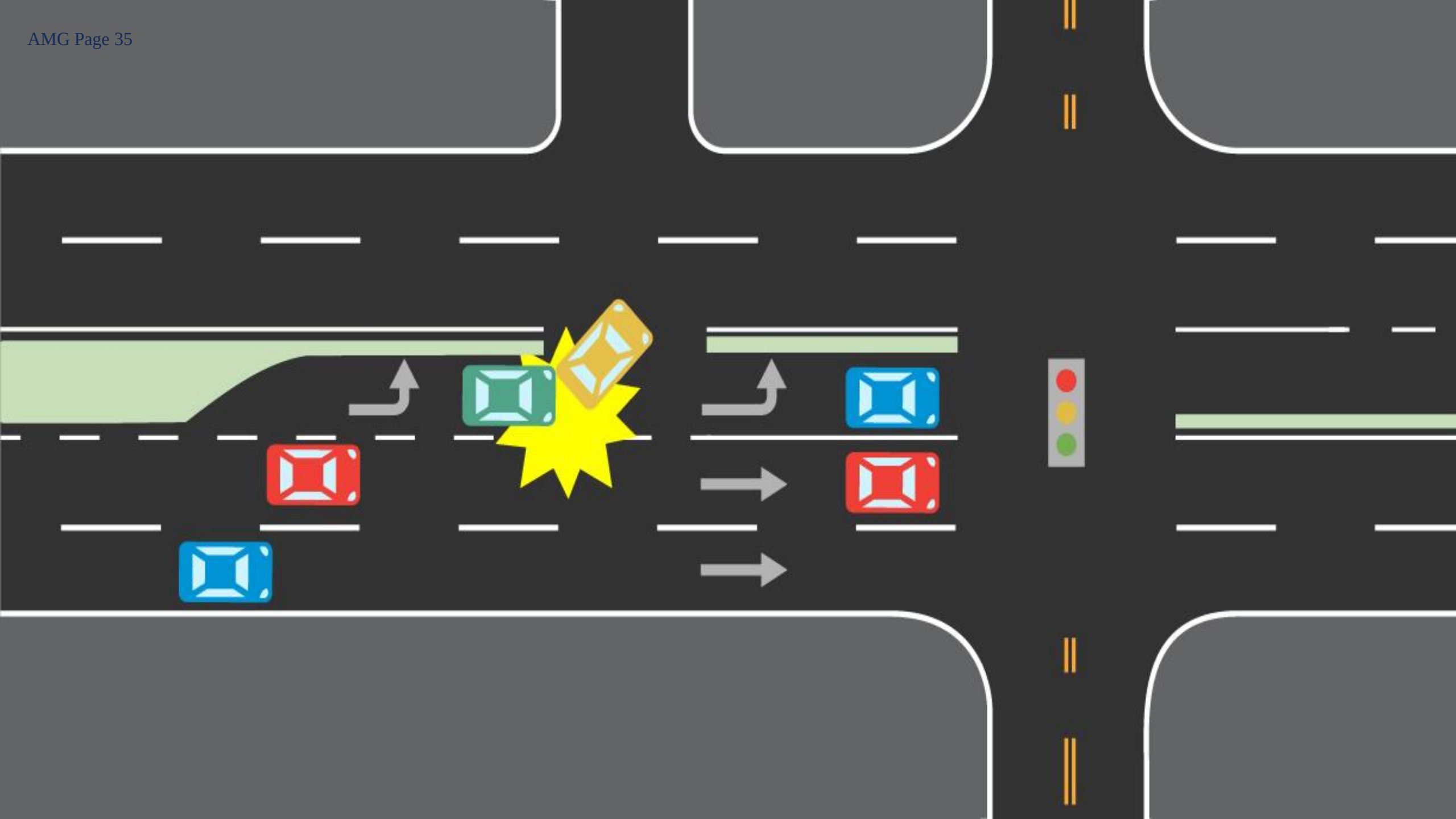
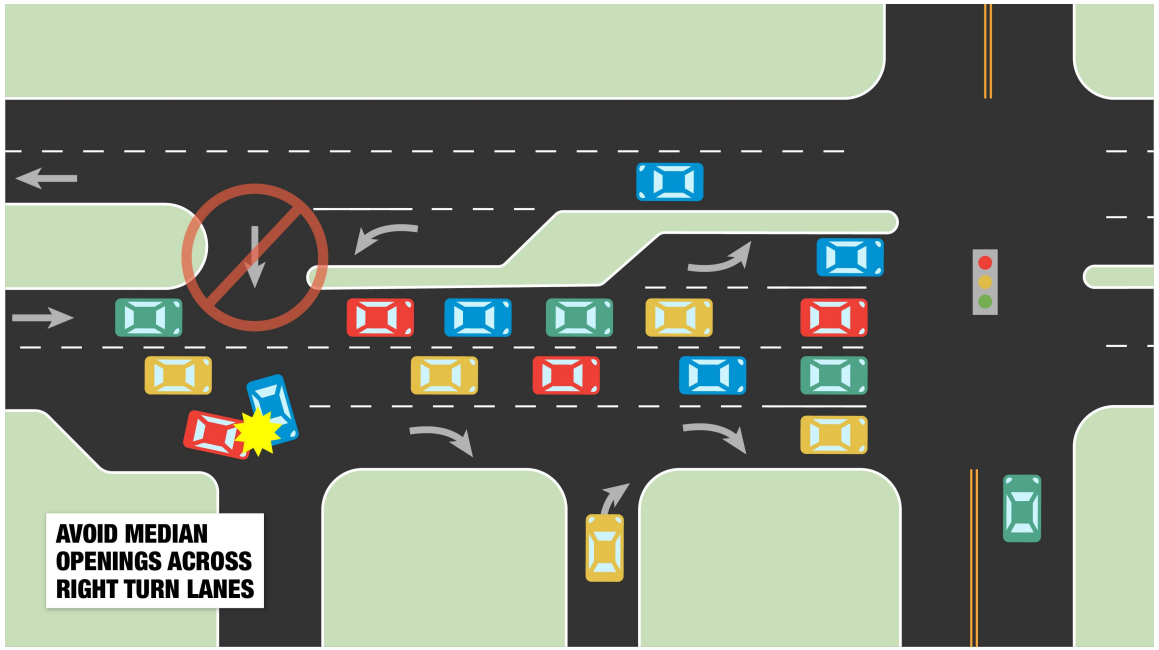
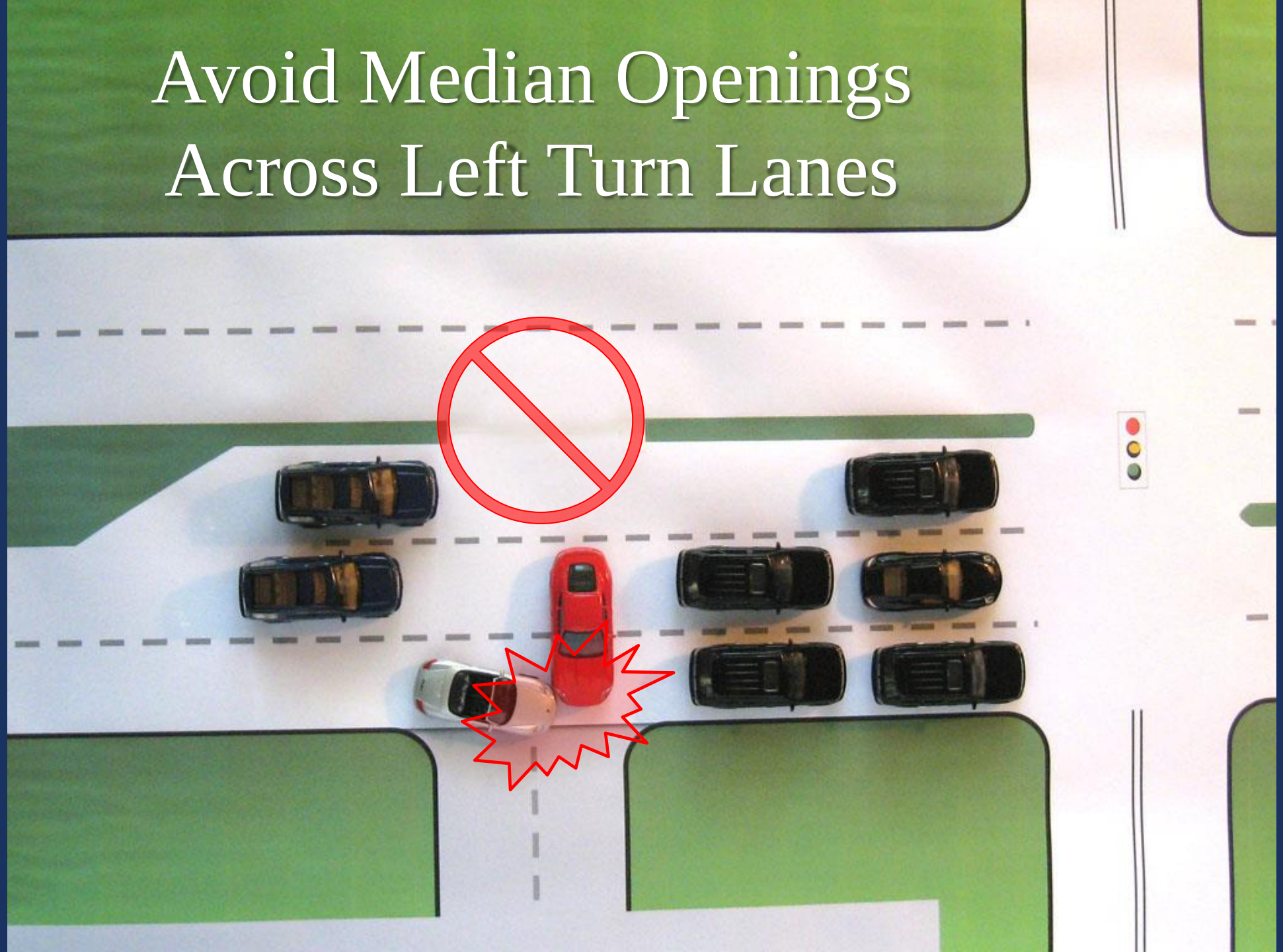


Important Considerations

- Avoid openings within exclusive turn lanes
- Exclusive right-turn lanes are most appropriate under the following conditions:
  - No median openings interfere,
  - The right-turn lane does not continue across intersections, and
  - No closely spaced high volume driveways

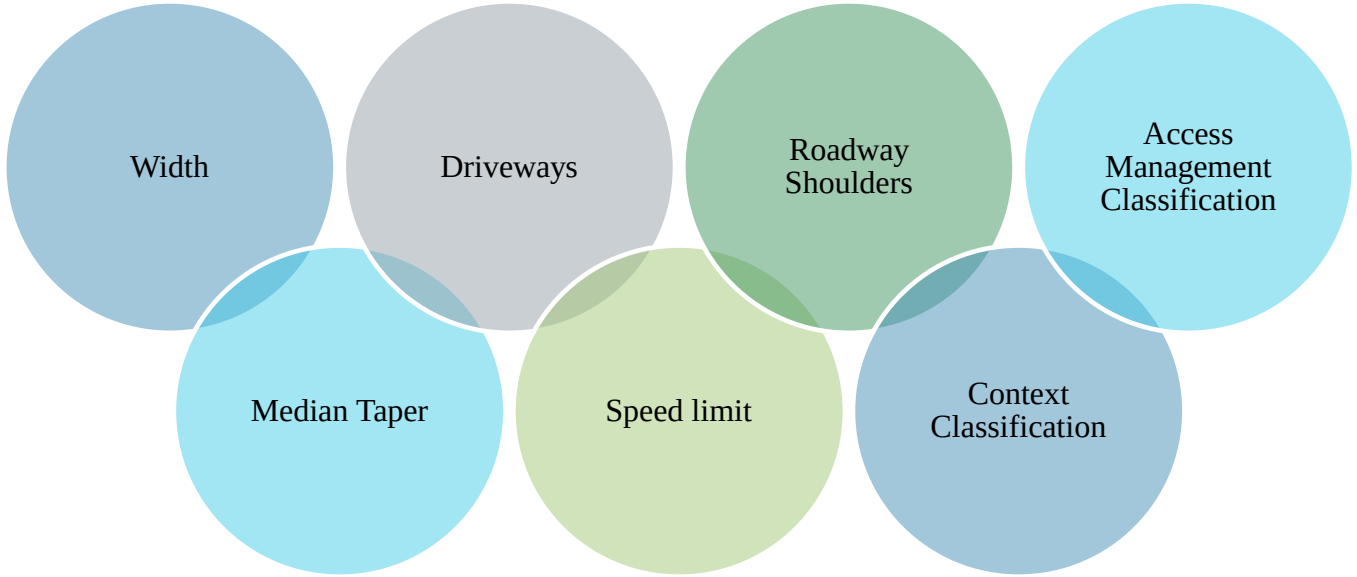


Avoid Median Openings Across Left Turn Lanes



Design of Median and Median Openings

- A critical function of many medians is to protect vehicles turning left. These design criteria are influenced by similar factors as driveways.
- The speed limit of the roadway, design of the roadway shoulders (flushed vs. curbed) and context classification all influence the various design criteria for medians and median openings.



Design of Medians & Medians Opening

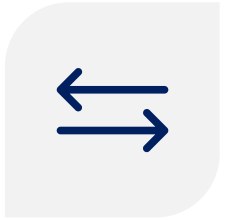
- FDM 210
  - Median width is expressed as the dimension between the inside edges of traveled way.
- The appropriate median width should be determined by the specific function the median is designed to serve.

Context Classification	Curbed Roadways and Flush Shoulder Roadways *(feet)*	High Speed Curbed Roadways *(feet)*	Flush Shoulder Roadways
	Design Speed *(mph)*		
	25-30	40-45	50-55	60-65
C1 Natural	N/A	N/A	30	40
C2 Rural	N/A	N/A	30	40
C2T Rural Town	15.5	22	N/A	N/A
C3 Suburban	22	22	30	40
C4 Urban General	15.5	22	N/A	N/A
C5 Urban Center	15.5	N/A	N/A	N/A
C6 Urban Core	15.5	N/A	N/A	N/A

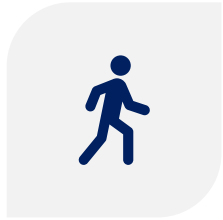
Notes:

1. On reconstruction projects where existing curb locations are fixed due to severe right of way constraints, the minimum median width may be reduced to 19.5 feet for design speeds = 45 mph, and to 15.5 feet for designs speeds ≤ 40 mph.
2. A minimum 6-foot median may be used within C5 and C6 context classifications only where left turn lanes are not expected.

Considerations which affect median width on roadways having at-grade intersections



Separate opposing traffic streams



Pedestrian refuge

Left-turns into side streets

Left-turns out of side streets

Crossing vehicle movements

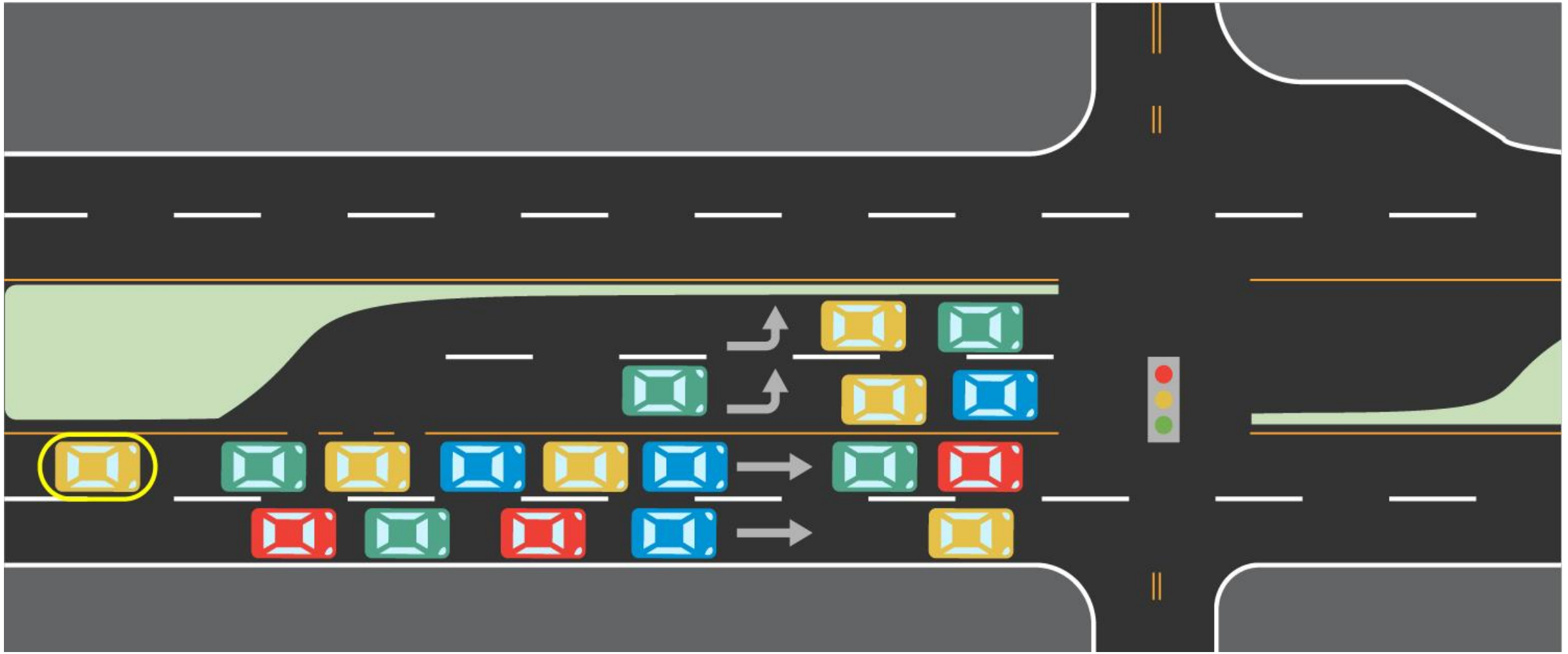
U-turns

Aesthetics and maintenance

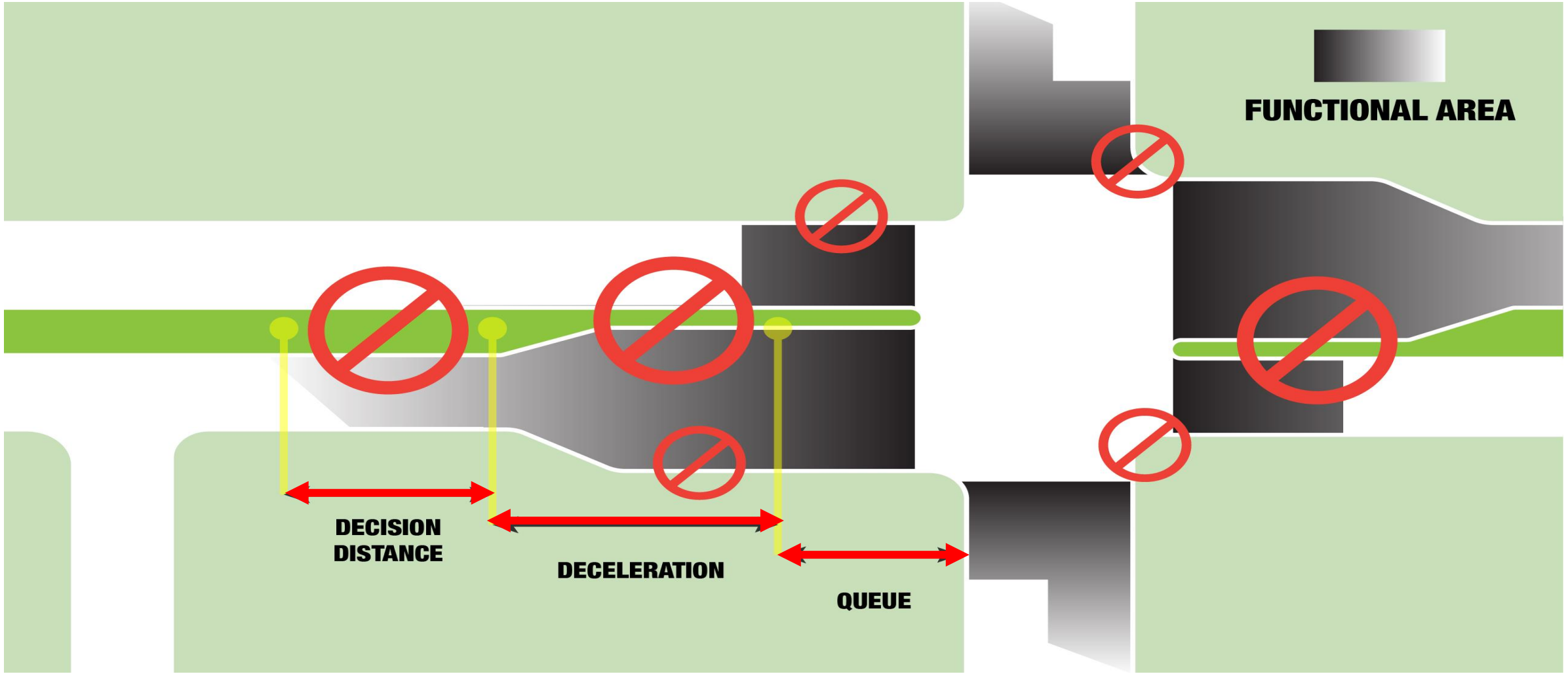
Median Opening Failures

- Median opening failure can occur when critical components of the opening are not designed appropriately.
- This is usually due to the inadequate space for left-turn storage.
- This can result in excessive deceleration in the through lane, because vehicles are queued in the area of the left-turn lane needed for deceleration.
- Additionally, an inadequate left-turn lane length can lead to vehicle queues extending into the through lane creating a more hazardous situation.

Median Opening Failure



Median Opening Failures | Exclusive Left-Turn Lane Length



Median Opening Failures | Perception-Reaction-Decision

- The perception-reaction-decision distance required by drivers varies depending on certain factors.
- For drivers who frequently use the corridor, the perception reaction decision may be as little as one second or less. However, unfamiliar drivers may not be in the proper lane to execute the desired maneuver and may require three or more seconds.

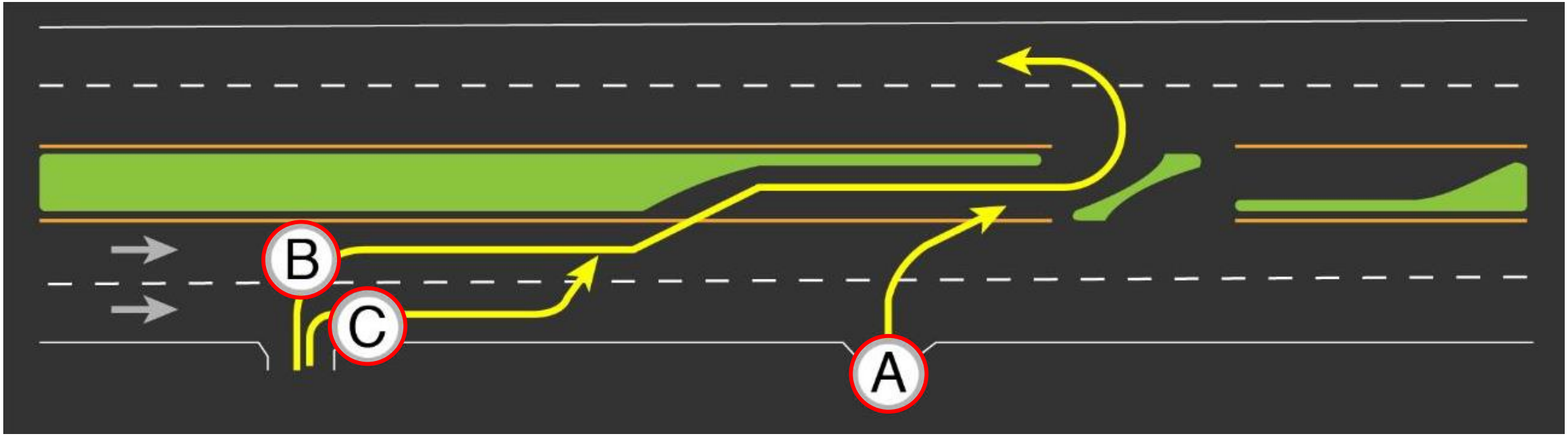
Areas	Seconds	35 MPH	45 MPH	55 MPH
Rural	2.5	130 ft.	165 ft.	200 ft.
Suburban	2	100 ft.	130 ft.	160 ft.
Urban	1.5	75 ft.	100 ft.	120 ft.

Median Opening Failures | Right-Turn Weaving Distance

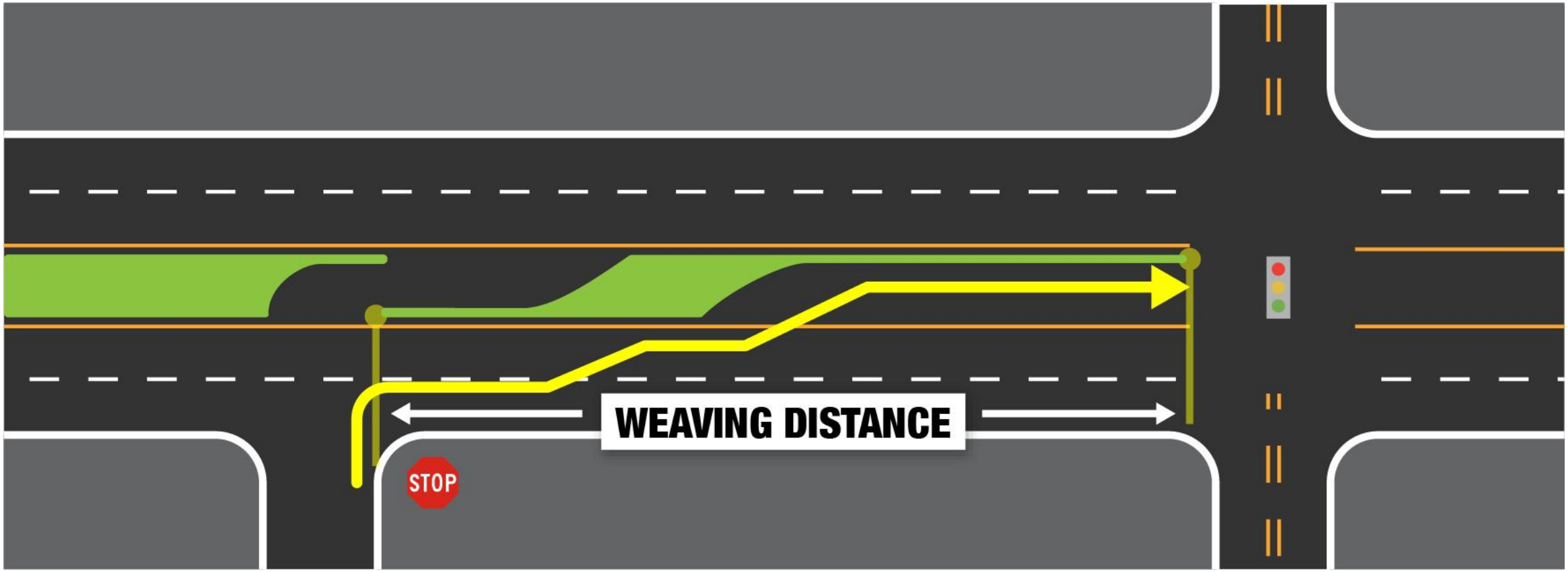
A- Short Distance

B- Long Separation, Low Volume approaching from the left

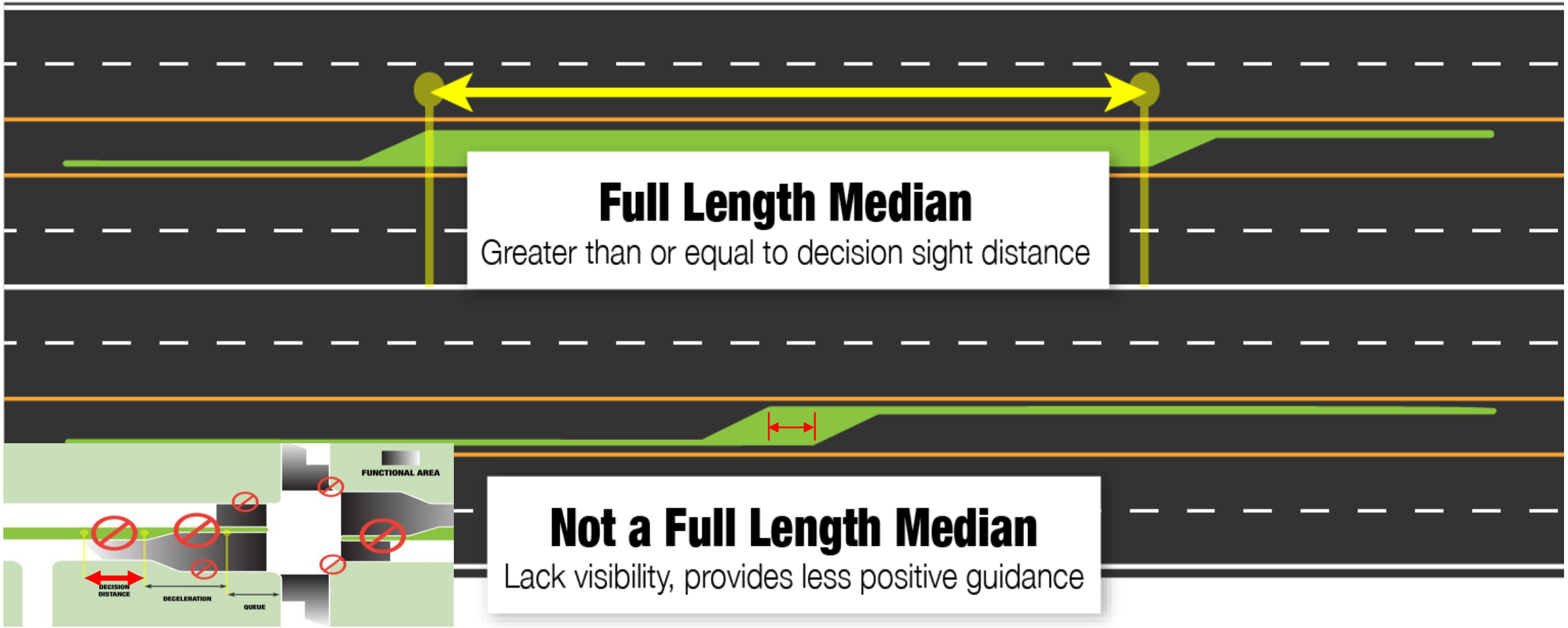
C- Long Separation, High Volume or Low Volume and high-speed traffic c from the left



Median Opening Failures | Right-Turn Weaving Distance



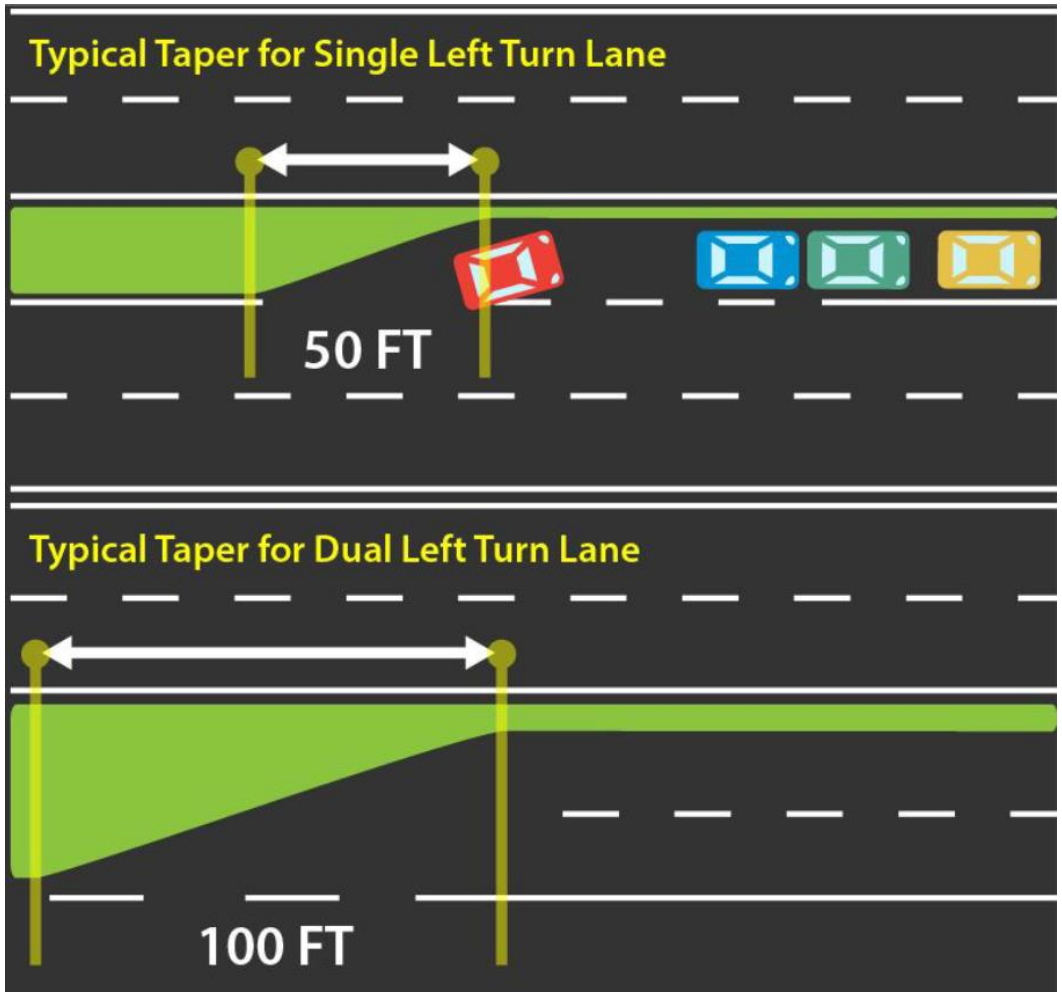
Median Opening Failures | Full Median Length



Median Opening Failures | Maneuver/Deceleration Distance

- The Maneuver-Deceleration Distance consists of two components; taper and deceleration.
- Taper is the portion of the median opening that begins the transition to the turn lane.
- The faster the speed, the longer the taper
- Most urban areas will benefit from a longer storage area for queued vehicles

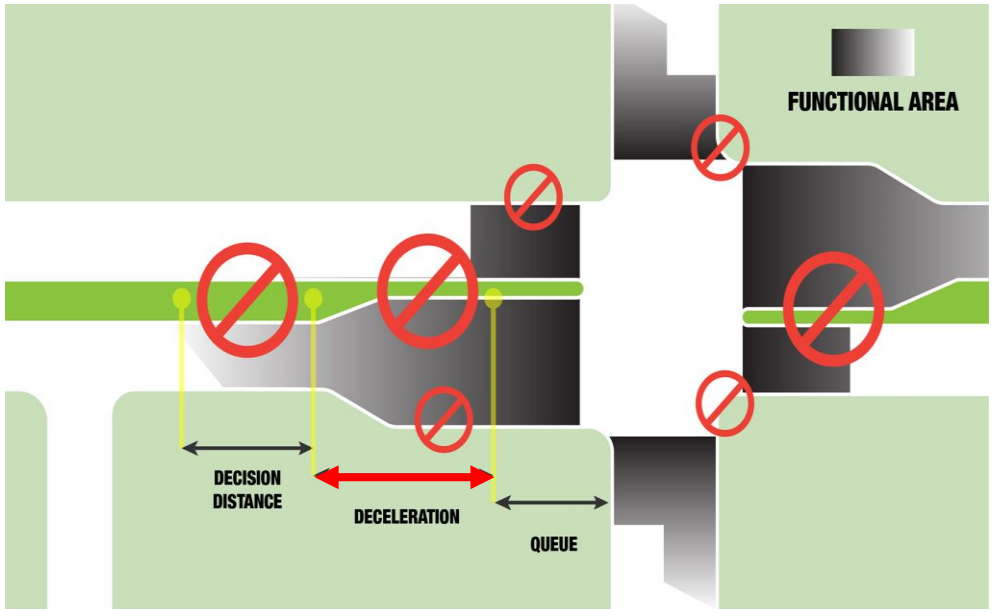
Additional information can be found in the AASHTO Green Book and FDM 212



Median Opening Failures | Total Deceleration

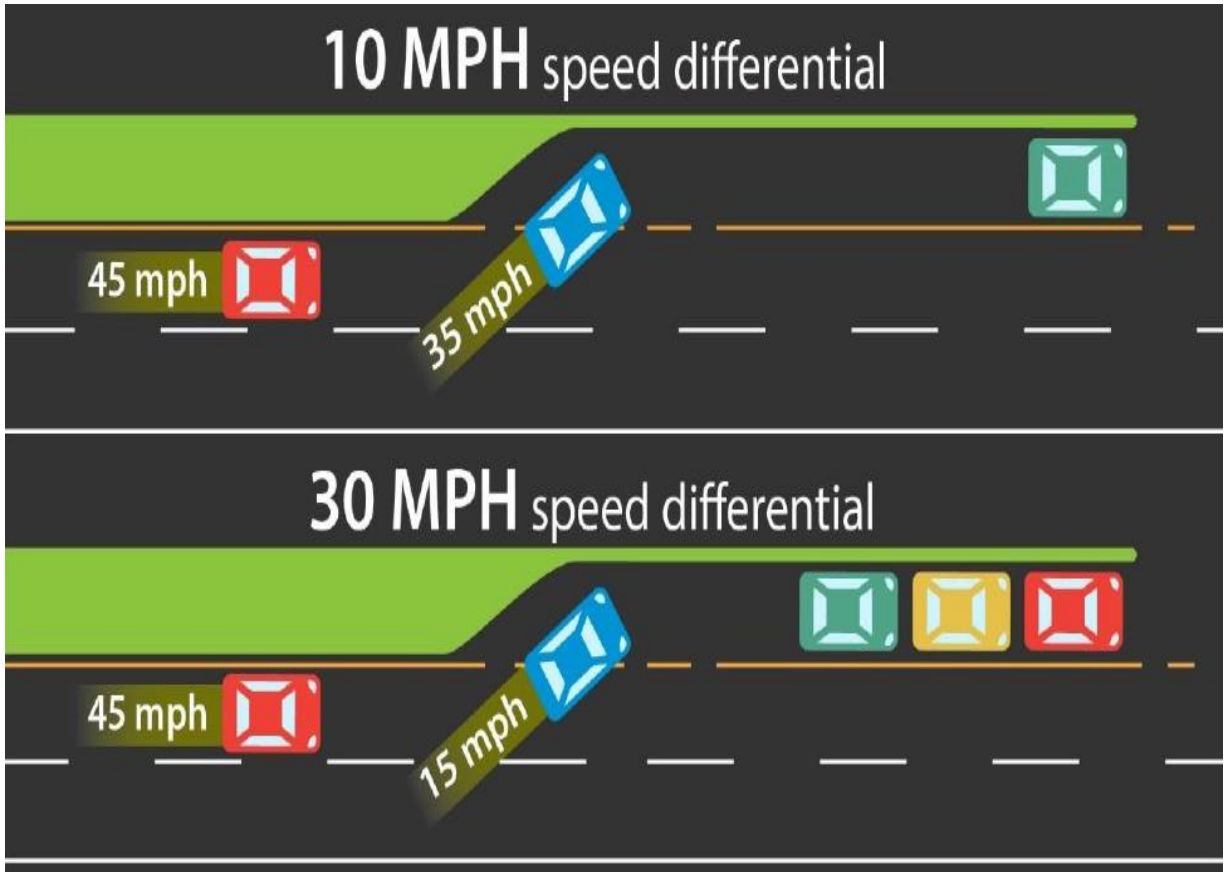
- This distance is measured from the beginning of the taper to the end of the queue storage portion.
  - Minimum standards for the distance needed to properly slow a vehicle down and bring the vehicle to the storage portion of the median opening, or deceleration distance, is found in *FDM 212* and FDOT Standard Plans, Index 711-001.

Design Speed (mph)	Entry Speed (mph)	Total Deceleration (ft)
35	25	145
40	30	155
45	35	185
50 Urban	40	240
50 Rural	44	290
55 Rural	48	350
60 Rural	52	405
65 Rural	55	460



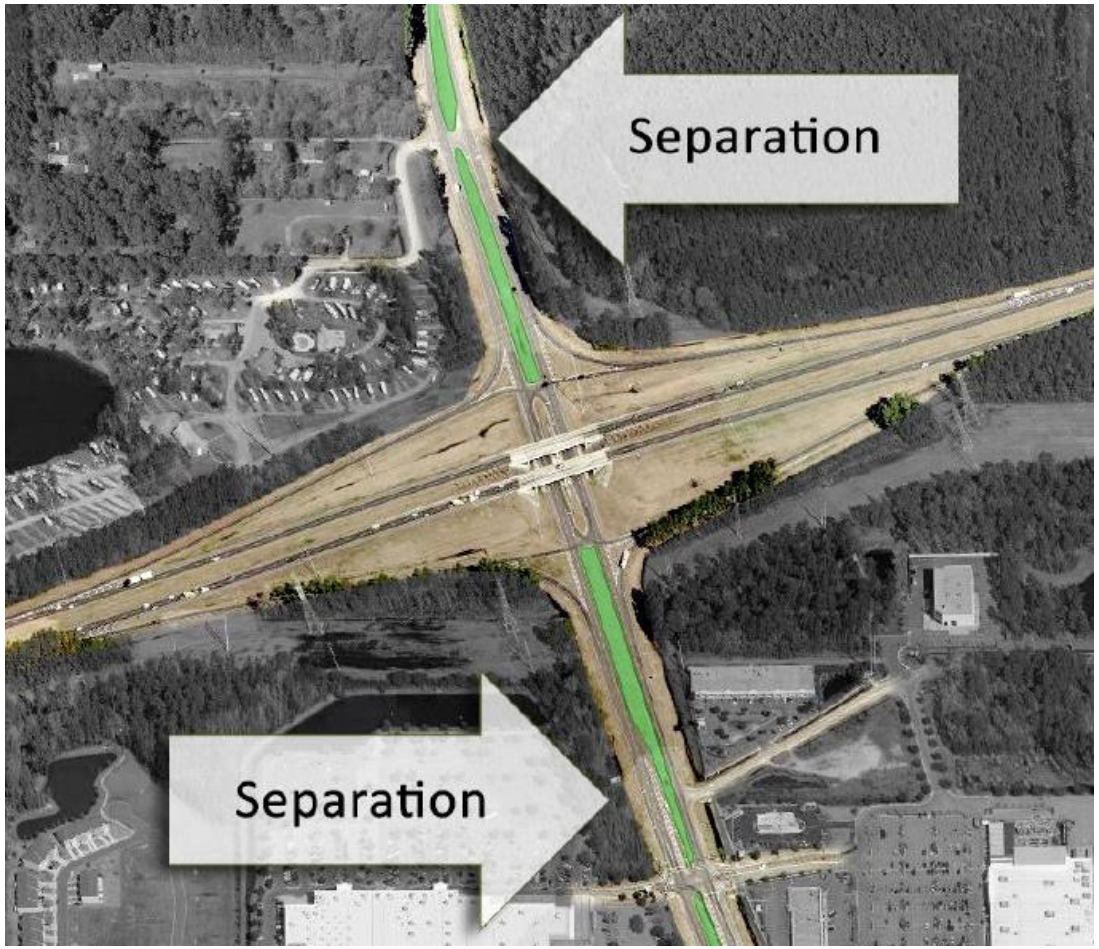
Median Opening Failures | Entry Speed

- Design Speed and the related entry speed are the bases for determining the minimum length of the turn lane for deceleration and stopping behind the turn lane queue.
- If the turn lane is too short, or queued vehicles take up too much of the deceleration portion of the turn lane, excessive deceleration will occur in the through lane. This creates a high crash potential.

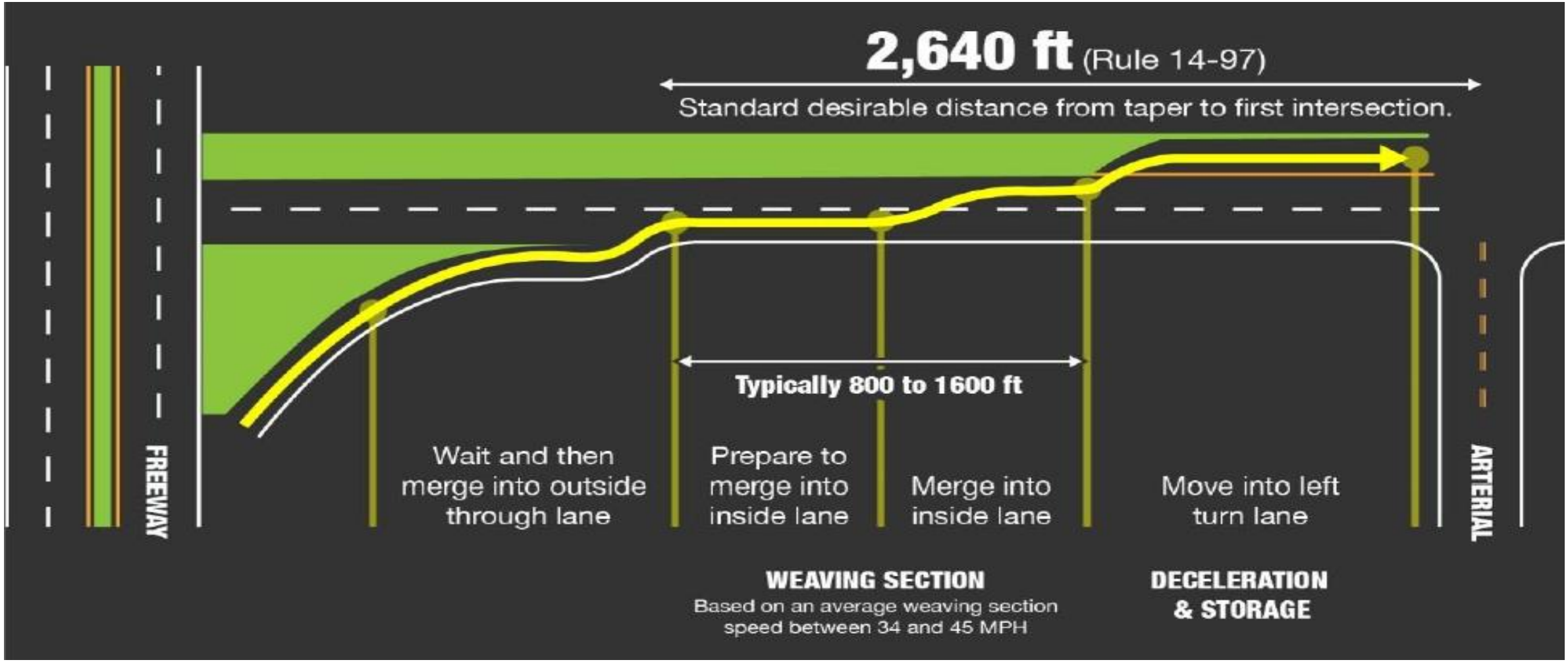


Median Opening Failures | Near Interchanges

- Rule 14-97
  - *"The standard distance to the first full median opening shall be at least 2,640 ft as measured from the end of the taper of the off ramp."*
  - *"Greater distances between proposed connections and median openings will be required when the safety or operation of the interchange or the limited access highway would be adversely affected. Based on generally accepted professional practice, FDOT makes this determination when the engineering and traffic study projects adverse conditions."*

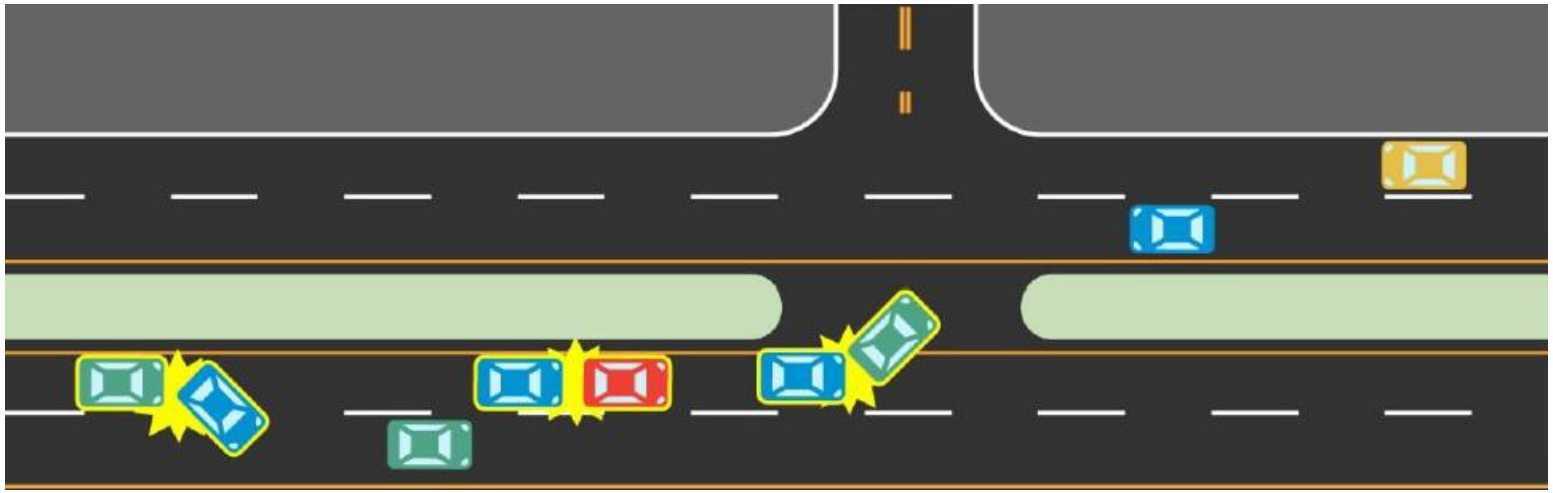


Median Opening Failures | Unsignalized On and Off Ramps



Median Treatments

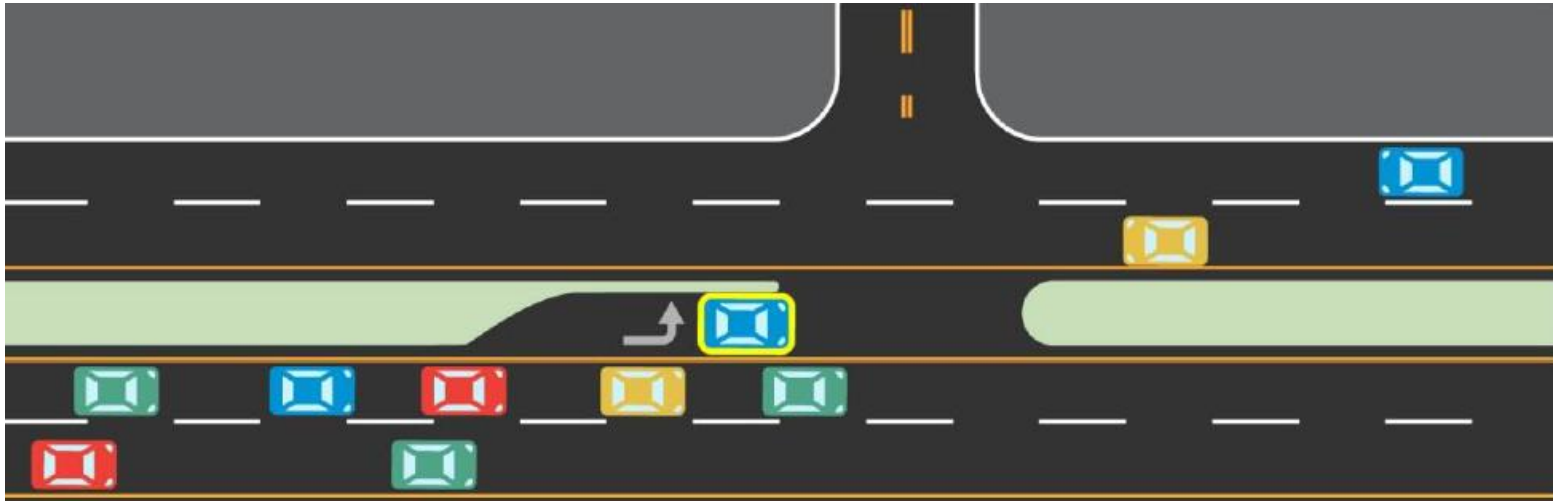
- The “bullet nose” median opening requires a vehicle to make a left turn from a through lane interfering with the through traffic. This will result in a situation with a high potential for rear-end crashes.



Bullet Nose Example

Median Treatments

- The most common method in which left-turning vehicles can be removed from a through traffic lane is to install a left-turn lane.
- Per the *FDOT Median Opening and Access Management Procedure*, "Existing bullet nose median openings should be replaced with an adequate left-turn lane."

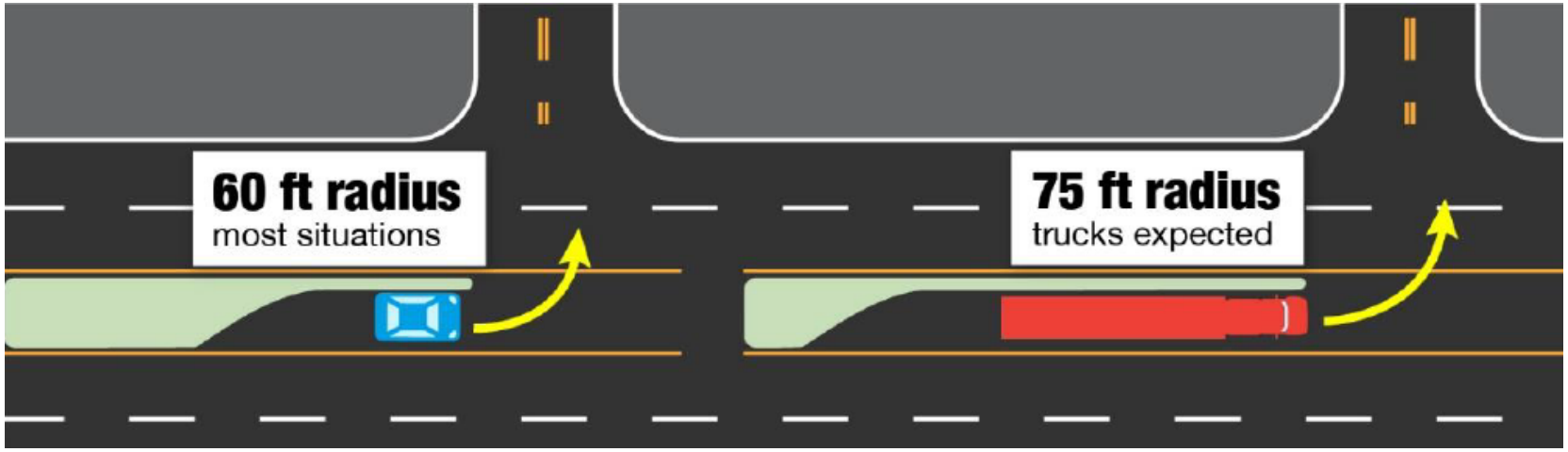


Median Opening Left Turn Radius

Control Radii for Minimum Speed Turns

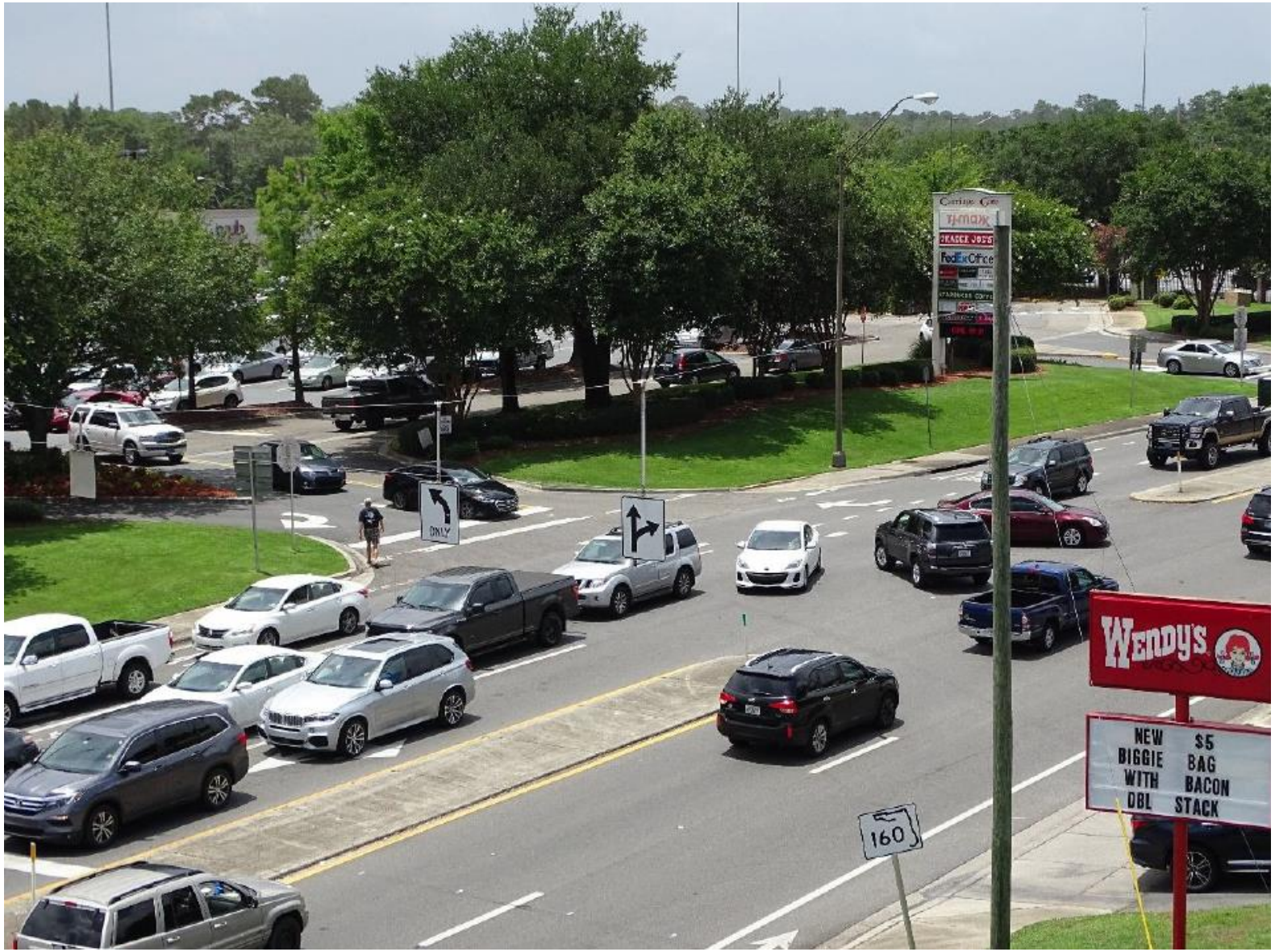
Design Vehicles Accommodated	Control Radius (ft)			
	50 (40 min)	60 (50 min)	75	130
Predominant	P	SU-30	SU-40, WB-40	WB-62FL
Occasional	SU-30	SU-40, WB-40	WB-62	WB-67

Source: FDM 212 – Intersections (Table 212.9.2)



Median Opening Length

- Median opening length is governed by the:
  - Turning or control radii
  - Side street geometrics
  - Median (traffic separator) width
  - Intersection skews
  - Intersection legs



Median Opening Length

Difficulties

- Multiple conflicts for both the turning vehicles and through traffic
- Impaired sight distance
- Signalization should be considered only if the median opening meets the criteria of a signal warrant analysis.

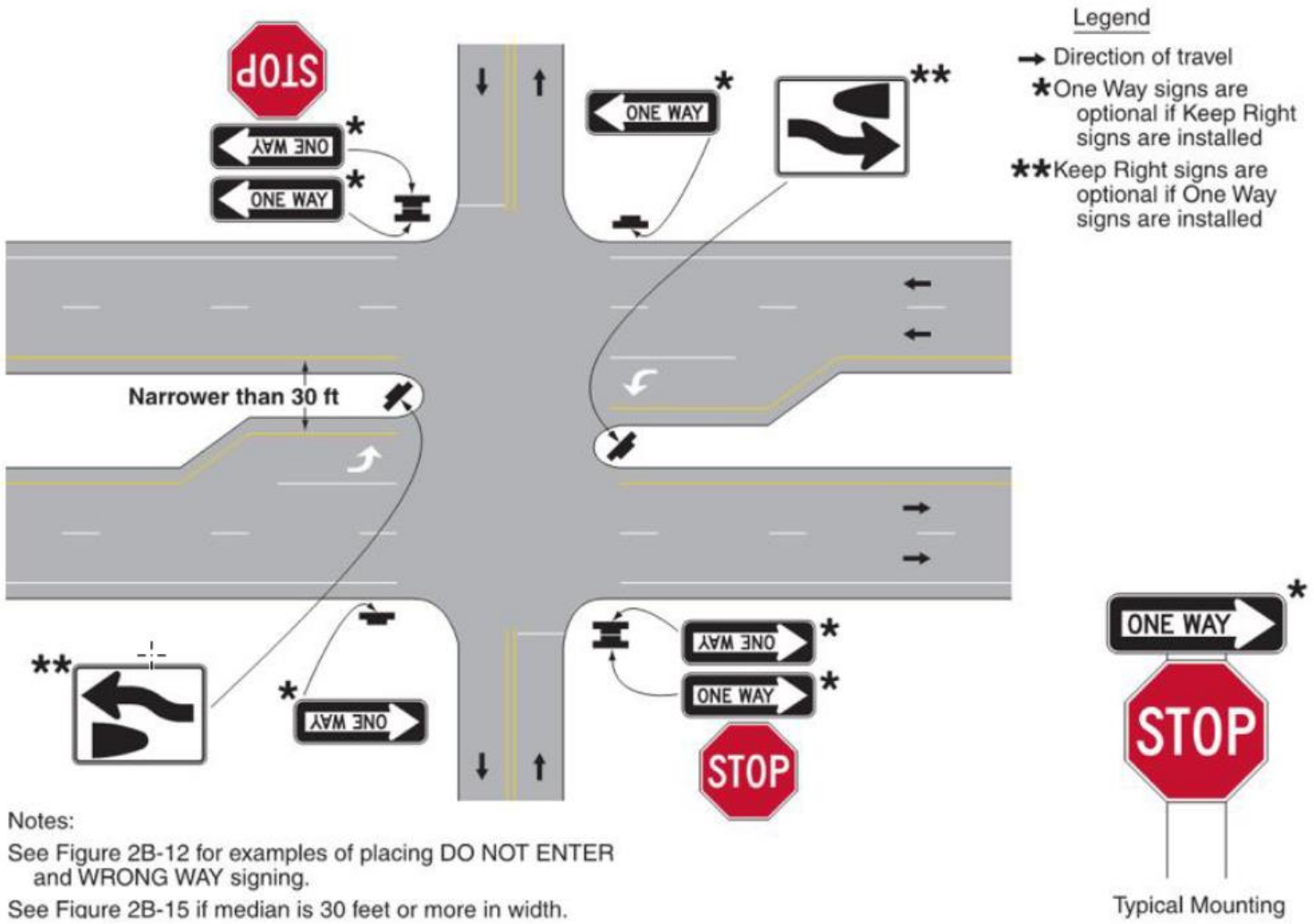
Solutions

- Reconstruct the unsignalized full opening as a more restrictive median opening
- Close the median opening
- Directionalize the median opening

The solution selected, as well as the design of the restrictive movement (if used) will depend on several factors including; the proximity to other median openings, alternative routes, traffic volumes, and the crash history of the roadway.

Pavement Markings And Signing

Figure 2B-16. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet



Notes:

See Figure 2B-12 for examples of placing DO NOT ENTER and WRONG WAY signing.

See Figure 2B-15 if median is 30 feet or more in width.

Typical Mounting

Source: MUTCD

Retrofit Considerations

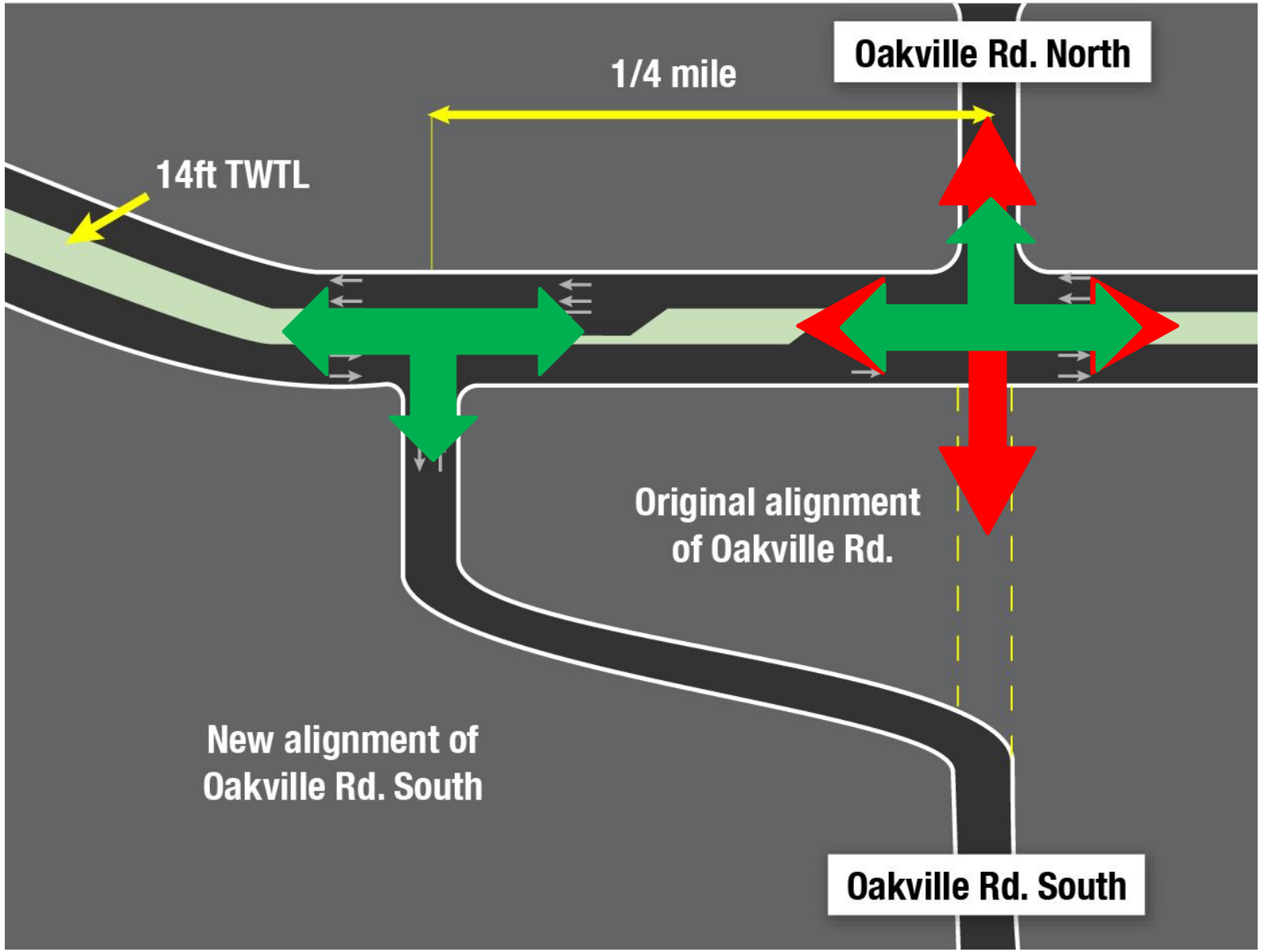
Assessing a Median Opening Guidance

- Determination of Major Cross Streets and Major Driveway Locations
- Data Collection
- Analysis
- Recommendations
  - Closing a Median Opening
  - Altering a Median Opening

Retrofit Considerations

Considerations for Resurfacing, Restauration, and Rehabilitation (3R):

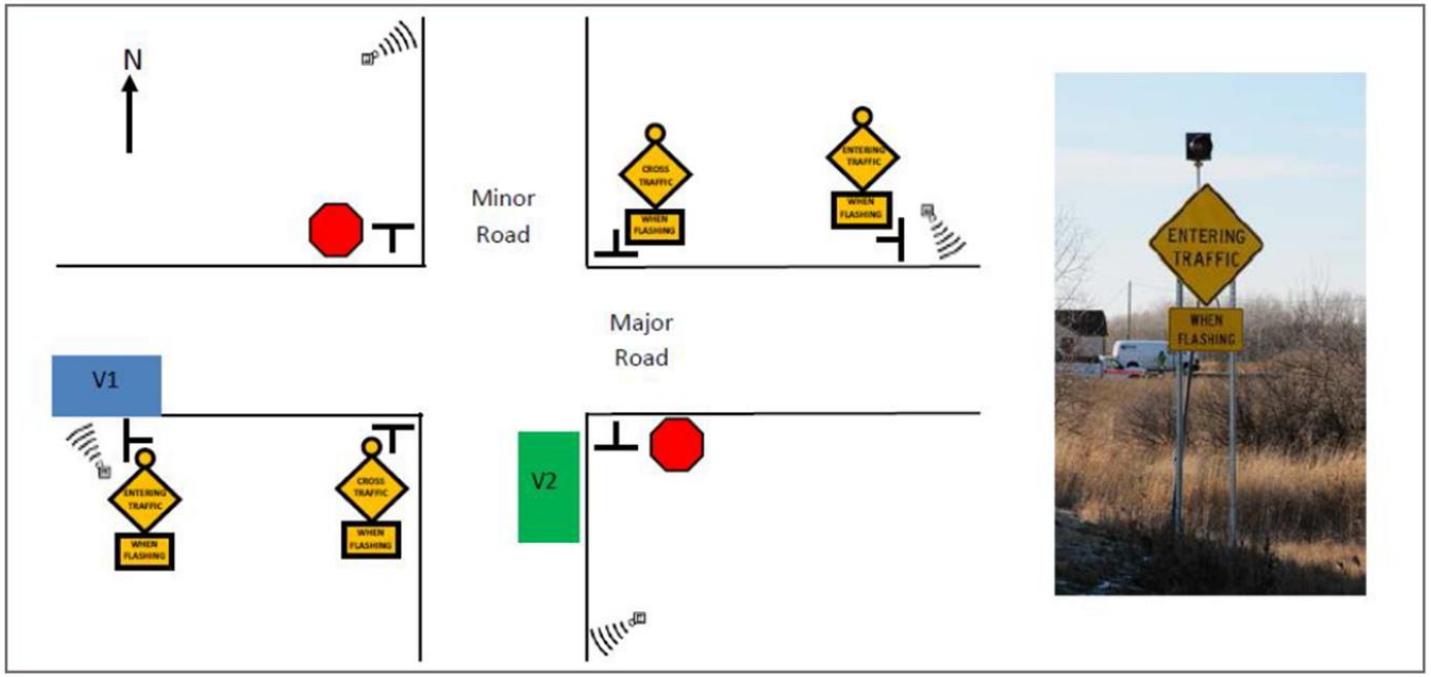
- Radius improvements at side road driveways due to evidence of off-tracking
- Close abandoned driveway in urban/curb & gutter section to improve ADA accessibility/sidewalk
- Correct driveways that do not meet design standards
- Construct new transit/bus amenities
- Construct new turn lanes to meet projected need
- Lengthen/revise existing turn lanes at signalized intersections due to documented operational issues
  - Any intersection could be revised as needed based on verified crash history



Rural Median Opening Considerations

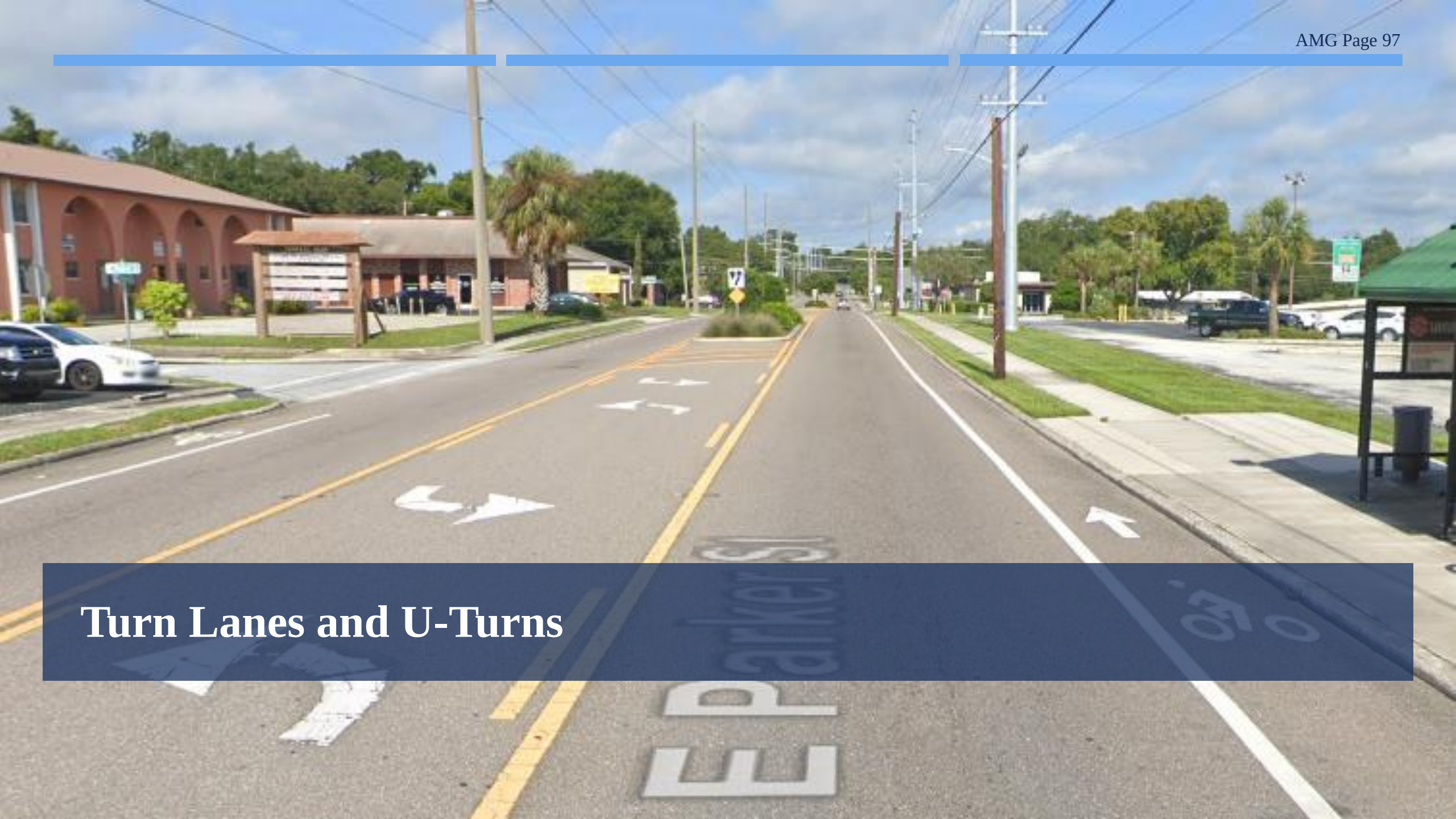
- Re-Aligning Minor Roadway Intersections
- NCHRP Report 650 Median Intersection Design for Rural High-speed Divided Highways.

Rural Highway Treatments



Source: *Rural Intersection Conflict Warning Systems Deployment – Concept of Operations (2012) Minnesota DOT*

RICWS system video, Minnesota Department of Transportation (MnDOT)



Turn Lanes and U-Turns

Exclusive Right-Turn Lanes

When to consider:

- High volume of buses, trucks or trailers
- Poor internal site design of a driveway
- Heavier than normal peak flows on the main roadway
- Very high operating speeds (such as 55 mph or above)
- Rural locations where turns are not expected by through drivers
- Highways with curves or hills where sight distance is impacted
- Gated entrances
- Crash experience
- Intersections or driveways just after signalized intersections
- Severe skewed angle of intersection requiring right-turn vehicle to slow greatly

When not to consider

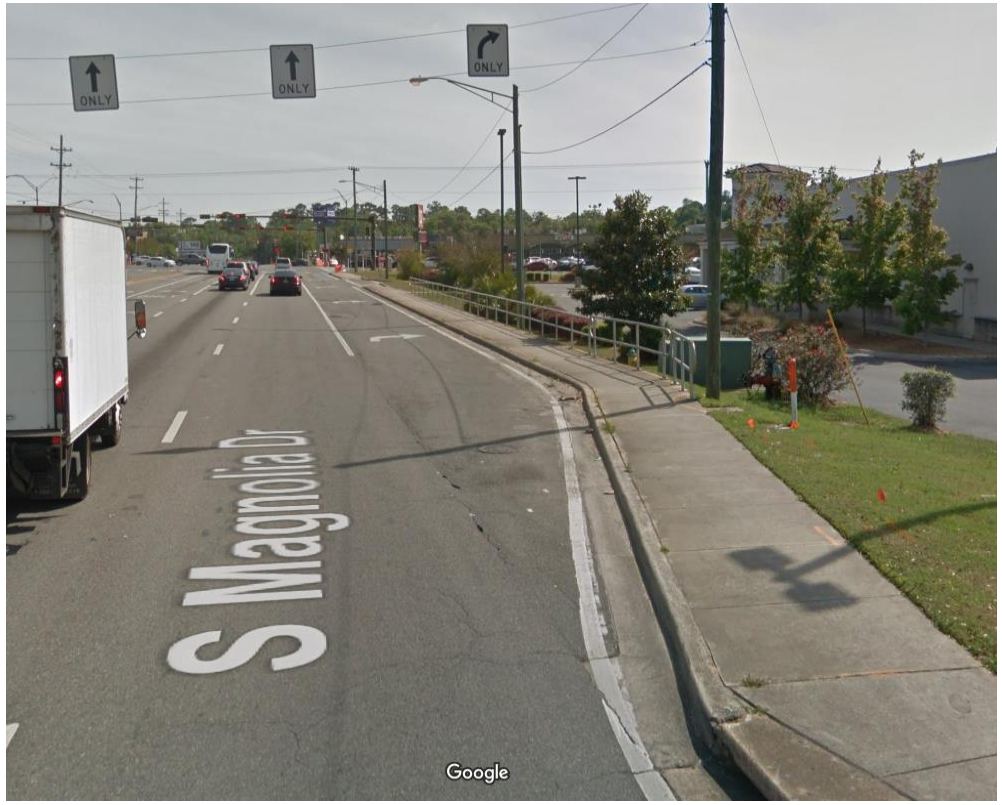
- Dense or built-out corridors with limited space
- Right-turn lane that would negatively impact pedestrians or bicyclists
- Vehicular movements from driveways or median openings that cross the right-turn lane resulting in multiple threat crashes
- Context classifications C2T, C4, C5, or C6

Exclusive Right-Turn Lanes

Roadway Posted Speed Limit	Number of Right Turns Per Hour
45 mph or less	80 – 125[1]
Over 45 mph	35 – 55[2]
Note: A posted speed limit of 45 mph may be used with these thresholds if the operating speeds are known to be over 45 mph during the time of peak right turn demand.	
Note on traffic projections: Projecting turning volumes is, at best, a knowledgeable estimate. Keep this in mind especially if the projections of right turns are close to meeting the guidelines. In that case, consider requiring the turn lane.	
[1] The lower threshold of 80 right-turn vehicles per hour would be most used for higher volume (greater than 600 vehicles per hour, per lane in one direction on the major roadway) or two-lane roads where lateral movement is restricted. The 125 right-turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with a large entry radius (50 feet or greater).	
[2] The lower threshold of 35 right-turn vehicles per hour would be most appropriately used on higher volume two-lane roadways where lateral movement is restricted. The 55 right-turn vehicles per hour upper threshold would be most appropriate on lower volume roadways, multilane highways, or driveways with large entry radius (50 feet or greater).	

Source: NCHRP Report 420 (Impacts of Access Management Techniques)

Exclusive Right-Turn Lanes | Design



Exclusive Right-Turn Lanes | Important Considerations

Right-Turns and Large Vehicles

- To minimize the rear-end collision potential of some situations, a right-turn lane may be required where large and slow-moving vehicles need to turn right such as;
  - Trucking facilities (or locations that have a high volume of large vehicle traffic such as water ports, train stations, etc.)
  - Recreational facilities attracting boats, trailers and other large recreation vehicles
  - Transit facilities
  - Schools driveways to drop-off and pick-up areas

Exclusive Left-Turn Lanes

When to consider

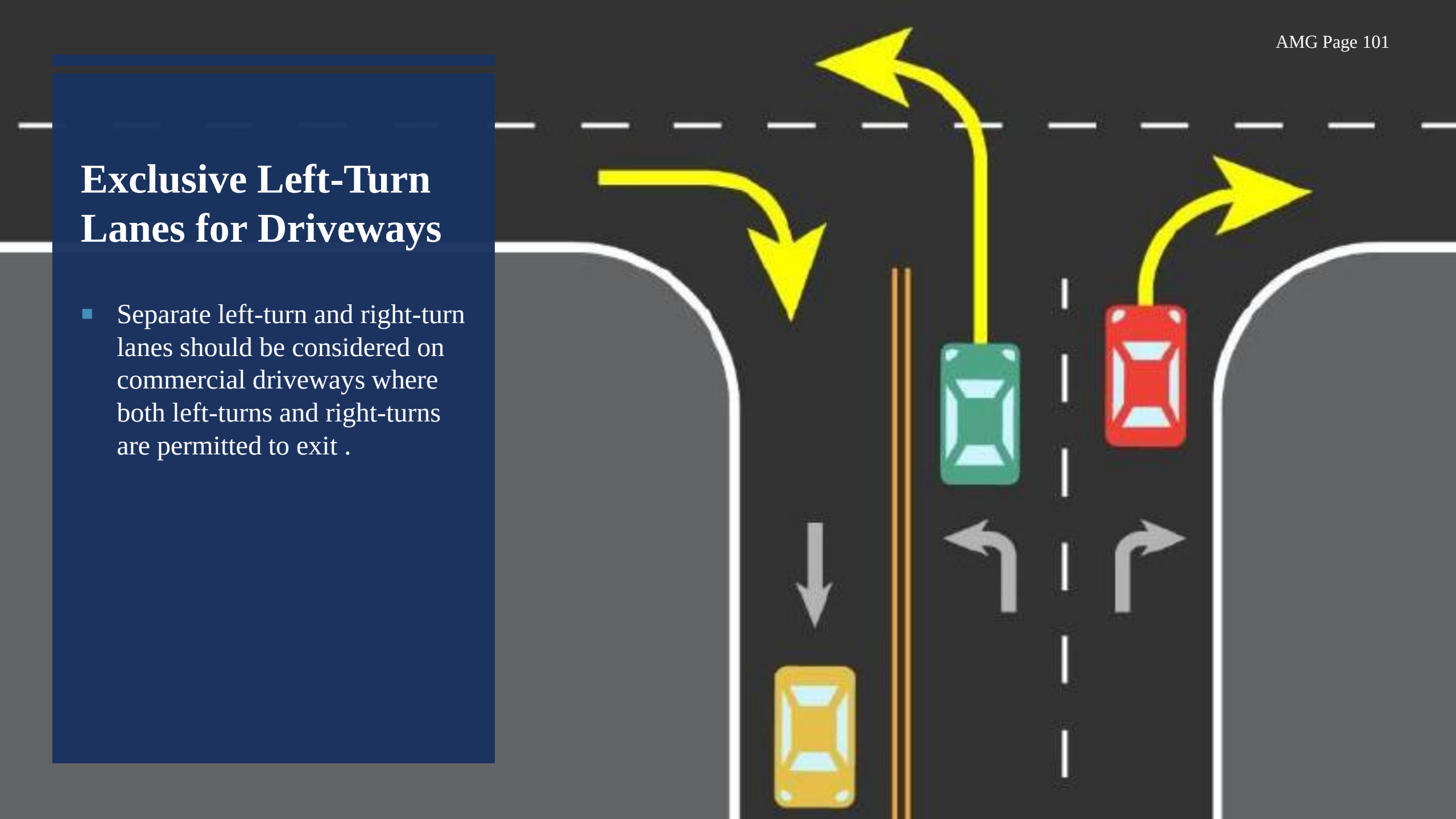
- Multilane roadway with a median opening
- At any location serving the public
- On curves
- When speeds are higher than 45mph
- Whenever a driveway is served by a median opening, a left turn lane should be available. This provides for the safest left turns into the driveway.

What to consider

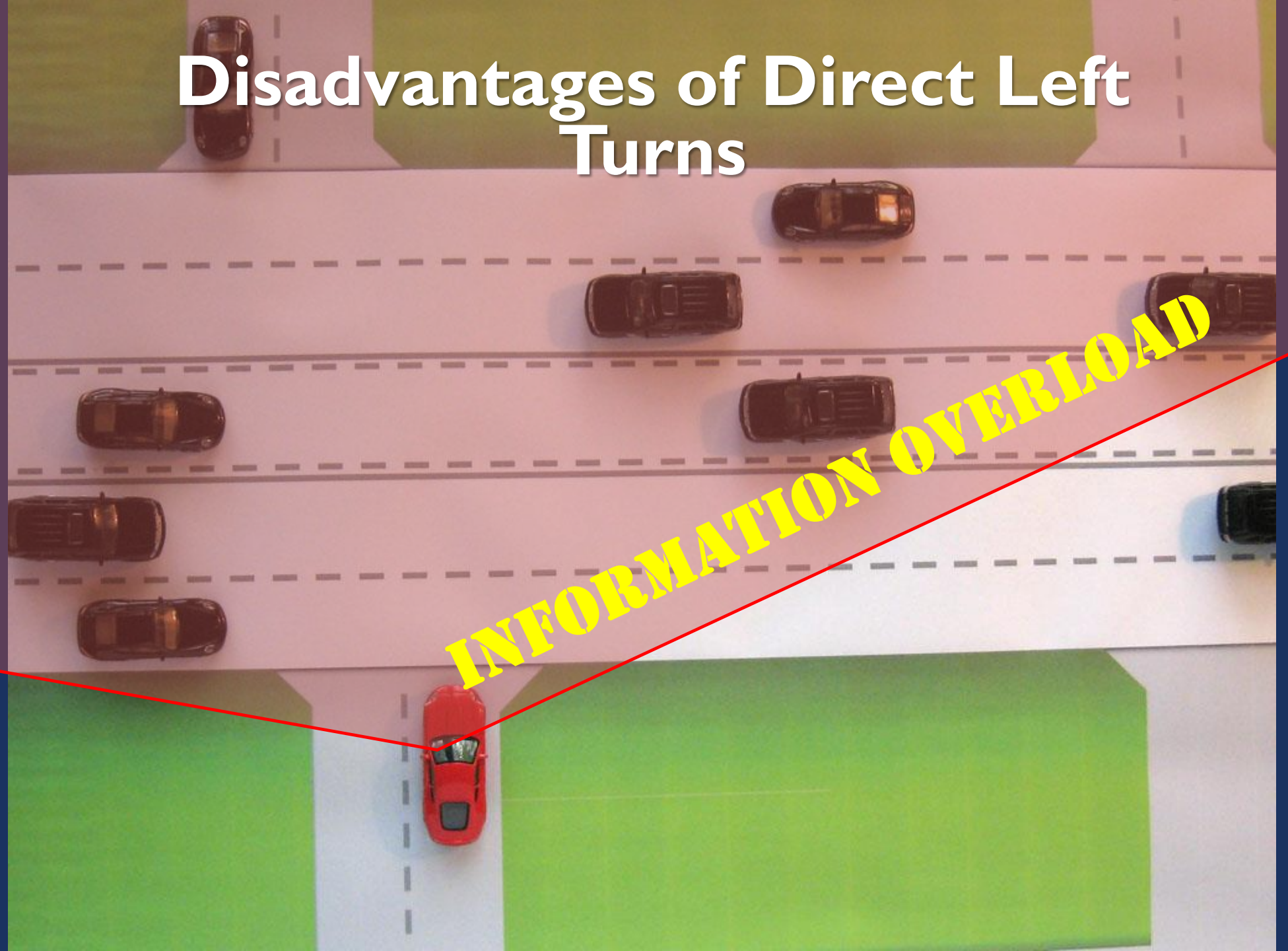
- Location
  - When a driveway is close to the intersection

Exclusive Left-Turn Lanes for Driveways

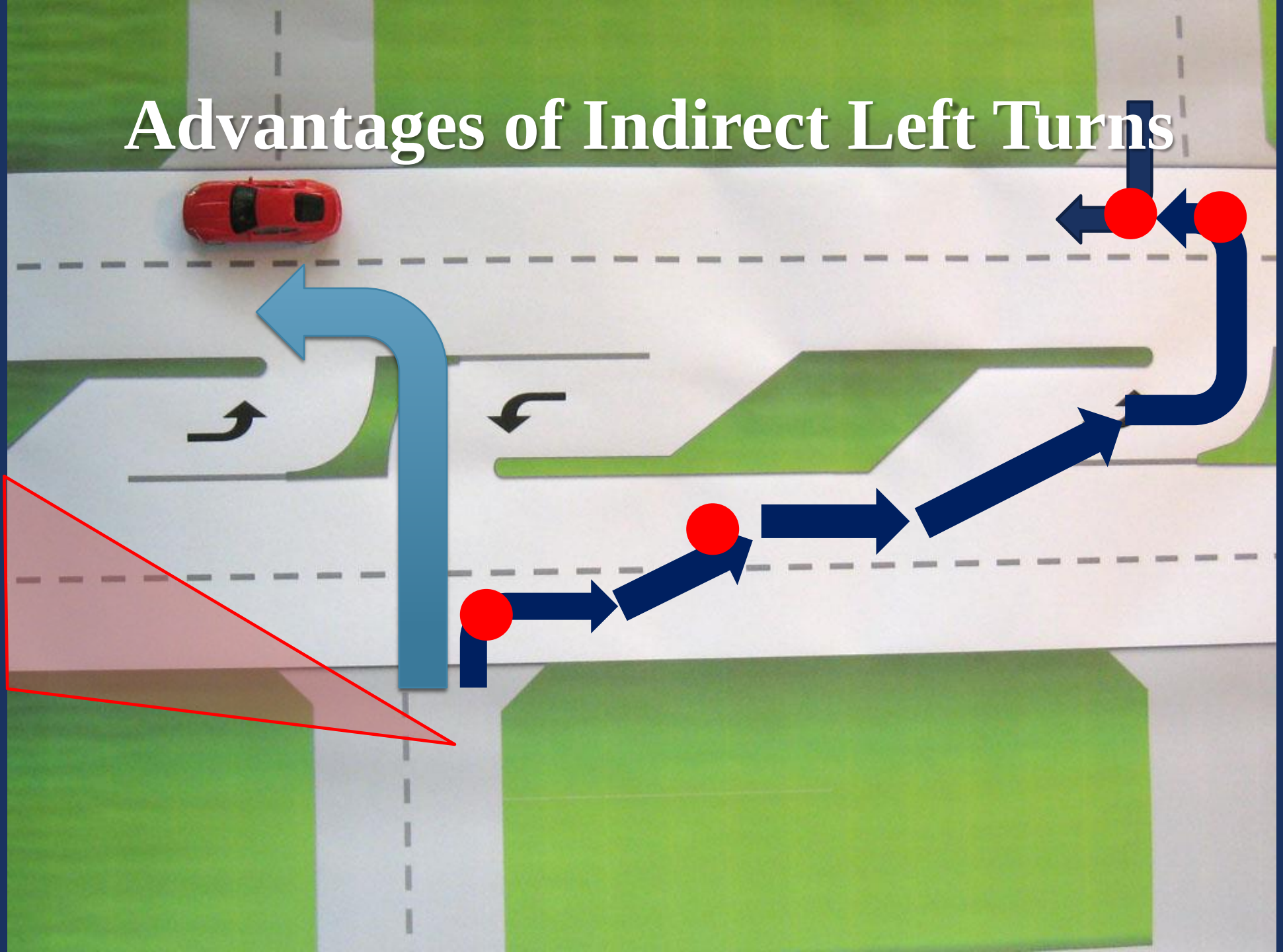
- Separate left-turn and right-turn lanes should be considered on commercial driveways where both left-turns and right-turns are permitted to exit .



Disadvantages of Direct Left Turns



Advantages of Indirect Left Turns

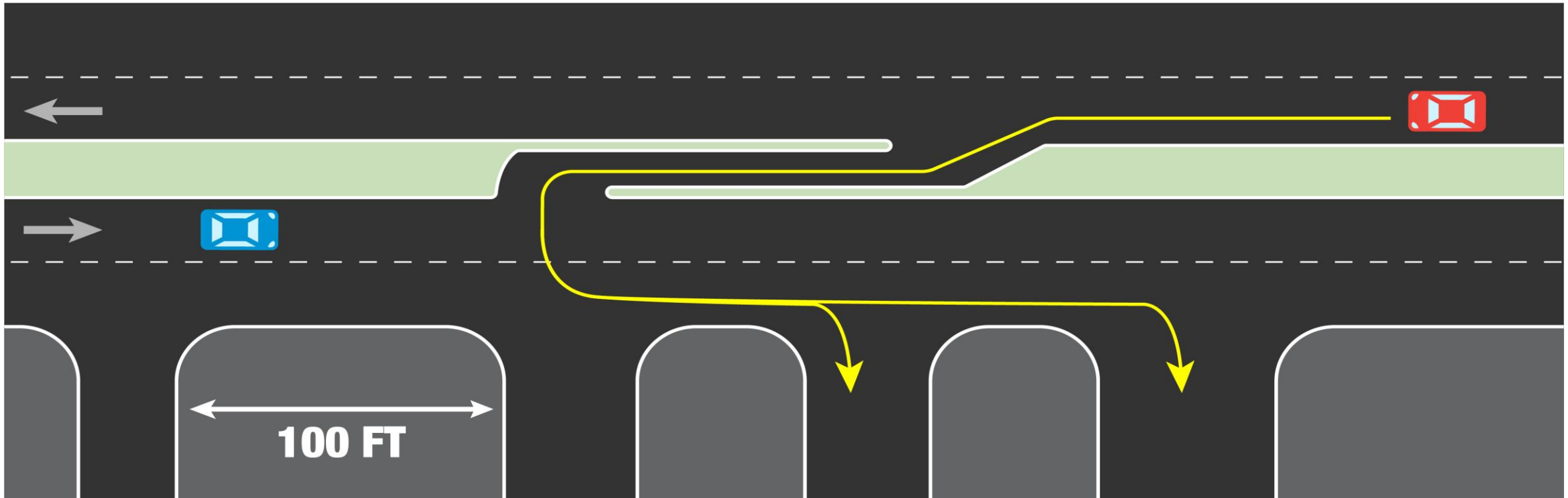


Two-Way Left-Turn (TWLTL)

- May be used on 3-lane and 5-lane typical sections with design speeds ≤ 40 mph.
- Design criteria for lane widths and pavement slopes are given by lane type, design speed and context classification.
- On new construction projects, flush medians are to include sections of raised or restrictive median to enhance vehicular, bicycle, and pedestrian safety, improve traffic efficiency, and attain the standards of the Access Management Classification of that highway system.

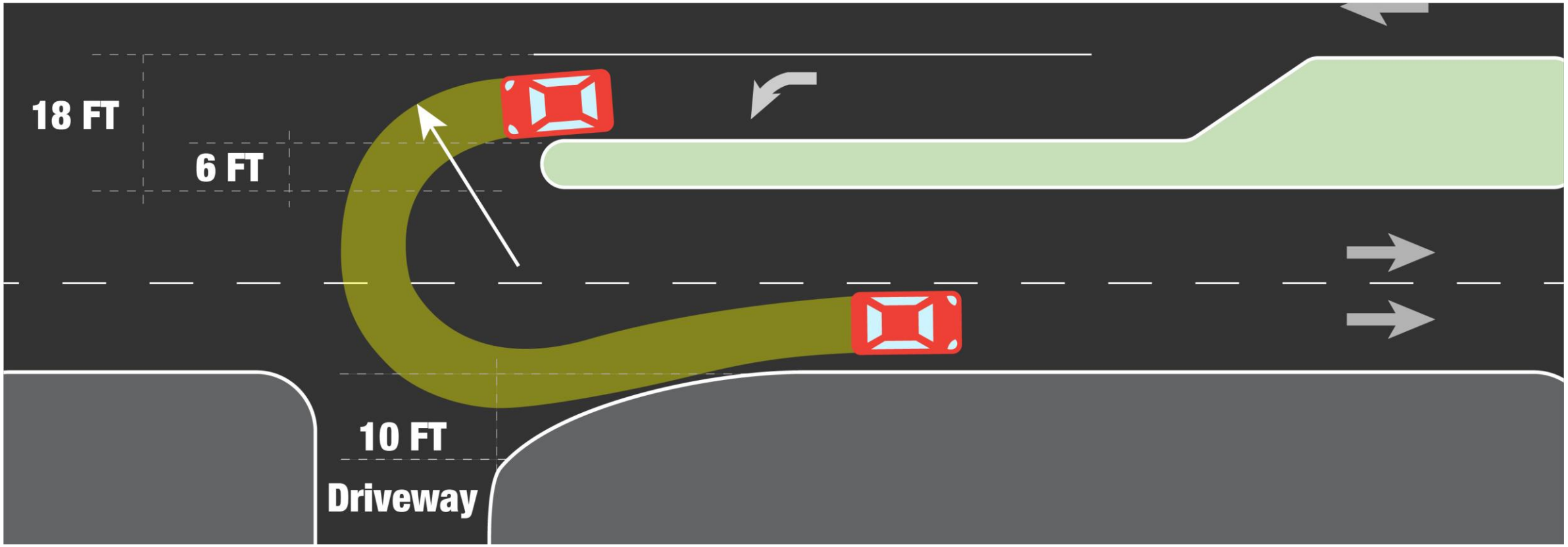
U-Turns

- Driveways should be located directly opposite, or downstream, from a median opening.
- Driveways access should be located more than 100 feet upstream from the median opening to prevent wrong-way maneuvers.



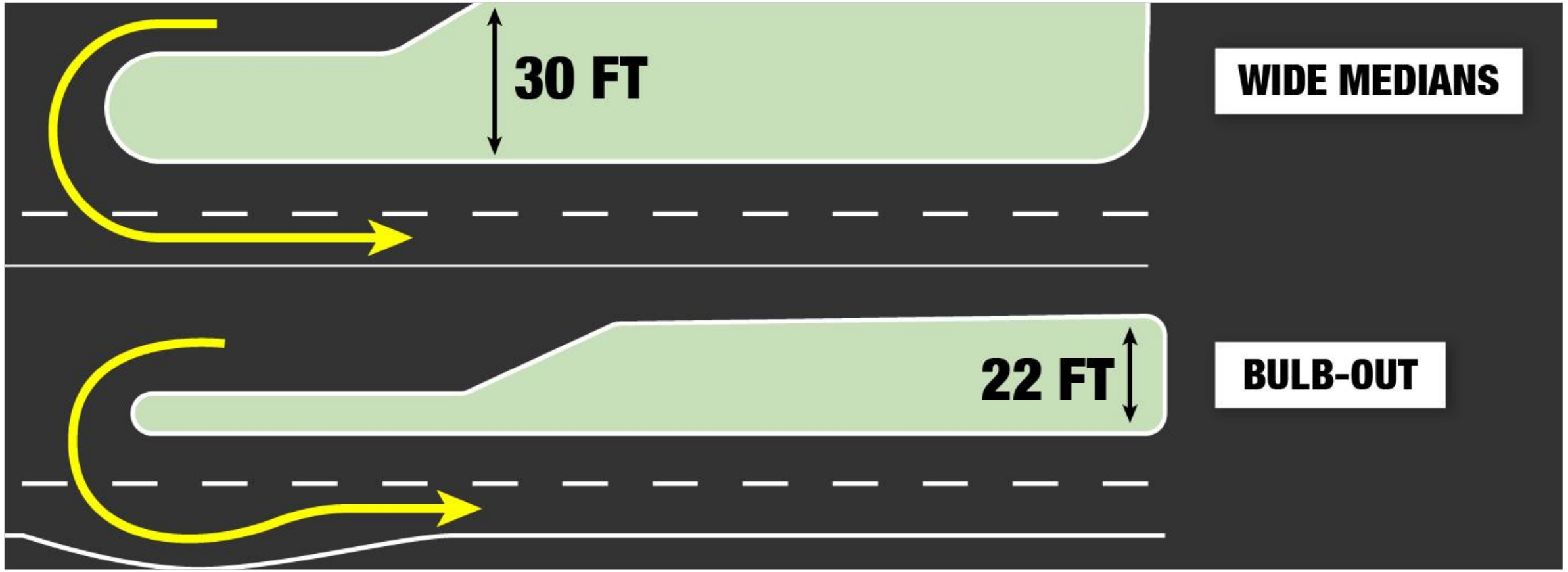
U-Turns

- Widen Driveways



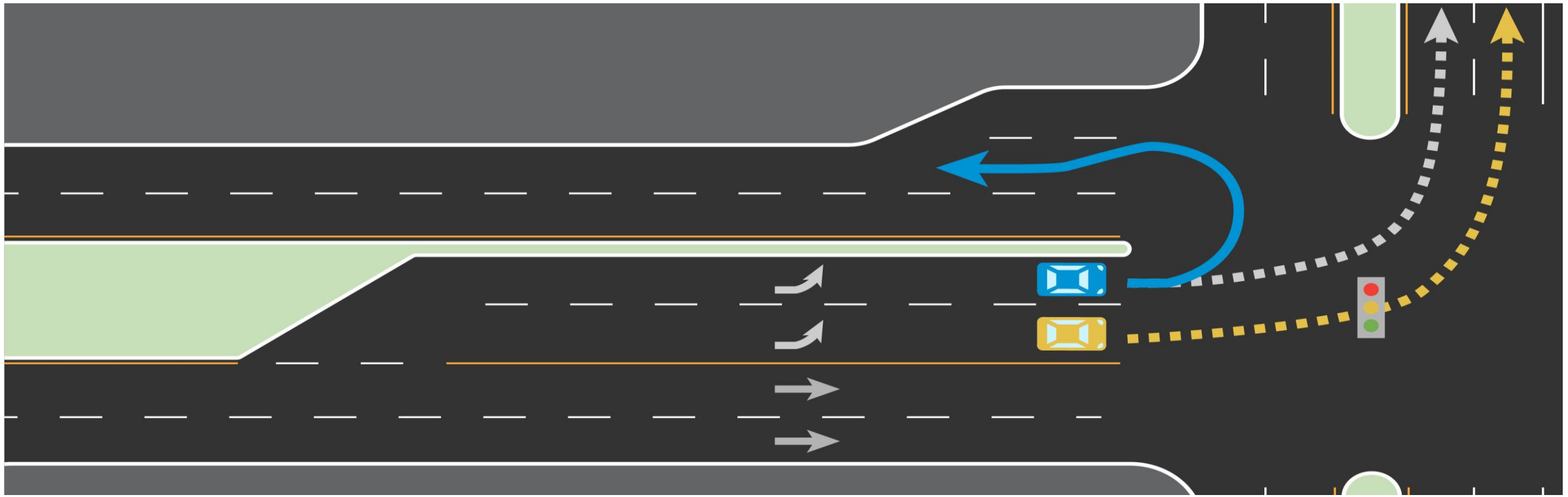
U-Turns

- Consider the type of vehicle



U-Turns

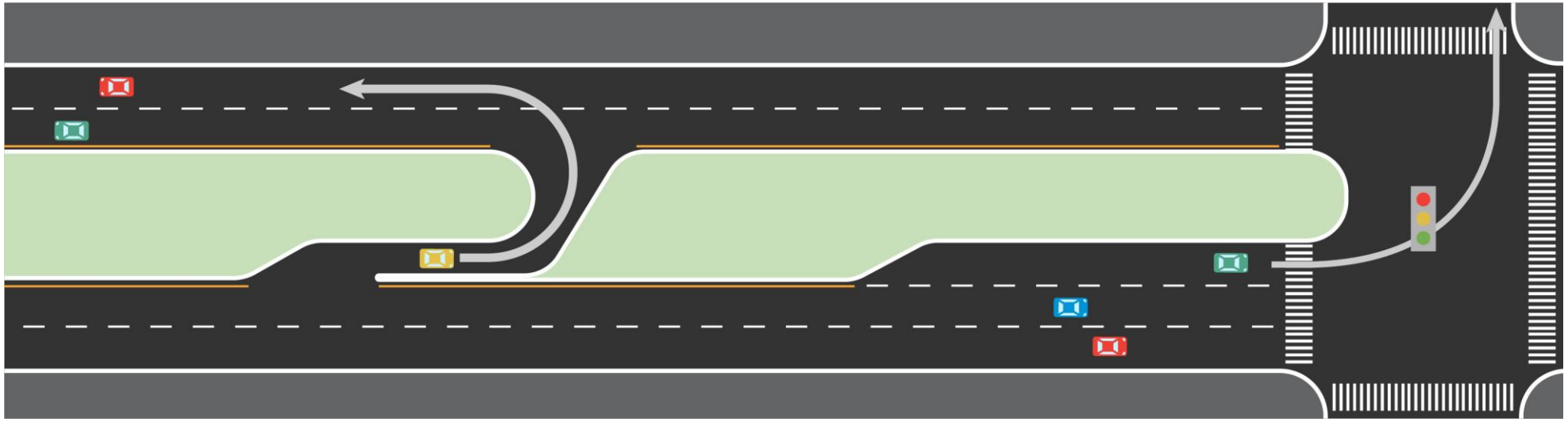
- There must be sufficient median width to avoid encroachment onto the sidewalks.
- Where medians are of sufficient width to accommodate dual left-turns, an option is to allow U-turns from the inside left-turn.



U-Turns

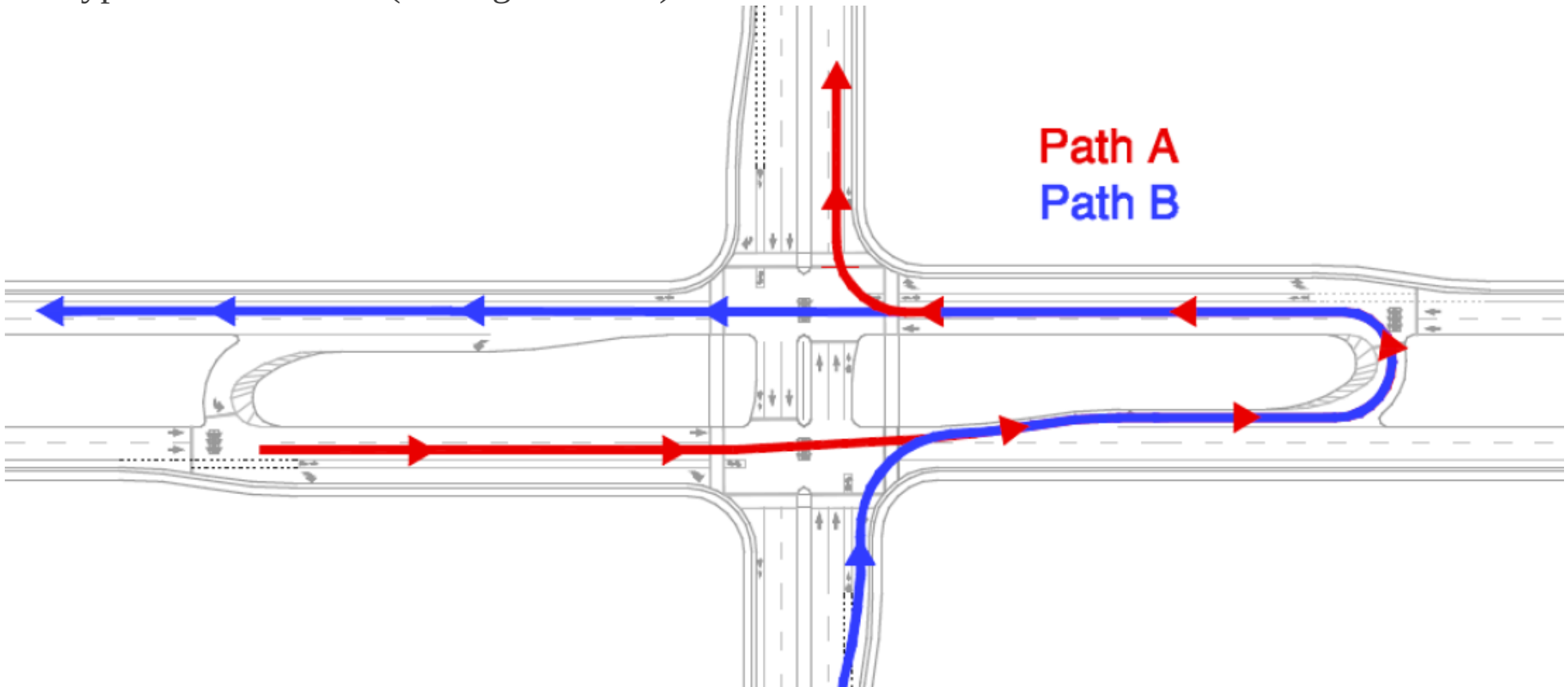
Indications that you should consider a U-turn opening before a signalized intersection are:

- High volume of left turns currently at signalized intersection
- Numerous conflicting left turns and U-turns
- Where there is enough space to separate the signalized intersection and U-turn opening



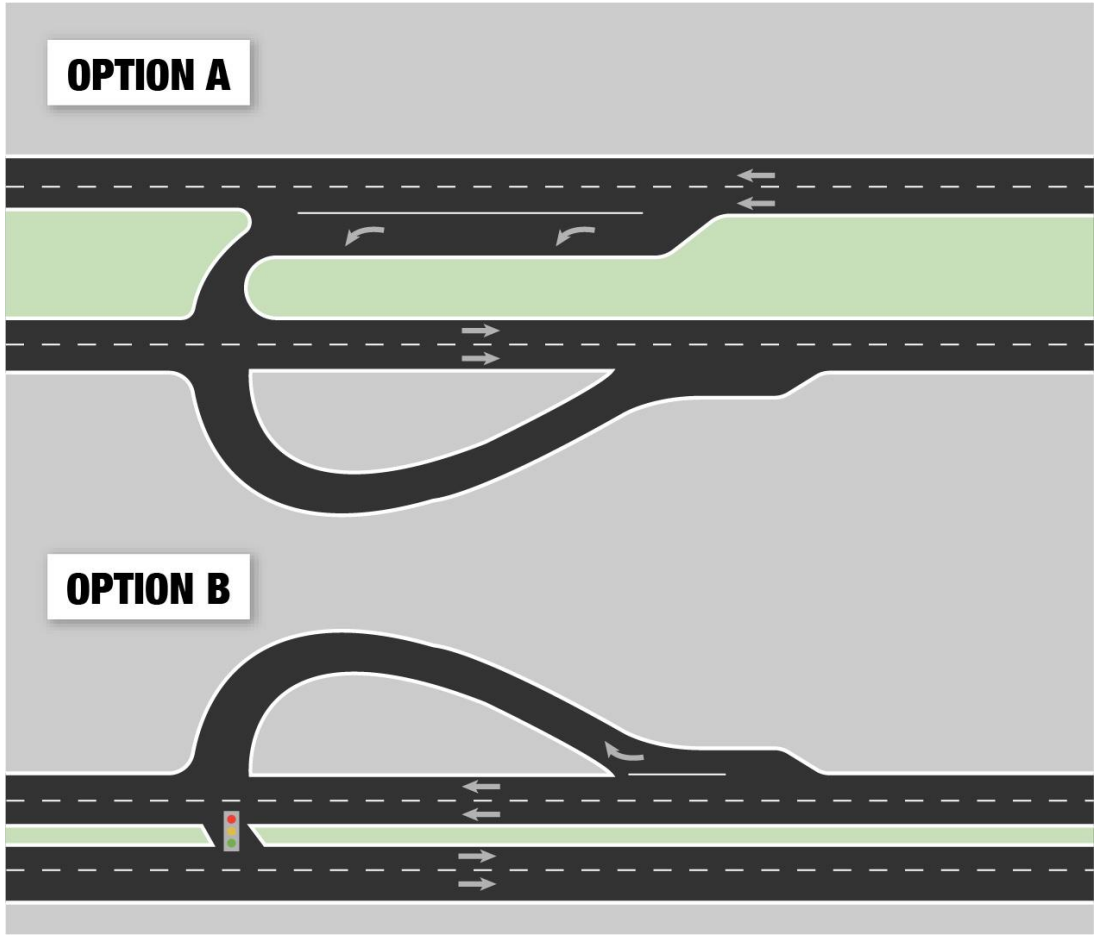
U-Turns

- For U-turns that are to be made after a traffic signal, it is recommended that a “Median U-Turn” is used to allow for these types of movements (Michigan U-turn).



U-Turns

- Alternatives for large vehicles
- Option A desirable operational features:
  - A U-turning vehicle is stored in the median parallel to the through traffic lanes
  - A suitable gap is needed in the opposing traffic stream only
  - After completion of the U-turn the driver can accelerate prior to merging into the through traffic lane
- Option B
  - A traffic signal is needed, in most of the cases



U-Turn Option B

Alternative Intersections and U-turns

- Median U-turn
- Restricted crossing U-turn
- Roundabout
- Displaced left-turn
- Quadrant Roadway

Module 4: Safety, Other Design Considerations, and Permitting

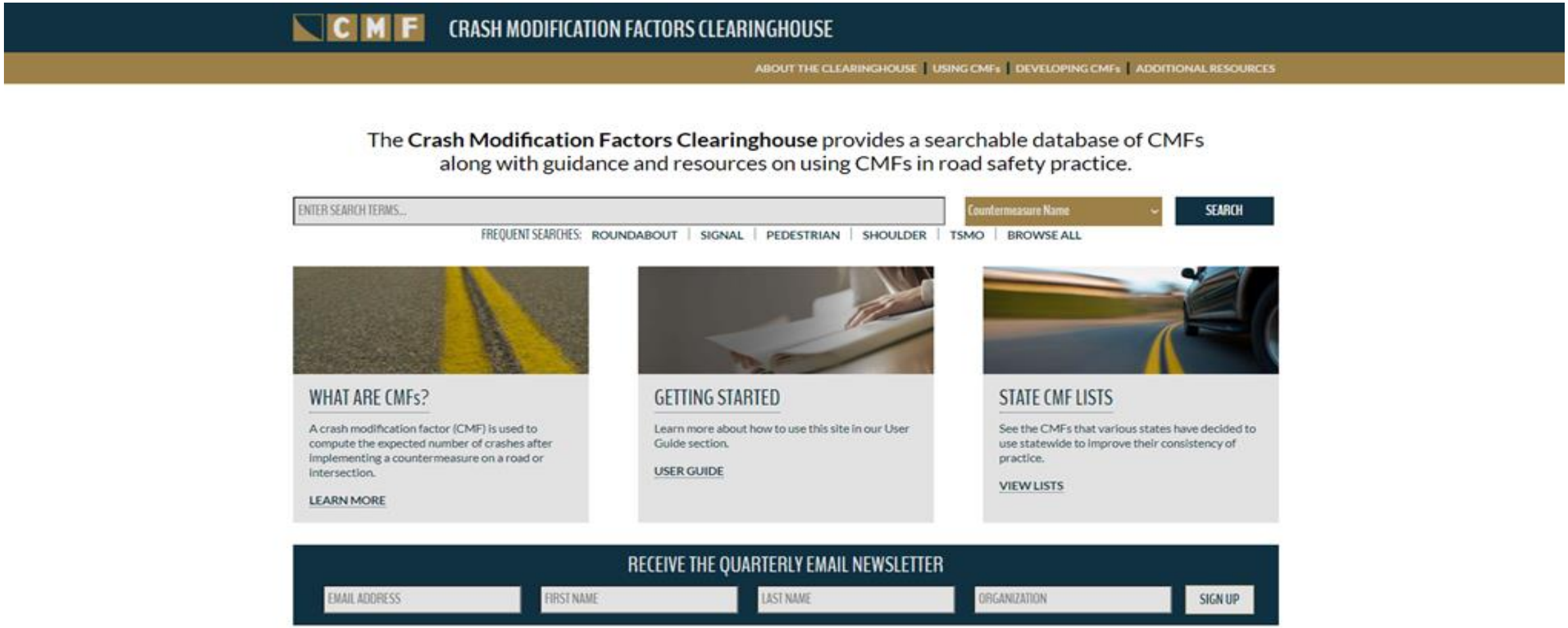
Module 4: Safety, Other Design Considerations, and Permitting

- Safety Benefits and HSM
  - Crash Modification factors
- Sight Distance
- Integration Considerations
  - Intersection Control Evaluation (ICE)
  - Innovative Intersection
  - Non-Motorized Connections
  - Safe Transportation for Every Pedestrian (STEP)
  - Large Vehicles Considerations
- Permitting and Public Involvement

Safety Benefits and Highway Safety Manual (HSM)

- *S*cientifically based guide that predicts the impacts of safety improvements on the highway system.
- The *HSM* conclusively demonstrates the safety benefits of access management, especially the provision of restrictive medians.
- It provides a method for safety impact projections which quantify the safety impact of installing restrictive medians.
- It provides crash prediction methods for driveway related crashes.

Crash Modification Factors (CMF)



http://www.cmfclearinghouse.org/

CMFs were last added to the clearinghouse on June 1, 2020.

Crash Modification Factors (CMF)

Urban and Suburban Arterials • Focus on Driveway Density; Reducing Driveways Reduces Crashes

Treatment	Setting *(Road Type)*	Traffic Volume	CrashType *(Severity)*	Percent Reduction in Crashes
Reduce driveways from 48 to 26-48 per mile				29%
Reduce driveways from 26-48 to 10-24 per mile	Urban and suburban (Arterial)	Unspecified	All types (Injury)	31%
Reduce driveways from 10-24 to less than 10 per mile				25%
Note: Initial driveway density per mile based on values in this table (48, 26-48, and 10-24 per mile).				

Source: Adapted from HSM Chapter 13.14: Access Management - Table 13-58. Potential Crash Effects of Reducing Access Point Density; Elvik, R. and T. Vaa. Handbook of Road Safety Measures. Elsevier, Oxford, United Kingdom, 2004.

HSM on Raised Medians

Chapter 13.4.2.6: Raised Median

Table 13-11. Potential Crash Effects of Providing a Median on Multi-Lane Roads (8)

Treatment	Setting (Road Type)	Traffic Volume	Crash Type (Severity)	CMF	Std. Error
Provide a median	Urban (Arterial Multilane[a,j])	Unspecified	All types (Injury)	0.78[7]	0.02
			All types (Non-injury)	1.09[7]	0.02
	Rural (Multilane[a,j])		All types (Injury)	0.88	0.03
			All types (Non-injury)	0.82	0.03

Base Condition: Absence of raised median.

Example Problem

- HSM sample problem – A 4 lane undivided urban roadway is to be reconstructed by adding a 22-foot raised median. The roadway is 2 miles long and there have been 36 crashes over the past 3 years.

  What is the predicted annual crash reduction of injury crashes by adding the median?

Table 13-11. Potential Crash Effects of Providing a Median on Multi-Lane Roads (8)

Treatment	Setting (Road Type)	Traffic Volume	Crash Type (Severity)	CMF	Std. Error
Provide a median	Urban (Arterial Multilane[a,j])	Unspecified	All types (Injury)	0.78[7]	0.02
			All types (Non-injury)	1.09[7]	0.02
	Rural (Multilane[a,j])		All types (Injury)	0.88	0.03
			All types (Non-injury)	0.82	0.03

Base Condition: Absence of raised median.

36/3 x (1-0.78) = 2.64 crashes/year reduction

12 x 0.22 = 2.64 crashes/year reduction

HSM on Median Width

Chapter 13.4.2.7: Median Width

- Base condition 10-foot median
  - Cross-median crashes reduced with wider median

Table 13-14. Potential Crash Effects of Median Width on Urban Four-Lane Roads with Full Access Control (15)

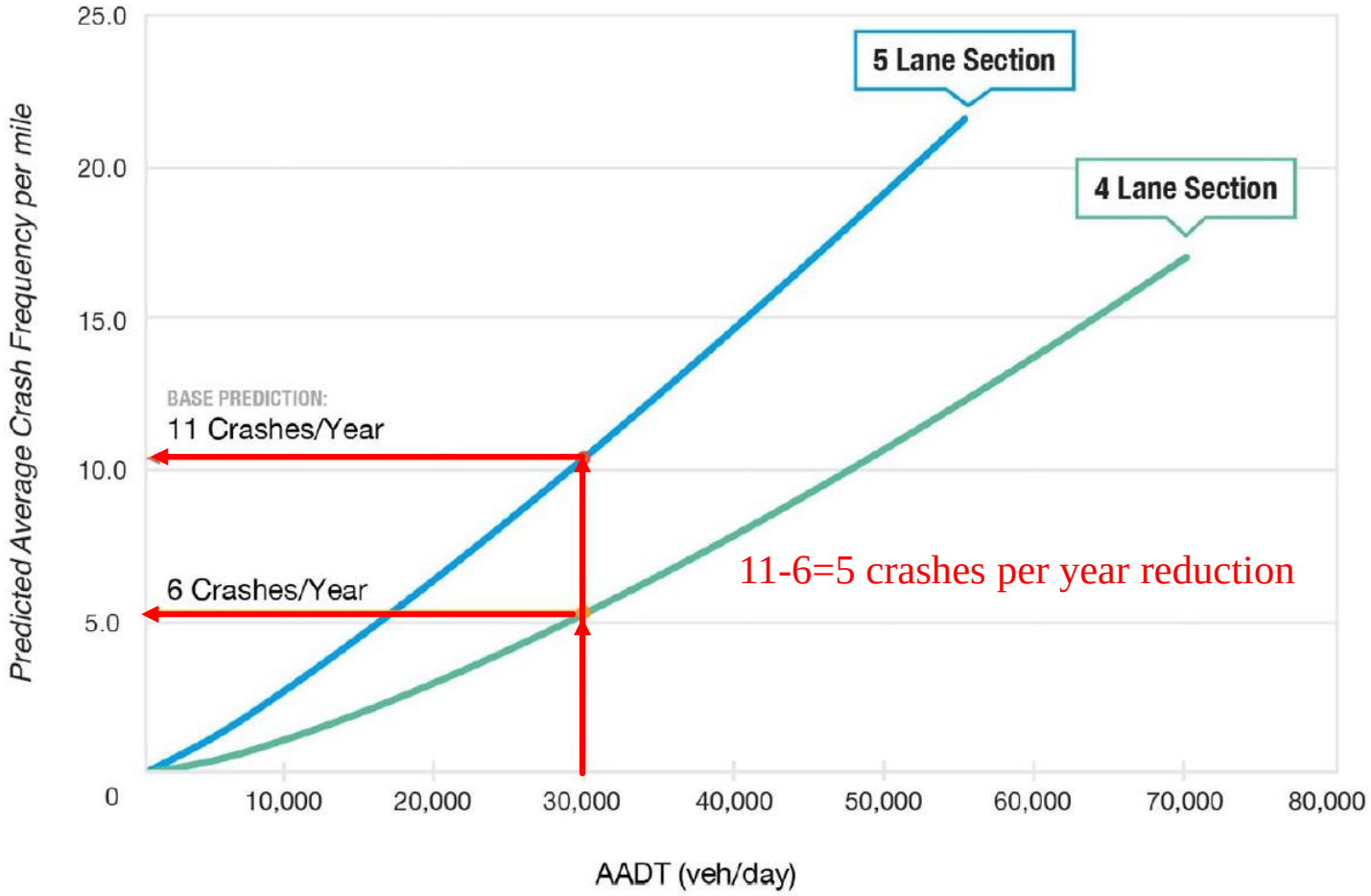
Median Width (ft)	Setting (Road Type)	Traffic Volume AADT	Crash Type (Severity)	CMF	Std. Error
10-ft to 20-ft conversion	Urban (4 lanes with full access control)	4,400 to 131,000	Cross-median crashes (Unspecified)	**0.89**	**0.04**
10-ft to 30-ft conversion				**0.80**	**0.07**
10-ft to 40-ft conversion				**0.71**	**0.09**
10-ft to 50-ft conversion				**0.64**	**0.1**
10-ft to 60-ft conversion				**0.57**	**0.1**
10-ft to 70-ft conversion				**0.51**	**0.1**
10-ft to 80-ft conversion				**0.46**	**0.1**
10-ft to 90-ft conversion				**0.41**	**0.1**
10-ft to 100-ft conversion				**0.36**	**0.1**
Base condition: 10-ft-wide traversable median.					

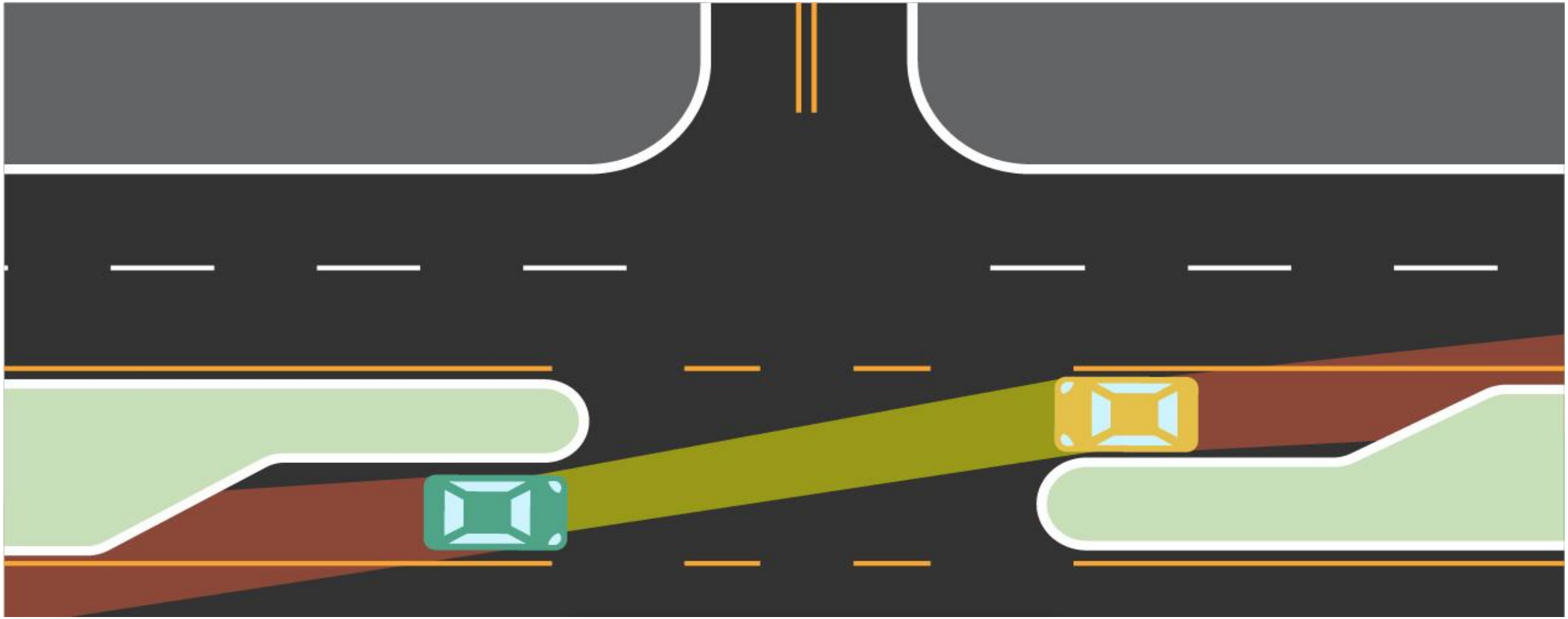
NOTE: **Bold** text is used for the most reliable CMFs. These CMFs have a standard error of 0.1 or less.

Median Example | Safety Performance Functions (SPFs)

Evaluate the safety benefits for converting a 5-lane section consisting of two lanes in each direction with a center two-way left-turn lane (TWLTL) into a 4-lane facility with a restrictive median.

- Corridor is one (1) mile in length
- Annual average daily traffic (AADT) volume of 30,000 vehicles.

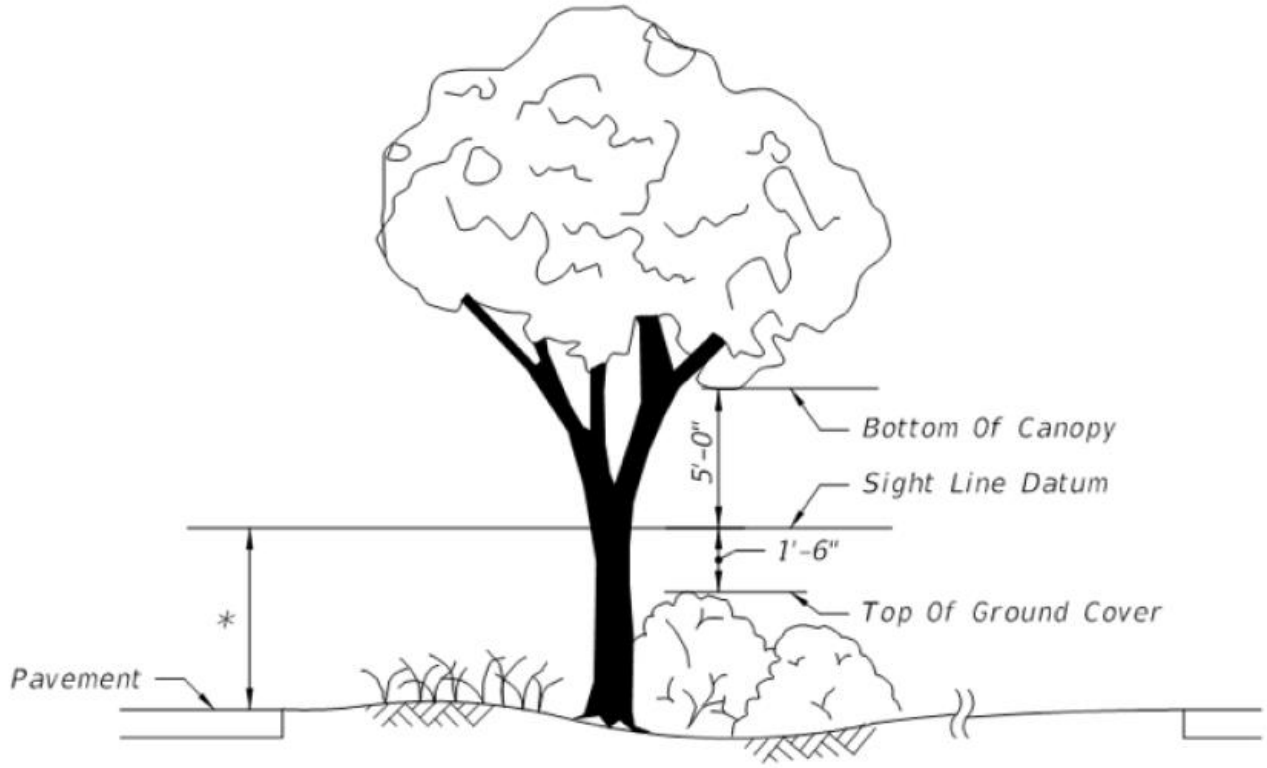




Sight Distance

Sight Distance Factors

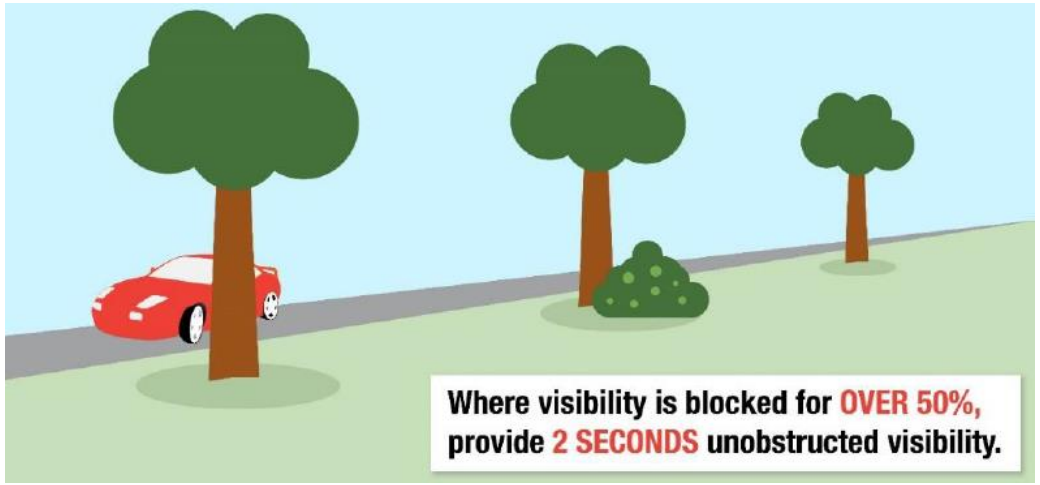
- Height of the eye
- Height of the object
- Drive eye setback
- Vehicle area
- Time
- Visibility



*Since observations are made in both directions, the line of sight datum between roadways is 3.5 feet above both pavements.

Source: FDM 212 – Intersections (Figure 212.11.2)

Time, Visibility and Vehicle Area Size



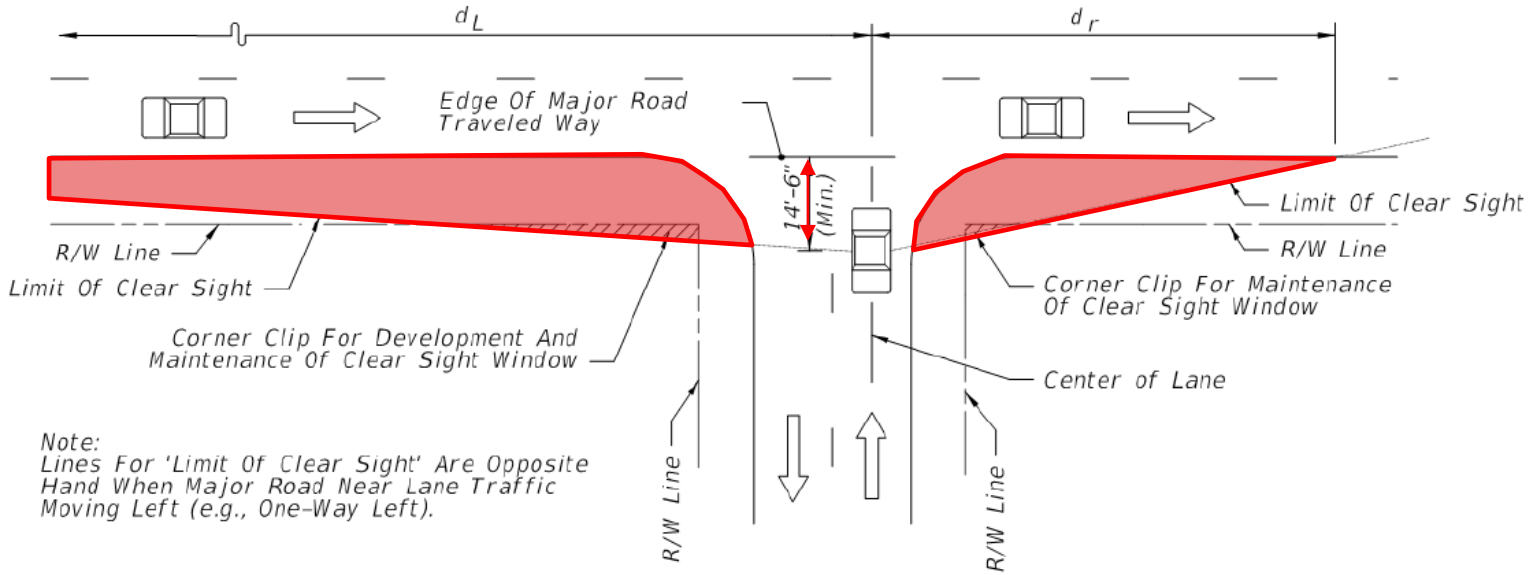
Stopping Sight Distance (SSD)

- SSD can be defined as the distance needed for drivers to see an object on the roadway ahead and bring their vehicles to a safe stop before colliding with the object.
- The various factors that affect stopping sight distance are the grade of the roadway and design speed which in turn determine the SSD for the roadway.
- When drivers require additional time to make decisions, larger distances may be necessary. The *AASHTO Green Book* states that:
  - *"…greater distances may be needed where drivers must make complex or instantaneous decisions, when information is difficult to perceive, or when unexpected or unusual maneuvers are needed."*

Grade (Percent)	Minimum Stopping Sight Distance (Feet)									
	Design Speed (MPH)									
	25	30	35	40	45	50	55	60	65	70
Downgrade/Upgrade (≤2%)	155	200	250	305	360	425	495	570	645	730

Intersection Sight Distance (ISD)

- ISD is defined as the distance necessary for drivers to safely approach and pass through an intersection."
- Intersection sight distances are important for medians and median openings, but more importantly for driveways, since they are treated as intersections.



Concerns at Driveways

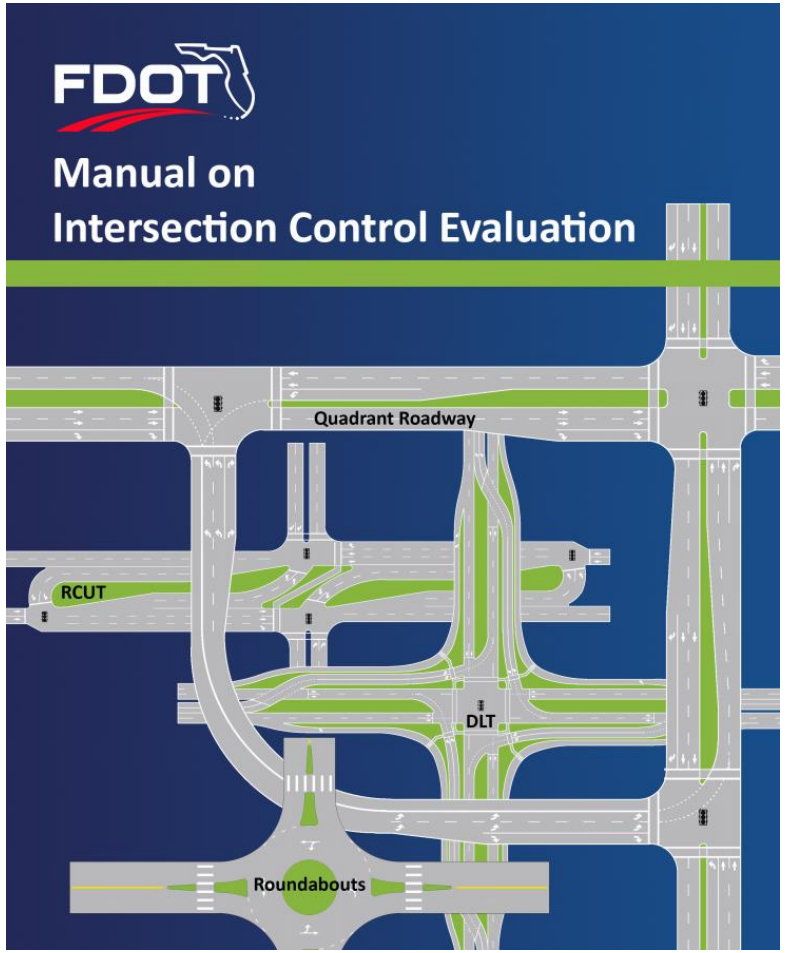
Integration Considerations

Intersection Control Evaluation Process

- The ICE process quantitatively evaluates several intersection control scenarios (alternatives) and ranks these alternatives based upon their operational and safety performance.

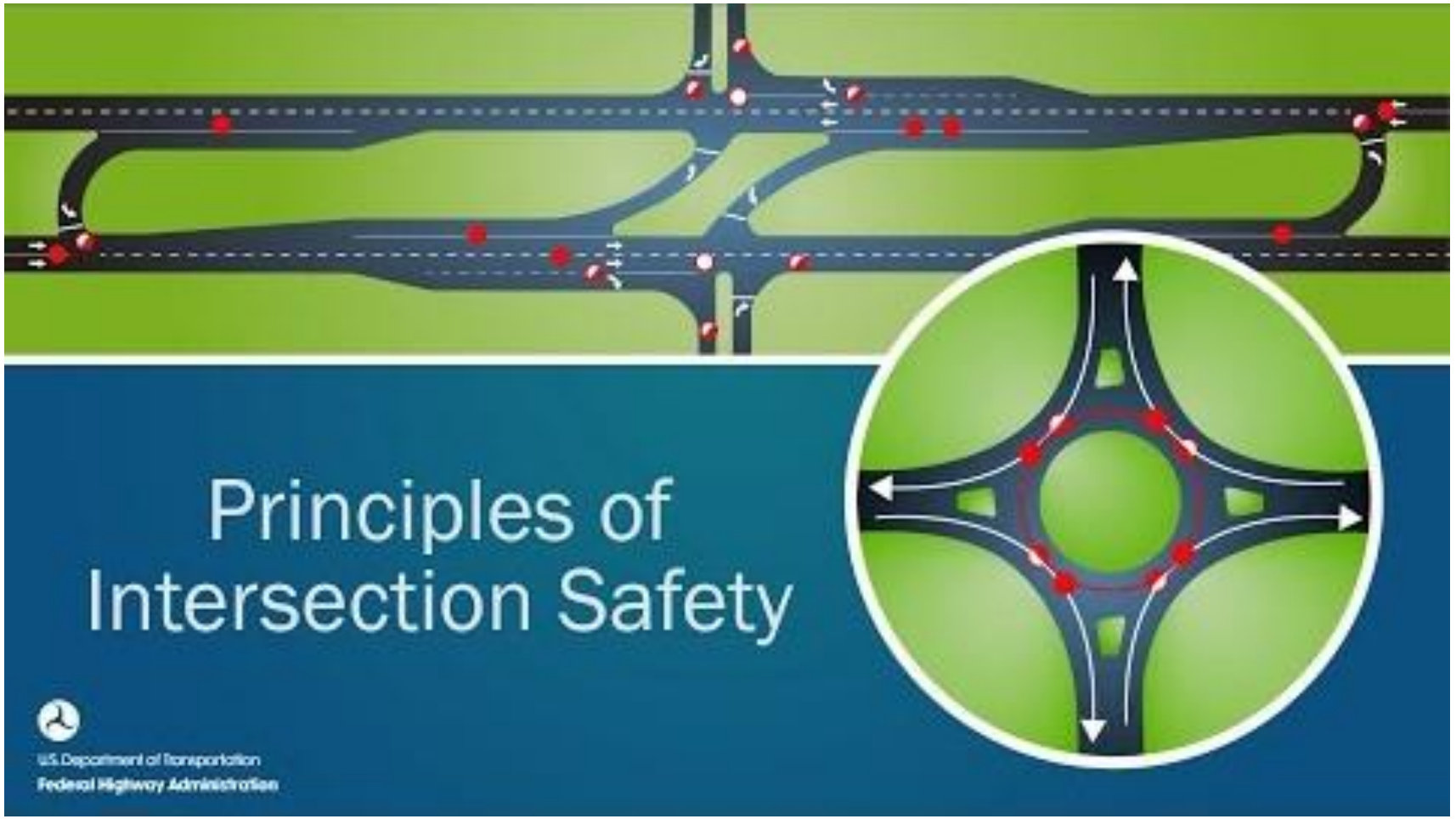
- Purpose of ICE is to consistently consider multiple context-sensitive control strategies when planning a new or modified intersection.

- *An ICE is required for:*
  - *a) New signal*
  - *b) Major reconstruction of an existing signalized intersection such as adding a left-turn lane for any approach;*
  - *c) Changing a directional or bi-directional median opening to a full median opening;*
  - *d) Driveway Connection permit applications for Category E, F, and G categories*
  - *e) Adding, removing, or modifying a traffic signal; or*
  - *f) District Design Engineer (DDE) and District Traffic Operations Engineer (DTOE) consider an ICE a good fit for the project.*



https://www.fdot.gov/traffic/trafficservices/intersection-operations.shtm

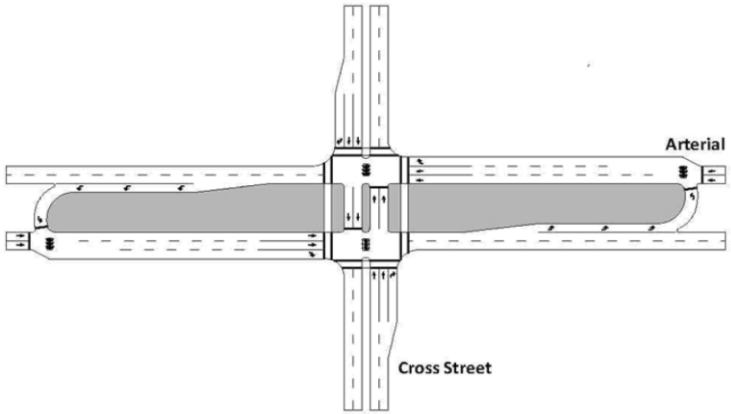
Innovative Intersection



Innovative Intersection

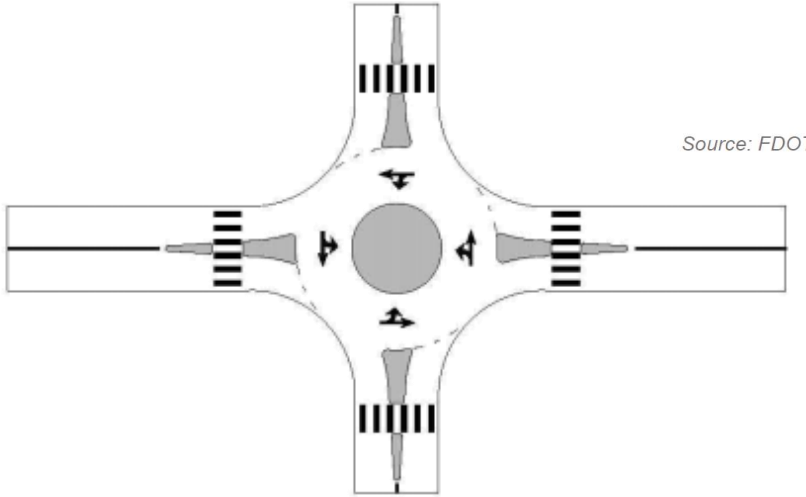
Alternative Intersections

Median U-Turn

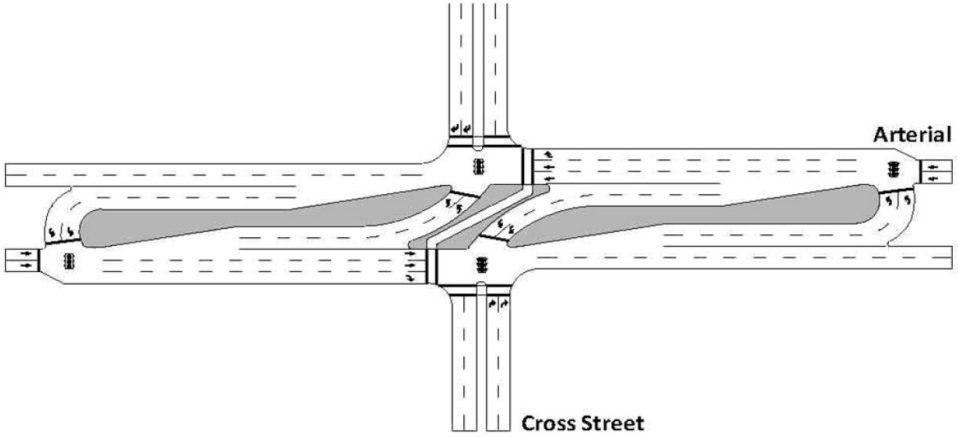


Source: FDOT ICE Manual

Roundabouts



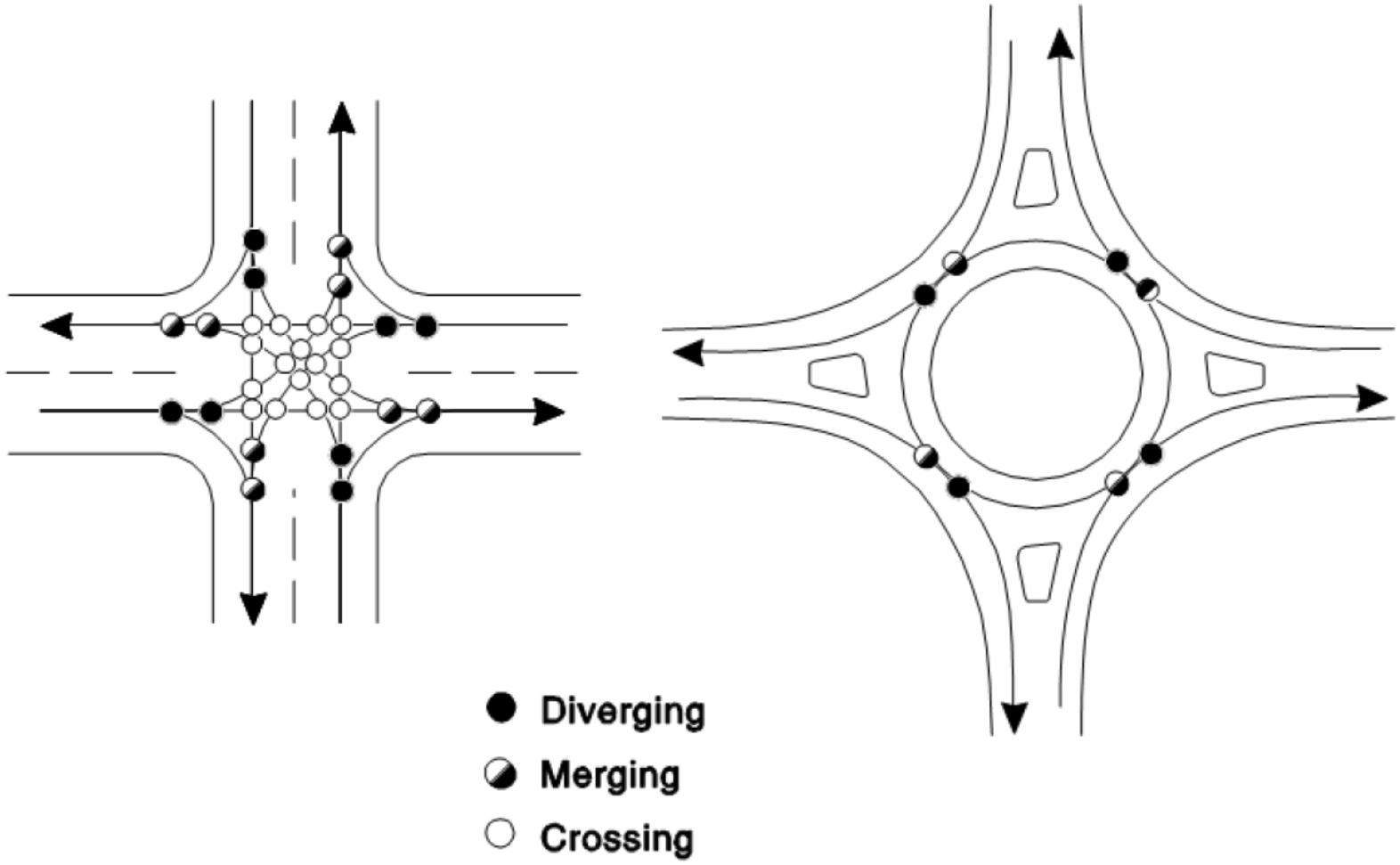
Signalized Restricted Crossing U-Turn (RCUT)



Source: FDOT ICE Manual

Roundabouts

- Decrease in number of conflicts (not a multilane roundabout)
- Increase safety for users by reducing the amount of serious injuries and fatalities by 79% when compare with a signalized intersection.



Source: NCHRP Report 672 (Figure 5-2)

Roundabouts

- *Guidance on Roundabout Category Comparisons*

Factor	Single lane	Multi-lane
Total Entering Traffic Volumes	Up to 25,000	Up to 45,000
Entry Speed	20 - 25 mph	25 - 30 mph
Typical Inscribed Circle Diameter	90 - 180 ft.	150 - 300 ft.

Source: Adapted from NCHRP 672

Roundabouts

- Geometric design of roundabouts reduces the speed of vehicles approaching, using, and exiting the roundabout.
- Considerations:
  - Good deflection at the entry of a roundabout
  - Truck Movements
  - Publics acceptance/awareness

Roundabouts

Non-Motorized Connections

- For design purposes, bicyclists are considered vehicles when traveling within the roadway.
- All users of the roadway benefit from improved safety and operations when conflict points are well managed as part of a comprehensive approach Medians have benefits for vehicular operations and pedestrians.
- Pedestrians are permitted to travel along all non-limited access facilities.
- Installing raised medians or pedestrian crossing islands can help improve safety.

Non-Motorized Connections | Safety Countermeasures

Medians and Pedestrian Refuge Islands Improve Pedestrian Midblock Crossings

- Nighttime Conditions
  - Raised medians and refuge islands provide a space to install improved lighting at pedestrian crossing locations.
  - Improved lighting has been shown to reduce the nighttime pedestrian fatalities at crossings by 78%.
- Delay Reduction
  - Raised medians and refuge also reduce the amount of delay incurred by pedestrians waiting for a gap in traffic to cross.

Non-Motorized Connections | Safety Countermeasures

Midblock Crossing Locations

- Consider medians or pedestrian crossing islands in curbed sections of urban and sub-urban multi-lane roadways.
  - Midblock areas
  - Approaches to multi-lane intersections
  - Areas near transit stops or other pedestrian focused sites
- Providing raised medians or pedestrian refuge areas at marked crosswalks has demonstrated a 46 and 56 percent reduction in pedestrian crashes, respectively

Non-Motorized Connections

Other important design considerations for pedestrian refuge islands:

- Include a vertical element (such as landscaping, bollard, or other) on pedestrian refuges to ensure visibility to motorists;
- Use the “z crossing” or angled crossing design for the pedestrian refuge to ensure that pedestrians are facing oncoming traffic

Non-Motorized Connections

Other important design considerations for pedestrian refuge islands:

- Include adequate lighting to ensure that crossing pedestrians are visible on the refuge and through the crosswalk

Roadway Classification	Illumination Level Average Initial Foot Candle		Illumination Uniformity Ratios	
Or Project Type	Horizontal (H.F.C.)	Vertical (V.F.C.)	Avg./Min.	Max./Min.
Midblock Crosswalk Lighting				
Low Ambient Luminance	N/A	2.3	N/A	N/A
Medium & High Ambient Luminance		3.0		
Sidewalks and Shared Use Paths				
Facilities Separated from the Roadway	2.5	N/A	4:1 or Less	10:1 or Less

Source: FDM 231 – Lighting (Table 231.2.1)

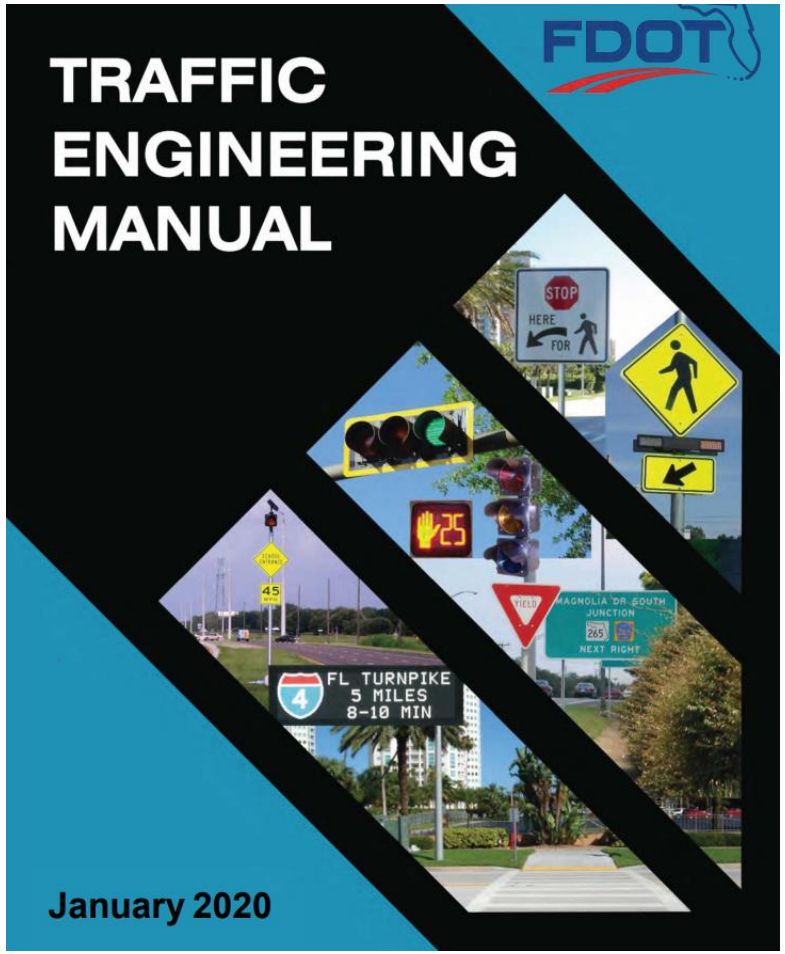
Non-Motorized Connections

- Installation Criteria for midblock crosswalks and refuge islands
  - FDOT Traffic Engineering Manual (TEM)

"Placement of midblock crosswalks should be based upon an identified need and not used indiscriminately. Important factors that should be considered when evaluating the need for a midblock crosswalk include:

- Proximity to significant generators
- Pedestrian demand
- Pedestrian-vehicle crash history
- Distance between crossing locations

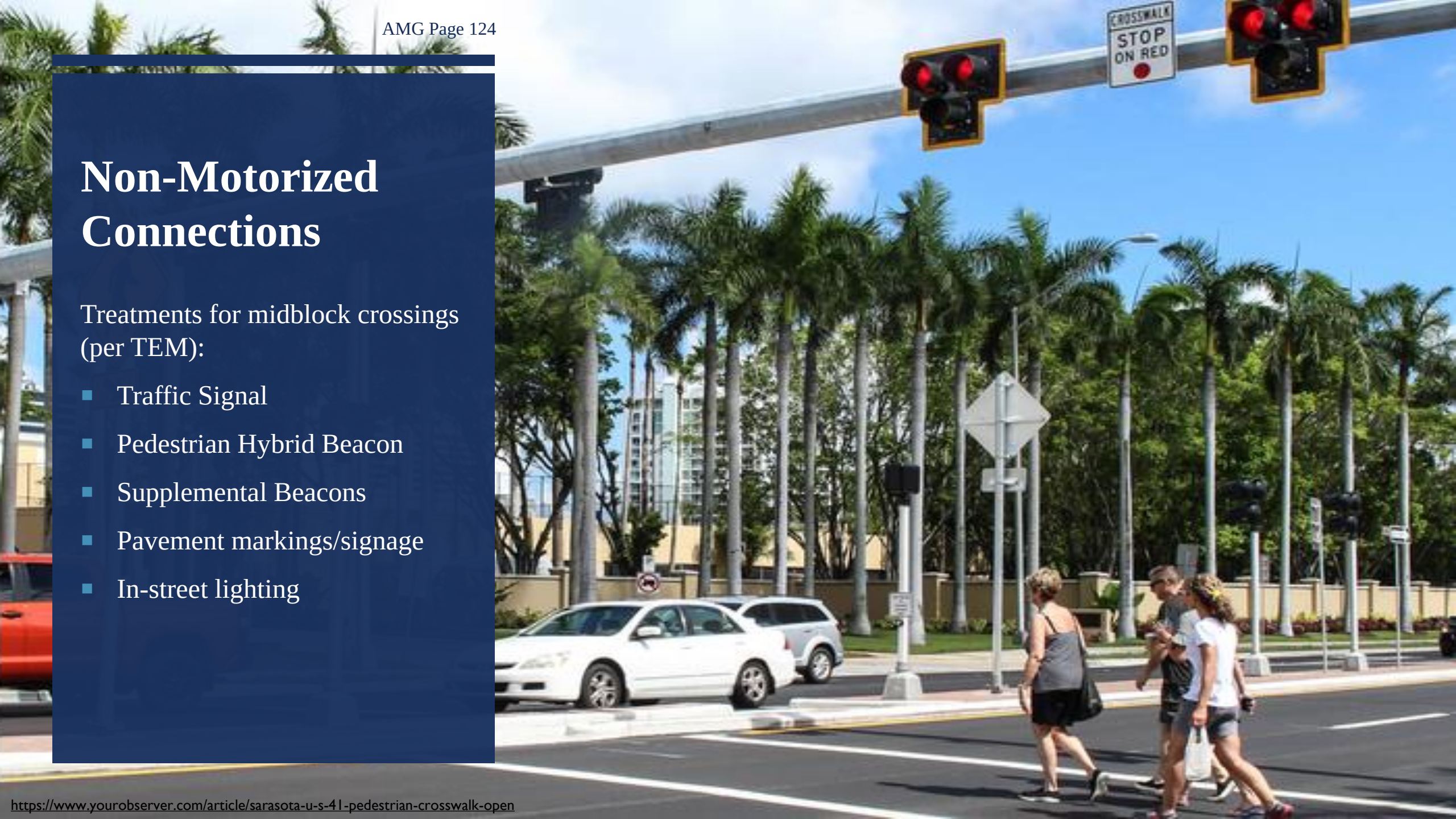
Any marked crosswalk proposed at an uncontrolled location across the SHS must be reviewed and approved by the District Traffic Operations Engineer prior to installation. A full engineering study documenting the need for a marked crosswalk based upon the location of significant generators, demand, crashes, and distances to nearest crossing locations provides the basis for the determination. Refer to the TEM Section 3.8 for detailed criteria for each facet of this evaluation."



Non-Motorized Connections

Treatments for midblock crossings (per TEM):

- Traffic Signal
- Pedestrian Hybrid Beacon
- Supplemental Beacons
- Pavement markings/signage
- In-street lighting



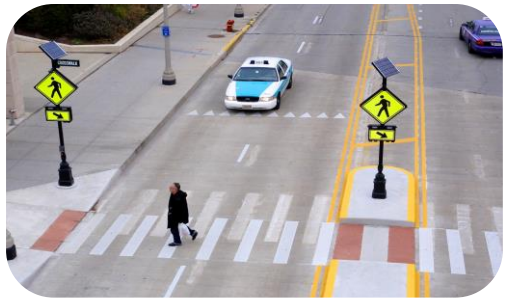
https://www.yourobserver.com/article/sarasota-u-s-41-pedestrian-crosswalk-open

Source: FHWA

Safe Transportation for Every Pedestrian (STEP)- Spectacular 7

Crosswalk Visibility Enhancements

Raised Crosswalks



Pedestrian Refuge Islands

Rectangular Rapid Flashing Beacon

Pedestrian Hybrid Beacon (PHB)

Road Diets

Leading Pedestrian Interval (LPI)

Source: FHWA

Safe Transportation for Every Pedestrian (STEP) | FHWA EDC-4

Benefits

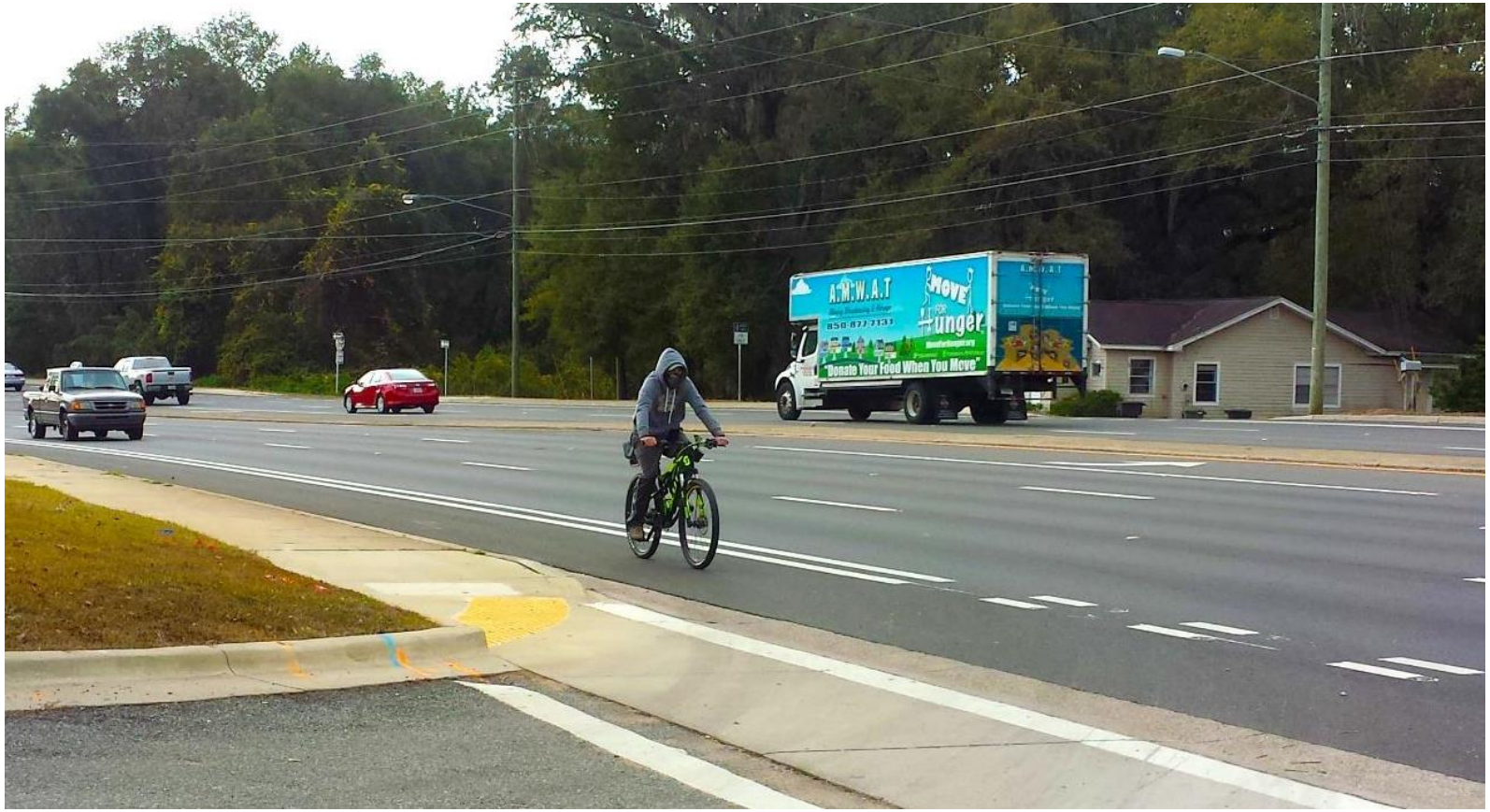
- **Improved Safety.** Countermeasures are available that offer proven solutions for reducing pedestrian fatalities at uncontrolled crossing locations.
- **Targeted Investment.** By focusing on uncontrolled locations, agencies can address a significant national pedestrian safety problem.
- **Enhanced Quality of Life.** Improving crossing opportunities boosts quality of life for pedestrians of all ages and abilities.

Source: FHWA

Safe Transportation for Every Pedestrian (STEP)

Large Vehicle and Freight Considerations

- Deliveries and truck parking behind facilities, or
- Have a specific area and allow deliveries during certain periods of the day
- Industrial areas
  - Redirect trucks off these roadways or move the bike lanes to a different facility
  - Utilize buffered bike lanes to separate the traffic from one another



Large Vehicle and Freight Considerations

Transit Vehicle Considerations

- Bus stop locations can have a major impact on the operations and visibility of driveways
- If a poorly positioned driveway cannot be moved, work with the local transit authority to possibly move the bus stop to avoid any potential safety issues

What to consider when locating a driveway near to a bust stop:

- The bus operator must be able to see the vehicles entering and exiting the driveway
- The bus operator and those entering and exiting the driveway should be able to see transit patrons
- The people using the driveway should have sufficient sight distance to see oncoming buses and traffic

Transit Vehicle Considerations

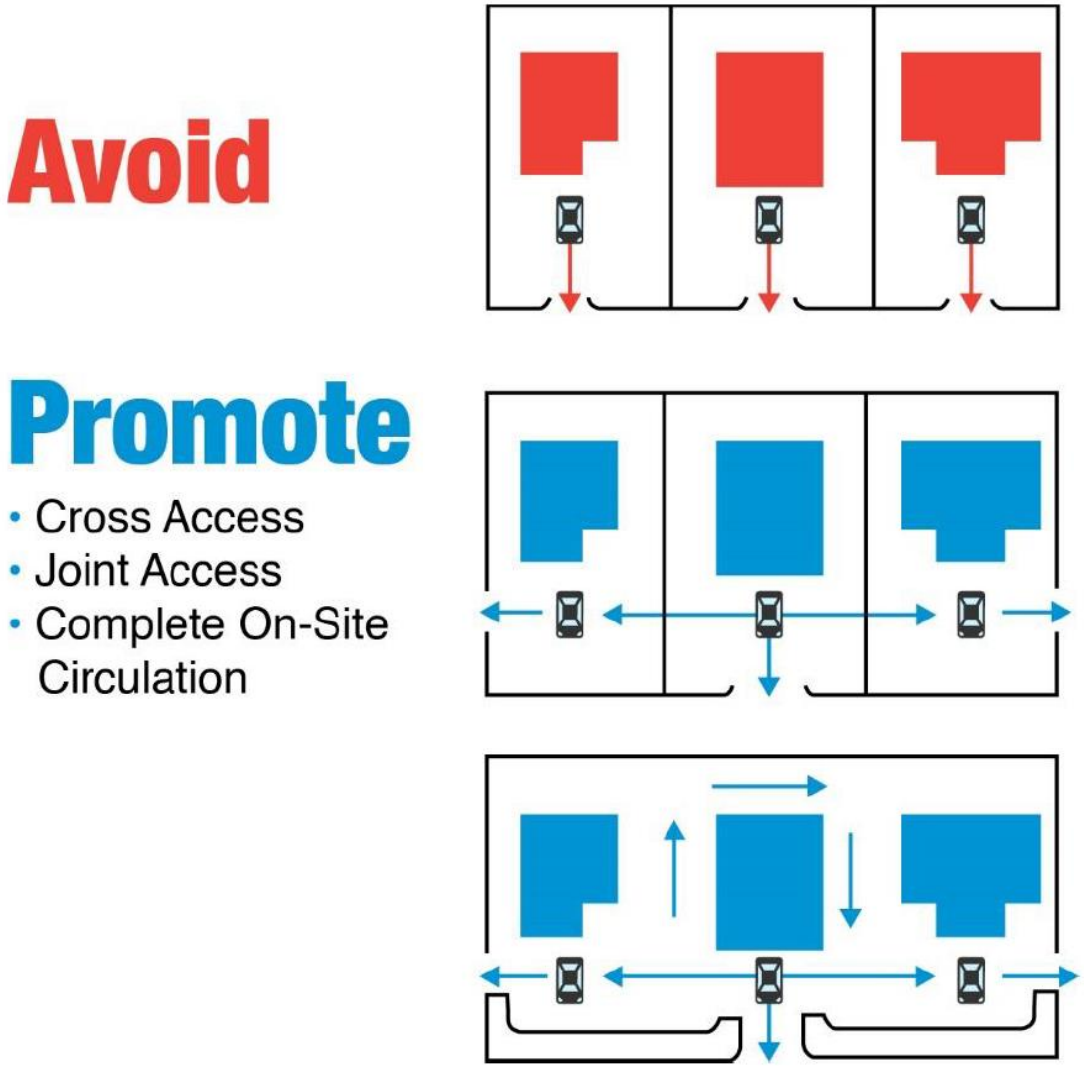
- Transit stops should be located a minimum of 200 feet away from any existing driveway when at all possible
- It recommends that if blocking a driveway cannot be prevented, at least one entrance and exit to a property should remain open while a bus is loading or unloading
- Bus shelters on the median are prohibited in Florida except when maintained by bus rapid transit providers using an inside lane for passenger transport.
- Sight distances for buses

Source: FDOT Accessing Transit 2013 (Figure 4.2.4)

Shared Driveways and Internal Site Connections

Benefits

- The first minimizes the number of driveways on the arterial road
- The second is providing cross access between properties broadens the access choices for the driver



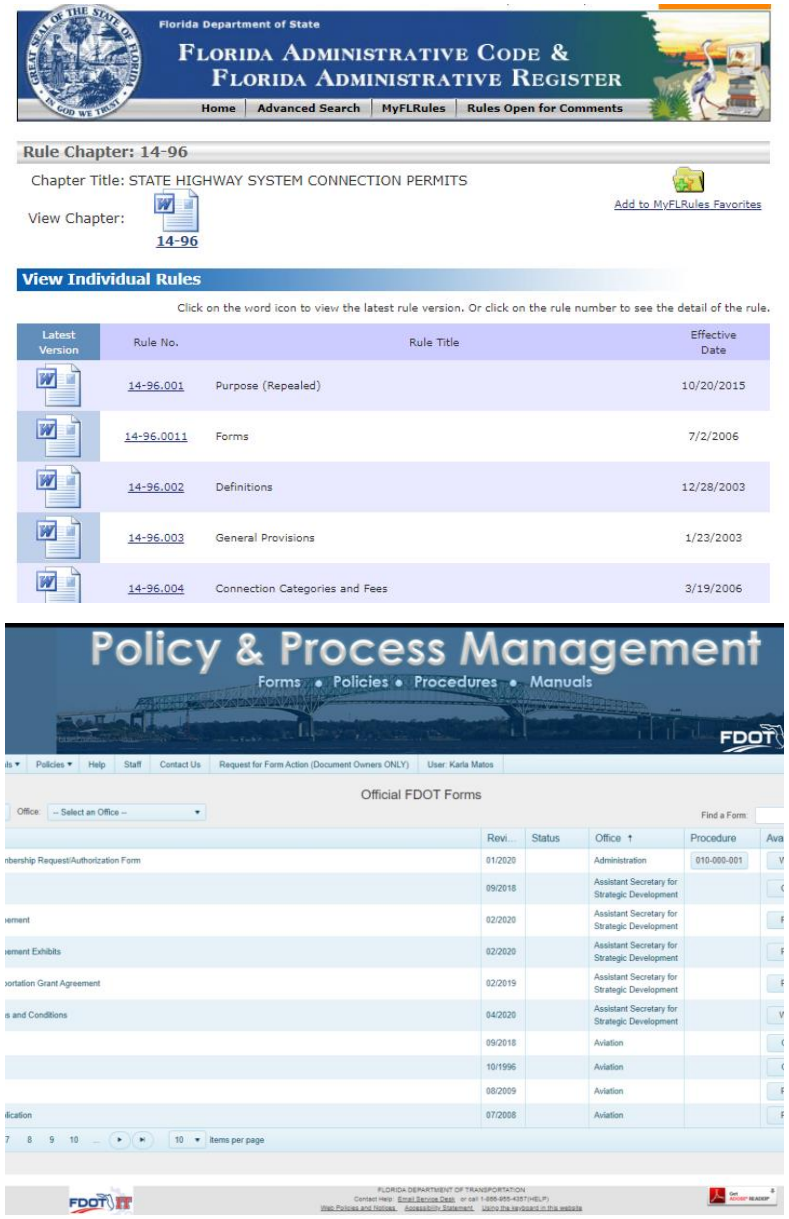
Source: "Managing Corridor Development, A Municipal Handbook", Center for Urban Transportation Research, University of South Florida, October 1996. Williams, Kristine M. and Marshall, Margaret A.

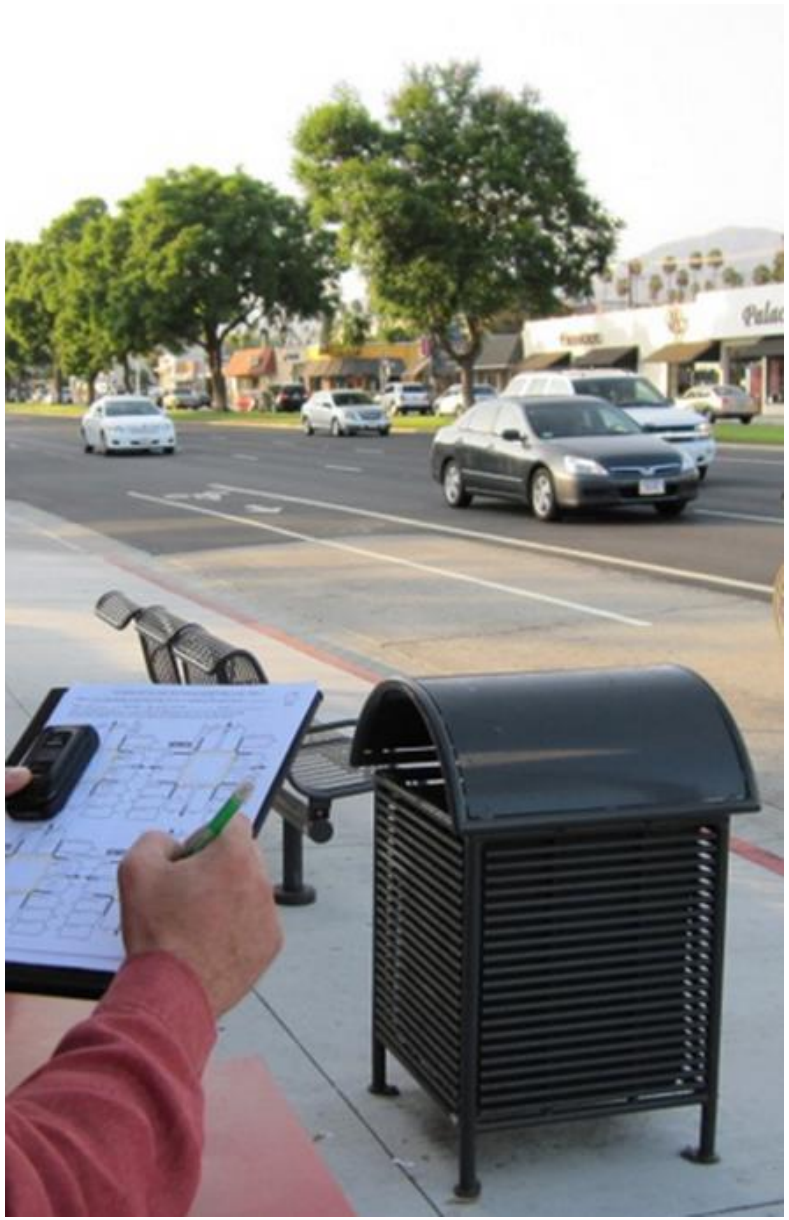
Permitting and Public Involvement

Permitting

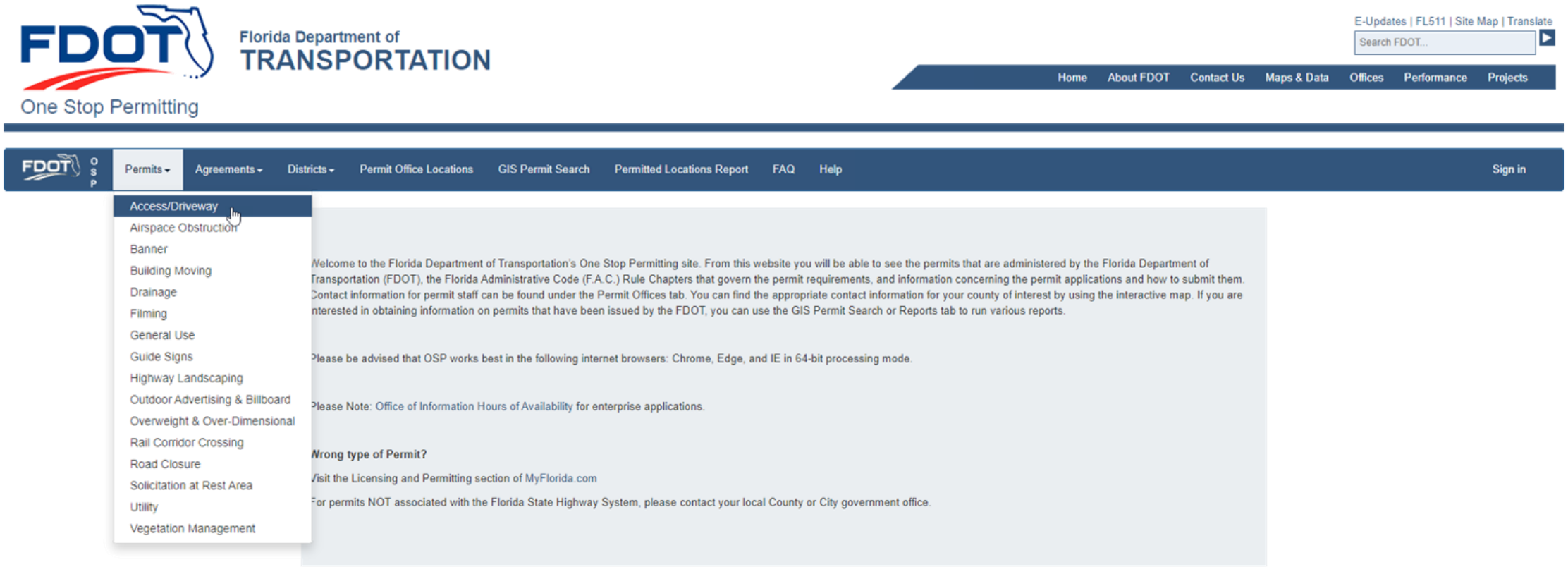
Resources

- FDOT One Stop Permitting Website
- Form 850-040-18 Driveway/Connection Permit for all Categories
- Rule 14-96 State Highway System Connection Permits

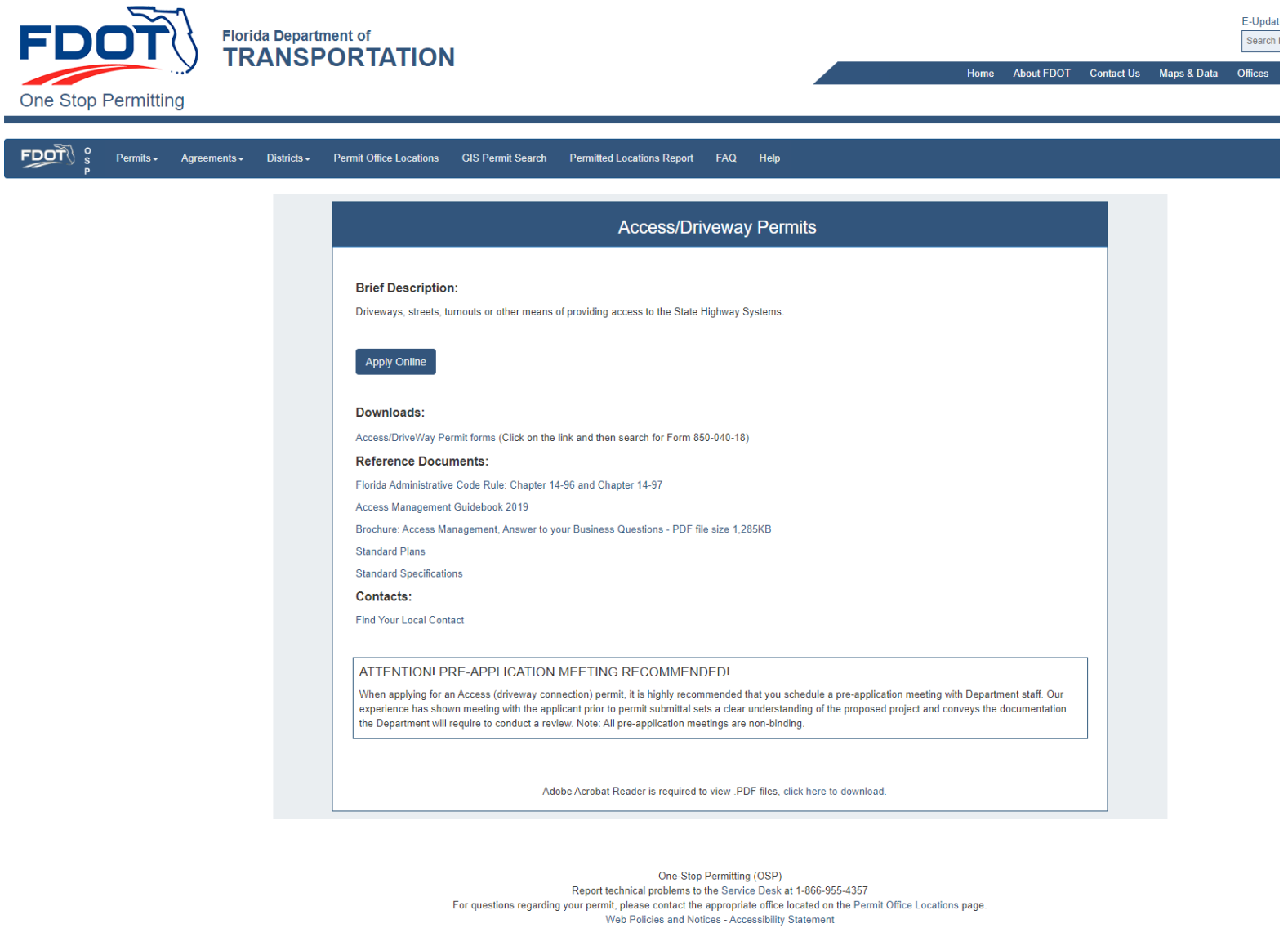




FDOT One Stop Permitting



https://osp.fdot.gov/



FDOT One Stop Permitting

Driveway Permit Contacts in Your County

Statewide

Permit	Office Name	Address	City	State	Zip	Phone	Counties Served
Vegetation Management	Office of Right of Way	605 Suwannee Street, MS 22	Tallahassee	FL	32399	850/414-4545	Statewide
Rail Corridor Crossing Permit	Rail Office	605 Suwannee Street, MS 22	Tallahassee	FL	32399	850/414-4500	Statewide
Outdoor Advertising/Billboards	Office of Right of Way	605 Suwannee Street, MS 22	Tallahassee	FL	32399	850/414-4545	Statewide
Airspace Obstruction	Aviation Office	605 Suwannee Street, MS 46	Tallahassee	FL	32399	850/414-4500	Statewide

Southwest Region

Office Name	Address	City	State	Zip	Phone	Counties Served
Bartow Operations Center	2740 State Road 60	Bartow	FL	33830	863/519-4300	Polk
Ft. Myers Operations Center	2981 Pine Island Road	Cape Coral	FL	33909	239/985-7800	Lee Charlotte Collier
Heartland Operations Center						
Arcadia Field Office	1190 West Oak Street	Arcadia	FL	34265	863/491-1818	DeSoto Hardee
Labelle Field Office	880 West Cowboy Way	Labelle	FL	33935	863/612-4646	Hendry Glades

https://osp.fdot.gov/#/ContentPage/34cdcb08-87d9-4132-a9c3-a7080112c95a

Form 850-040-18 Driveway/Connection Permit for All Categories

Rule 14-96, F.A.C.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
DRIVEWAY/CONNECTION PERMIT
FOR ALL CATEGORIES

850-040-18
SYSTEMS PLANNING
06/06
Page 1 of 3

PART 1: PERMIT INFORMATION

Application Number: _____

Permit Category: _____ Access Classification: _____

Project: _____

Permittee: _____

Section/Mile Post: _____ State Road: _____

Section/Mile Post: _____ State Road: _____

PART 2: PERMITTEE INFORMATION

Permittee Name: _____

Permittee Mailing Address: _____

City, State, Zip: _____

Telephone: _____

Engineer/Consultant/or Project Manager: _____

Engineer responsible for construction inspection: _____
NAME P.E. #

Mailing Address: _____

City, State, Zip: _____

Telephone: _____ Mobile Phone: _____

PART 3: PERMIT APPROVAL

The above application has been reviewed and is hereby approved subject to all Provisions as attached.

Permit Number: _____
Department of Transportation

Signature: _____ Title: _____

Department Representative's Name: _____

Temporary Permit: ☐ YES ☐ NO (If temporary, this permit is only valid for 6 months)

Special provisions attached: ☐ YES ☐ NO

Date of Issuance: _____

If this is a normal (non-temporary) permit it authorizes construction for one year from the date of issuance. This can only be extended by the Department as specific in 14-96.007(6).

See following pages for General and Special Provisions

Rule 14-96, F.A.C.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
DRIVEWAY/CONNECTION PERMIT
FOR ALL CATEGORIES

850-040-18
SYSTEMS PLANNING
06/06
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PART 4: GENERAL PROVISIONS

1. Notify the Department of Transportation Maintenance Office at least 48 hours in advance of starting proposed work.

   Phone: _____, Attention: _____

2. A copy of the approved permit must be displayed in a prominent location in the immediate vicinity of the connection of construction.
3. Comply with Rule 14-96.008(1), F.A.C., Disruption of Traffic.
4. Comply with Rule 14-96.008(7), F.A.C., on Utility Notification Requirements.
5. All work performed in the Department's right of way shall be done in accordance with the most current Department standards, specifications and the permit provisions.
6. The permittee shall not commence use of the connection prior to a final inspection and acceptance by the Department.
7. Comply with Rule 14-96.003(3)(a), F.A.C., Cost of Construction.
8. If a Significant Change of the permittee's land use, as defined in Section 335.182, Florida Statutes, occurs, the Permittee must contact the Department.
9. Medians may be added and median openings may be changed by the Department as part of a Construction Project or Safety Project. The provision for a median might change the operation of the connection to be for right turns only.
10. All conditions in NOTICE OF INTENT WILL APPLY unless specifically changed by the Department.
11. All approved connection(s) and turning movements are subject to the Department's continuing authority to modify such connection(s) or turning movements in order to protect safety and traffic operations on the state highway or State Highway System.
12. **Transportation Control Features and Devices in the State Right of Way.** Transportation control features and devices in the Department's right of way, including, but not limited to, traffic signals, medians, median openings, or any other transportation control features or devices in the state right of way, are operational and safety characteristics of the State Highway and are not means of access. The Department may install, remove or modify any present or future transportation control feature or device in the state right of way to make changes to promote safety in the right of way or efficient traffic operations on the highway.
13. The Permittee for him/herself, his/her heirs, his/her assigns and successors in interest, binds and is bound and obligated to save and hold the State of Florida, and the Department, its agents and employees harmless from any and all damages, claims, expense, or injuries arising out of any act, neglect, or omission by the applicant, his/her heirs, assigns and successors in interest that may occur by reason of this facility design, construction, maintenance, or continuing existence of the connection facility, except that the applicant shall not be liable under this provision for damages arising from the sole negligence of the Department.
14. The Permittee shall be responsible for determining and notify all other users of the right of way.
15. Starting work on the State Right of Way means that I am accepting all conditions on the Permit.

Rule 14-96, F.A.C.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
DRIVEWAY/CONNECTION PERMIT
FOR ALL CATEGORIES

850-040-18
SYSTEMS PLANNING
06/06
Page 3 of 3

PART 5: SPECIAL PROVISIONS

NON-CONFORMING CONNECTIONS: ☐ YES ☐ NO

If this is a non-conforming connection permit, as defined in Rule Chapters 14-96 and 14-97, then the following shall be a part of this permit.

1. The non-conforming connection(s) described in this permit is (are) not permitted for traffic volumes exceeding the Permit Category on page 1 of this permit, or as specified in "Other Special Provisions" below.
2. All non-conforming connections will be subject to closure or relocation when reasonable access becomes available in the future.

OTHER SPECIAL PROVISIONS:

PART 6: APPEAL PROCEDURES

You may petition for an administrative hearing pursuant to sections 120.569 and 120.57, Florida Statutes. If you dispute the facts stated in the foregoing Notice of Intended Department Action (hereinafter Notice), you may petition for a formal administrative hearing pursuant to section 120.57(1), Florida Statutes. If you agree with the facts stated in the Notice, you may petition for an informal administrative hearing pursuant to section 120.57(2), Florida Statutes. You must file the petition with:

Clerk of Agency Proceedings
Department of Transportation
Haydon Burns Building
605 Suwannee Street, M.S. 58
Tallahassee, Florida 32399-0458

The petition for an administrative hearing must conform to the requirements of Rule 28-106.201(2) or Rule 28-106.301(2), Florida Administrative Code, and be filed with the Clerk of Agency Proceedings by 5:00 p.m. no later than 21 days after you received the Notice. The petition must include a copy of the Notice, be legible, on 8 1/2 by 11 inch white paper, and contain:

1. Your name, address, telephone number, any Department of Transportation identifying number on the Notice, if known, the name and identification number of each agency affected, if known, and the name, address, and telephone number of your representative, if any, which shall be the address for service purposes during the course of the proceeding.
2. An explanation of how your substantial interests will be affected by the action described in the Notice;
3. A statement of when and how you received the Notice;
4. A statement of all disputed issues of material fact. If there are none, you must so indicate;
5. A concise statement of the ultimate facts alleged, including the specific facts you contend warrant reversal or modification of the agency's proposed action, as well as an explanation of how the alleged facts relate to the specific rules and statutes you contend require reversal or modification of the agency's proposed action;
6. A statement of the relief sought, stating precisely the desired action you wish the agency to take in respect to the agency's proposed action.

If there are disputed issues of material fact a formal hearing will be held, where you may present evidence and argument on all issues involved and conduct cross-examination. If there are no disputed issues of material fact an informal hearing will be held, where you may present evidence or a written statement for consideration by the Department.

Mediation, pursuant to section 120.573, Florida Statutes, may be available if agreed to by all parties, and on such terms as may be agreed upon by all parties. The right to an administrative hearing is not affected when mediation does not result in a settlement.

Your petition for an administrative hearing shall be dismissed if it is not in substantial compliance with the above requirements of Rule 28-106.201(2) or Rule 28-106.301(2), Florida Administrative Code. If you fail to timely file your petition in accordance with the above requirements, you will have waived your right to have the intended action reviewed pursuant to chapter 120, Florida Statutes, and the action set forth in the Notice shall be conclusive and final.

Public Involvement | 335.199 F.S.

Whenever the Department of Transportation proposes any project on the State Highway System which will divide a state highway, erect median barriers modifying currently available vehicle turning movements, or have the effect of closing or modifying an existing access to an abutting property owner, the Department shall notify all affected property owners, municipalities, and counties at least 180 days before the design of the project is finalized. The Department's notice shall provide a written explanation regarding the need for the project and indicate that all affected parties will be given an opportunity to provide comments to the department regarding potential impacts of the change.

Effective November 17, 2010

Public Involvement | 335.199 F.S.

Requirements:

- Notify, in writing, the Chief Elected Official for the City and/or County as well as property owners
- Consult with local government
- At least one public hearing (advertised and recorded)
- Review and consider all comments

Public Involvement | F.A.C. Rule Chapter 14-96.003

Connection permits authorize the initiation of construction of connections within Department right of way and the maintenance of connection(s) according to the permit provisions and adopted department standards. It is the responsibility of the applicant or permittee to obtain any other local permits or other agency approvals that may be required before the initiation of the connection construction. No person may construct, relocate, or alter a connection without first obtaining a connection permit from the Department, as provided in this rule chapter, regardless of governmental entity permits and approvals.

Contact Information

Gina Bonyani
Senior Transportation Planner
Gina.Bonyani@dot.state.fl.us
850-414-4707

Jenna Bowman, PE
Systems Management Administrator
Jenna.Bowman@dot.state.fl.us
850-414-4909