



Complete Streets Access Management & Site Impact Implications

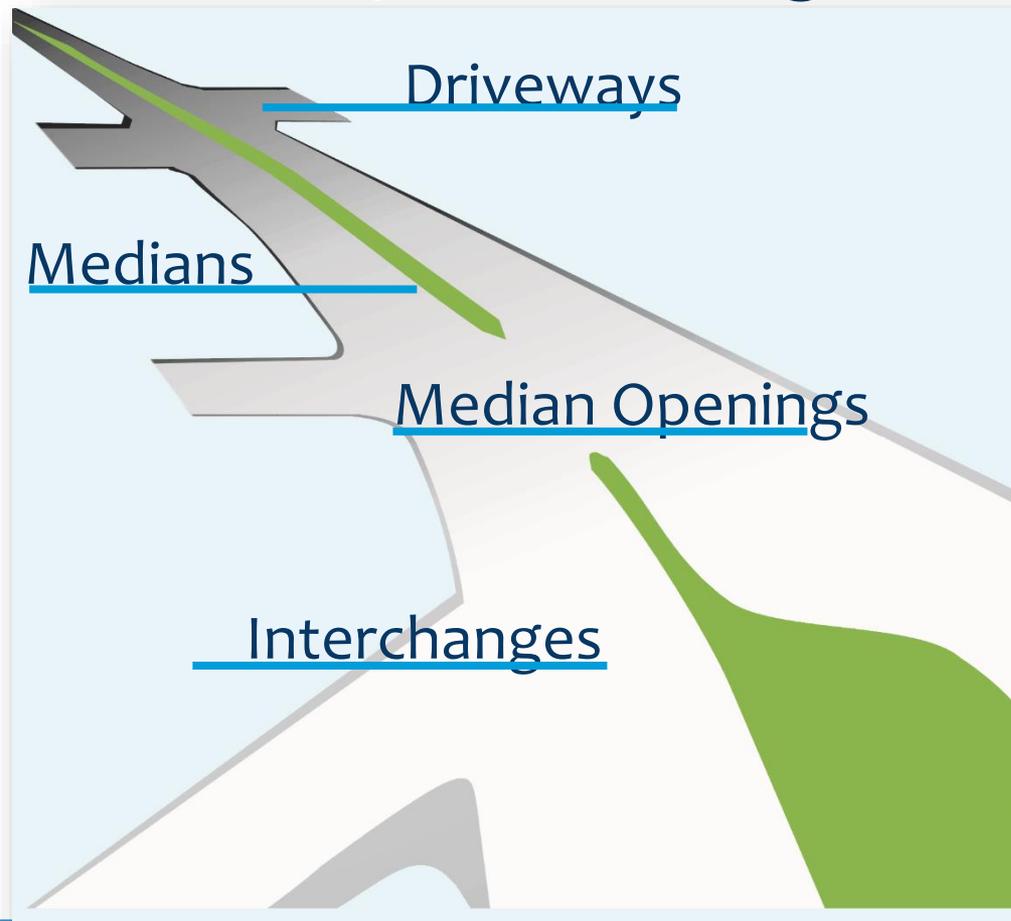
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Florida Dept. of Transportation – Florida Highway Systems Management Tallahassee, Florida 32399 USA

Web: [Systems Management](#) | [Access Management](#) | [Systems Management Training](#)

Defining Access Management

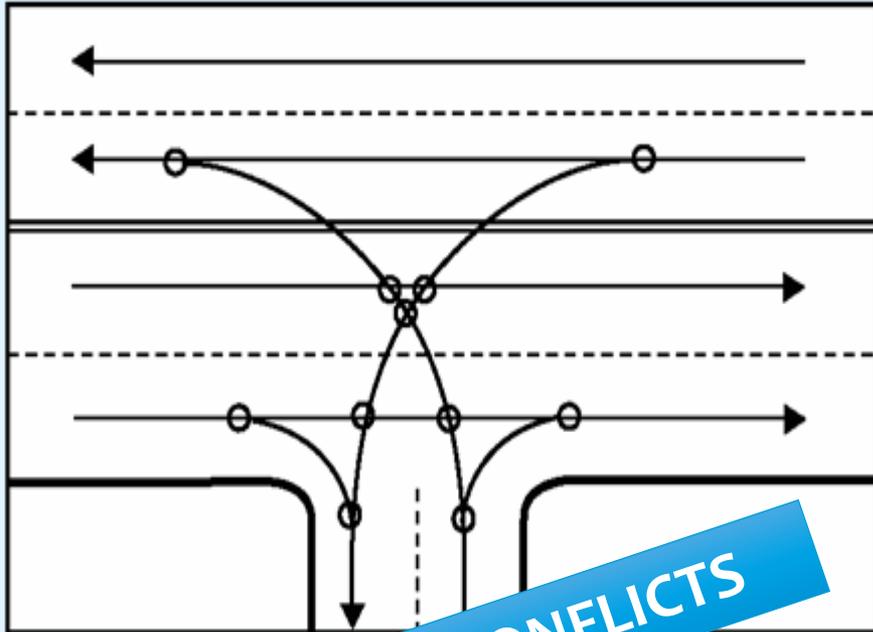
Access management is the careful planning of the location, type and design of access.



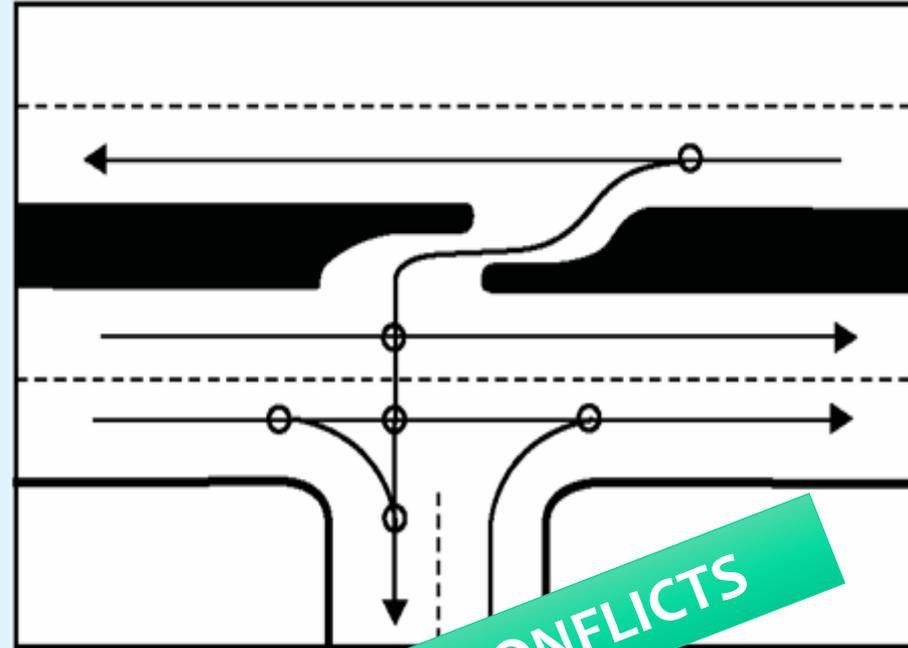
Why We Care So Much

More **conflicts** means more **crashes**

Before Access Management



After Access Management



We didn't just make this stuff
up
*Safety is the Prime Reason for Access
Management*

What Are Complete Streets?

- **Context Appropriate Streets**
 - Some roads are for high speed
 - *But that does not negate the need to serve pedestrians and transit users*

Who are the users of the roadway/right-of-way?

Employers



Institutional (schools, churches, etc.)



Elderly



Retailers



Residents



Children



Alt. Motorized Transp.



Freight



Bicyclist



Pedestrian



Disabled



Emergency Vehicles



Motorist



Transit user



COMPLETE STREETS IMPLEMENTATION PLAN

M2D2: Multimodal Development and Delivery

December 2015



The Florida Department of Transportation and Smart Growth America



Link:
<http://www.flcompletestreets.com/Files/FINAL-CSI-Implementation-Plan.pdf>



Smart Growth America
Making Neighborhoods Great Together



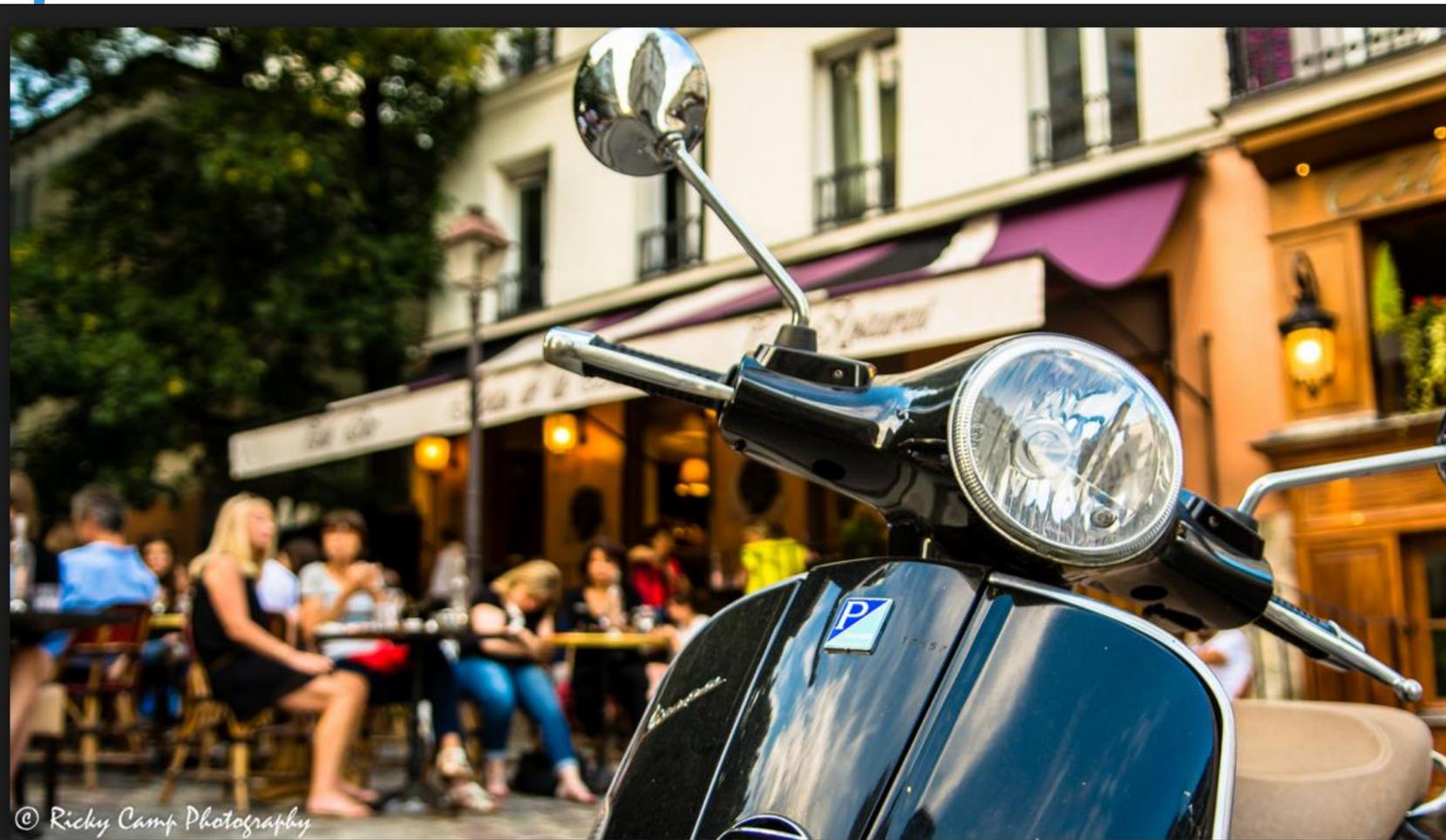
Convincing Our Profession

Much more than sidewalk cafes on state highways



convince
me

Boulevard Street Scene



© Ricky Camp Photography

It Does Not Mean Every Road has Bike Lane



SR 40 Ormond Beach, FL

Does Not Mean bike lanes on every street?

130 US-27
Tallahassee, Florida
Street View - Sep 2014

Monroe St. Tallahassee

Perhaps
Sharrow

Conflict with
opening car
doors



Slowing Traffic is NOT Appropriate on All Highways

- Needs to have the right conditions
- Prevailing speeds
- Prevailing traffic type
- Be supported by local governments
- *However slowing speeds does not always lead to noticeable decreased travel time, especially on regional trips*

Current Study **Spoiler Alert** Possible Changes to Access Management Practice

- Remove or revise signal spacing from standards
 - Grid/Block size
- Revise driveway design standards to better serve to pedestrians, cyclists and transit users
 - Curb Radius
 - Harmony with sidewalks
- Change administrative rule to include safe pedestrian access as a necessity
- More context based access management

Current Study Spoiler Alert

Possible Changes to Access Management Practices

- Remove or revise signal spacing from standards
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 - Curb Radius
 - Harmony with sidewalks
- Change administrative rule to include safe pedestrian access as a necessity
- Context based access management decisions

**Faster and Longer
- Not Always Better**

The Push and Pull Of Philosophies

Speed & Efficiency can conflict with safety

Is Access Management the Enemy?

By Dom Nozzi

“Access Management- was touted strongly — to the detriment of pedestrians, bicyclists, transit users and overall quality of life”

Source: <https://domz60.wordpress.com/2010/07/06/access-management-for-bikes-and-peds/>



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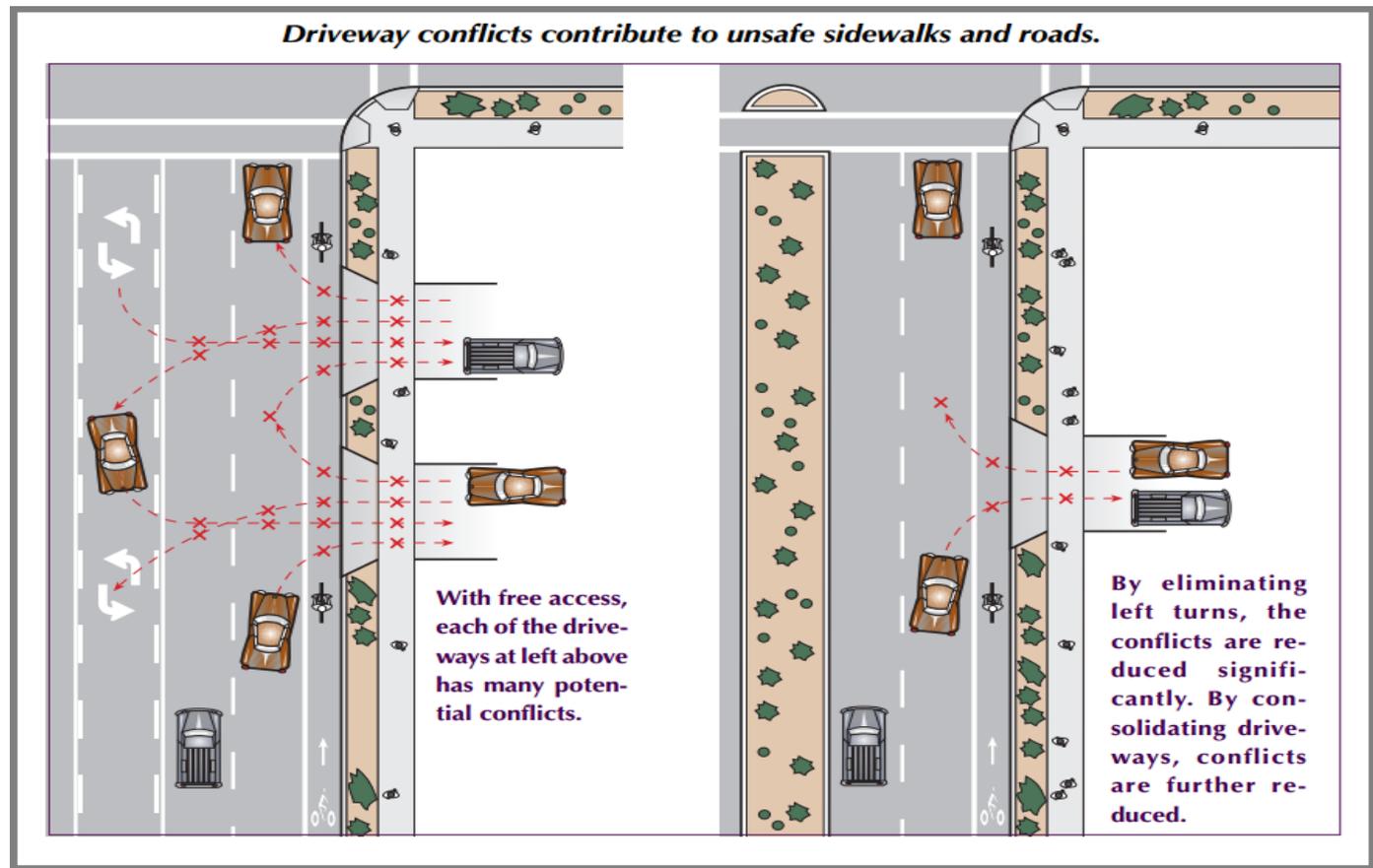
Access Management is NOT the Enemy

Striving to Reduce Driveway and Pedestrian Conflict



Source: Sprinkle Engineers

Driveways and Pedestrian Conflict



Effects of access management on bicycle and pedestrian exposure to crashes

Traditional Goals of Access Management

Reduced
vehicle
conflict

**Favoring
higher Speed**



Our New Job

Managing
Modal
Conflicts

Separating
Conflict
Points

Auto



Pedestrian



Transit

Bike



Downtowns are Usually Access Management Friendly



Much of the access to parking is off the side streets

Driveways not common features

GOOD NEWS!

Small Towns Can Be Access Management Friendly



On Wide Florida Roads, Running for Dear Life



Chip Litherland for The New York Times

A pedestrian walked across Semoran Boulevard in Orlando last week. Some cars and trucks whiz by on the six-lane state road at 60 miles per hour, 15 m.p.h. above the speed limit.

By LIZETTE ALVAREZ

Published: August 15, 2011

ORLANDO, Fla. — As any pedestrian in Florida knows, walking in this car-obsessed state can be as tranquil as golfing in a lightning storm. Sidewalks are viewed as perks, not necessities. Crosswalks are disliked and dishonored. And many drivers maniacally speed up when they see someone crossing the street.

- RECOMMEND
- TWITTER
- SIGN IN TO E-MAIL
- PRINT

The New York Times



Chip Litherland for The New York Times

A pedestrian bolts across Semoran Boulevard in Orlando, Fla.

Multimedia



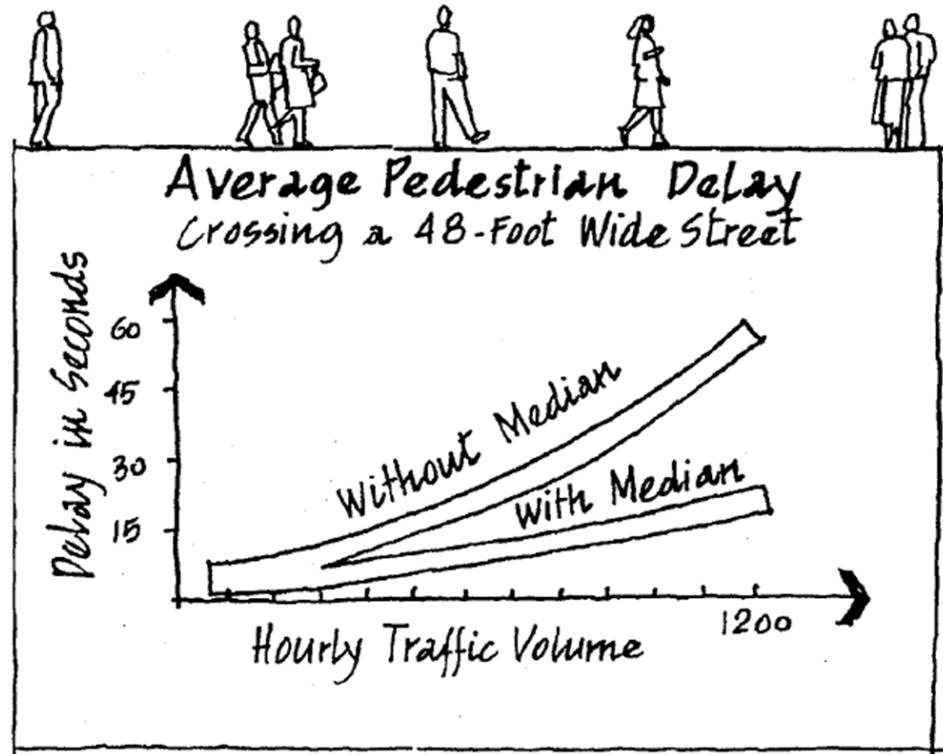
Graphic

The Most Dangerous Cities for Walking

Close Window

Pedestrian Crossing Delay on a 4-Lane Street with and without a Median

Restrictive Medians Have Been Saving Lives (and patience) for Years



Source: Adapted from S.A. Smith, *Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas*, National Cooperative Highway Research Program Report 294A, Transportation Research Board, Washington, D.C., 1987, p. 62.

Fruitville Rd, Sarasota County

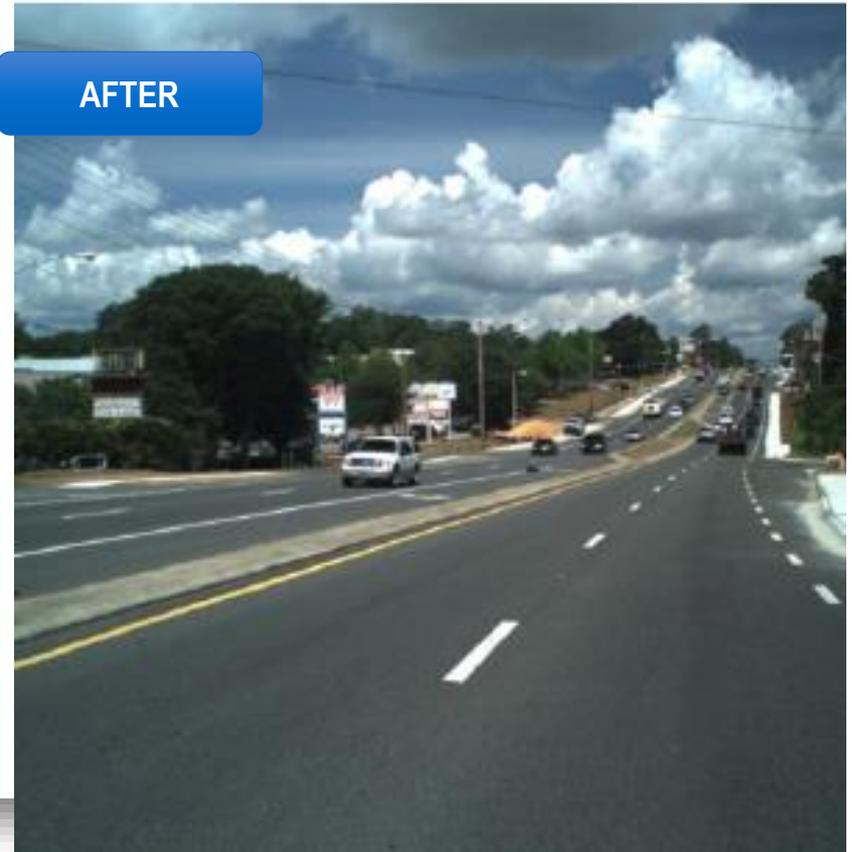
(RDW ID: 17040000; MP: 3.754)



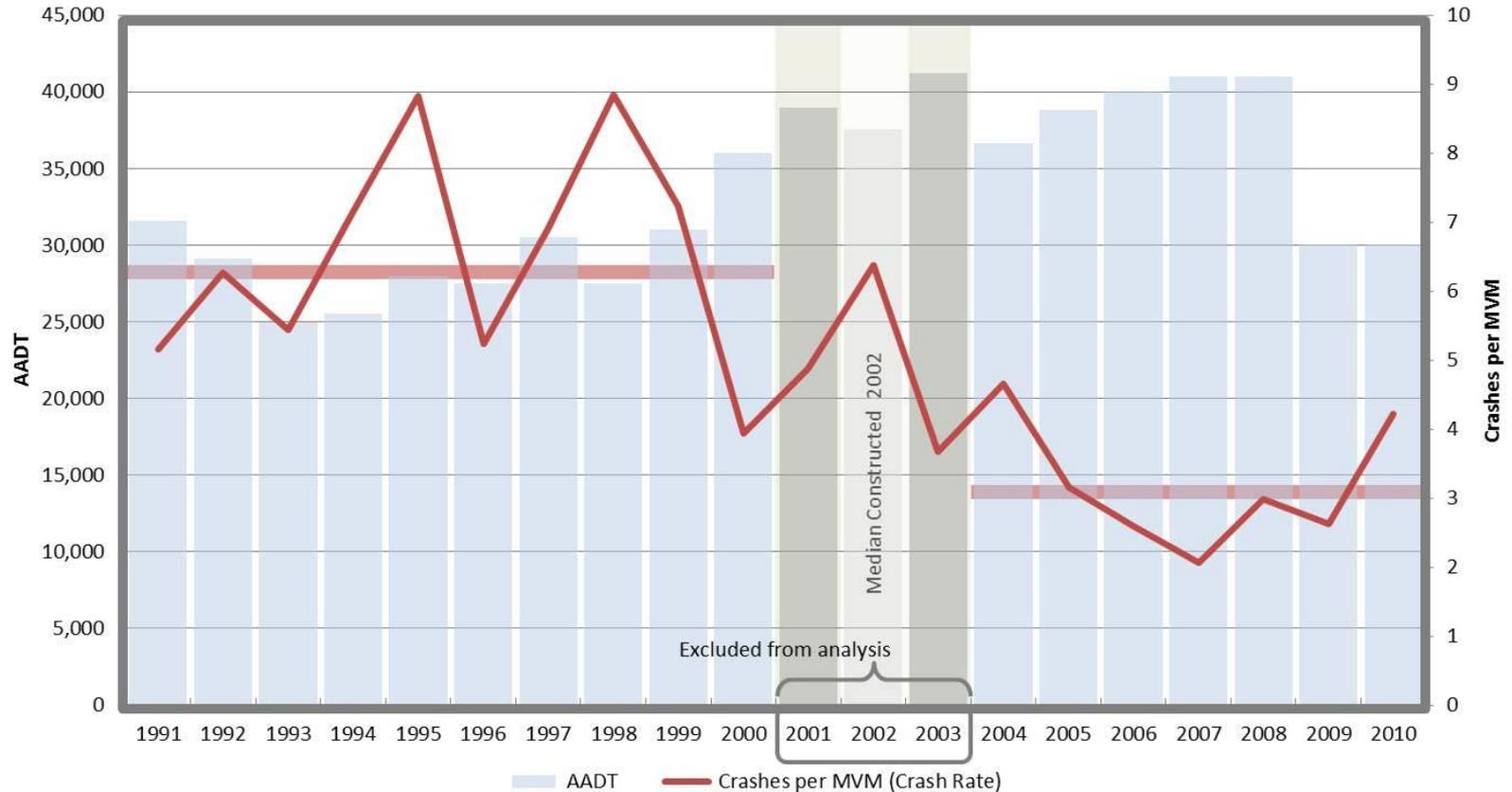
Study by Albert Gan/Priyanka Alluri Florida International University

- Head-on
- Rear-end
- Left-turn
- Angle
- Bike/Ped
- Others

Apalachee Parkway Before and After Study 2012



Apalachee Parkway Safety Study



NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT **279**

INTERSECTION CHANNELIZATION DESIGN GUIDE

TIMOTHY R. NEUMAN
Jack E. Lelsch & Associates
Evanston, Illinois

RESEARCH SPONSORED BY THE AMERICAN
ASSOCIATION OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS IN COOPERATION
WITH THE FEDERAL HIGHWAY ADMINISTRATION

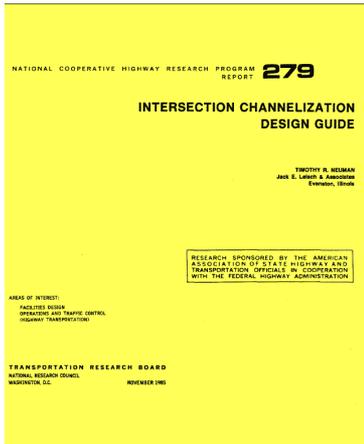
AREAS OF INTEREST:

FACILITIES DESIGN
OPERATIONS AND TRAFFIC CONTROL
(HIGHWAY TRANSPORTATION)

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C. NOVEMBER 1985

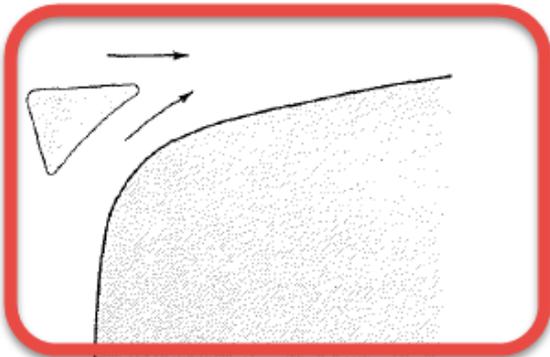
Channelization is
Cool:
or is it?

Channelization is Cool: *or is it?*



20

FUNCTIONAL OBJECTIVE OF CHANNELIZATION—
Limitation of Conflict Severity



Safe merging of traffic streams is accomplished by small angles of merge and acceleration tapers, both of which reduce conflict severity.



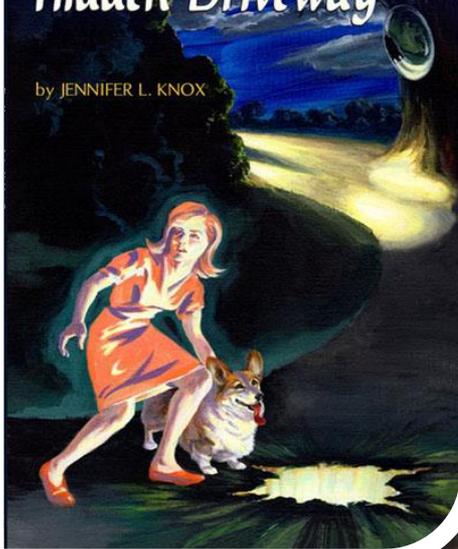
Long transition tapers and turn lanes promote comfortable deceleration, enabling safer speed reductions. Note the potential combined effectiveness of appropriate striping and physical channelization.

Free Right Turn Will Conflict Driveway



The Mystery of the Hidden Driveway

by JENNIFER L. KNOX



Free Right Turn Will Conflict Driveway



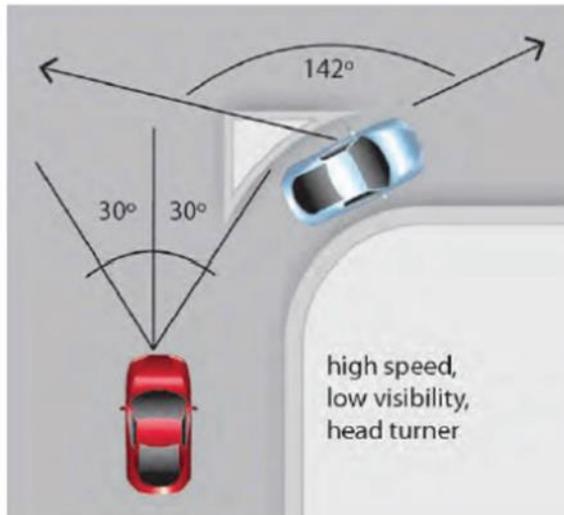
Updated Guide 2014 – NCHRP 780

NCHRP
REPORT 780

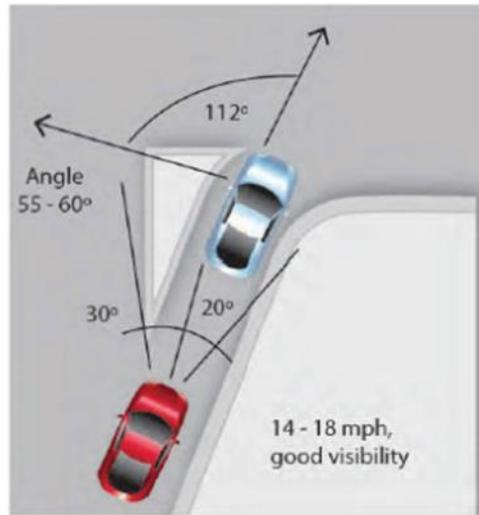
NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

Design Guidance for Intersection Auxiliary Lanes

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES



Channelized Right-Turn Lane With
Flat-Angle Entry to Cross



Channelized Right-Turn Lane With
Nearly Right-Angle Entry to Cross Street

Source: FHWA PEDSAFE, 2013 Guide, found at: <http://www.pedbikesafe.org/PEDSAFE/>

Figure 2-7. Typical channelized right-turn lane with differing entry angles to the cross street (adapted from 46).

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_780.pdf

Long Signal Spacing – The Pros

EXHIBIT 2-13 Percentage Increase in Travel Time as Signalized Density Increases (1)

Signals per Mile	Increase in Travel Time ^a (%)
2.0	0
3.0	9
4.0	16
5.0	23
6.0	29
7.0	34
8.0	39

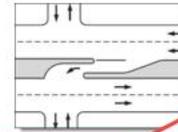
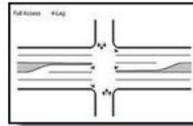
^aCompared with two signals per mile.

Access Management Manual

SECOND EDITION



FDOT Standards



Full Median Opening Standards Based on Desired Signal Spacing

CLASS	MEDIANS	MEDIAN OPENINGS		CONNECTION	
		FULL	DIRECTIONAL	MORE THAN 45MPH	45MPH OR LESS
2	Restrictive w/ Service Roads	2,640	1,320	1,320	660
3	Restrictive	2,640	1,320	660	440
4	Non-Restrictive			660	440
5	Restrictive	2,640 <i>(More than 45MPH)</i>	660		
		1,320 <i>(45MPH or Less)</i>			
6	Non-Restrictive				
7	Both	660	330	125	125

Most Strict

Least Strict

Classification # 7 was created for the Suburban Commercial Strip (not downtown)

Long Signal Spacing – The Pros

Arterial Corridor Designed Well for Vehicles

- Good vehicular access management
- Carries great amount of traffic at high speed
- Some side street connectivity
- Median good for safety



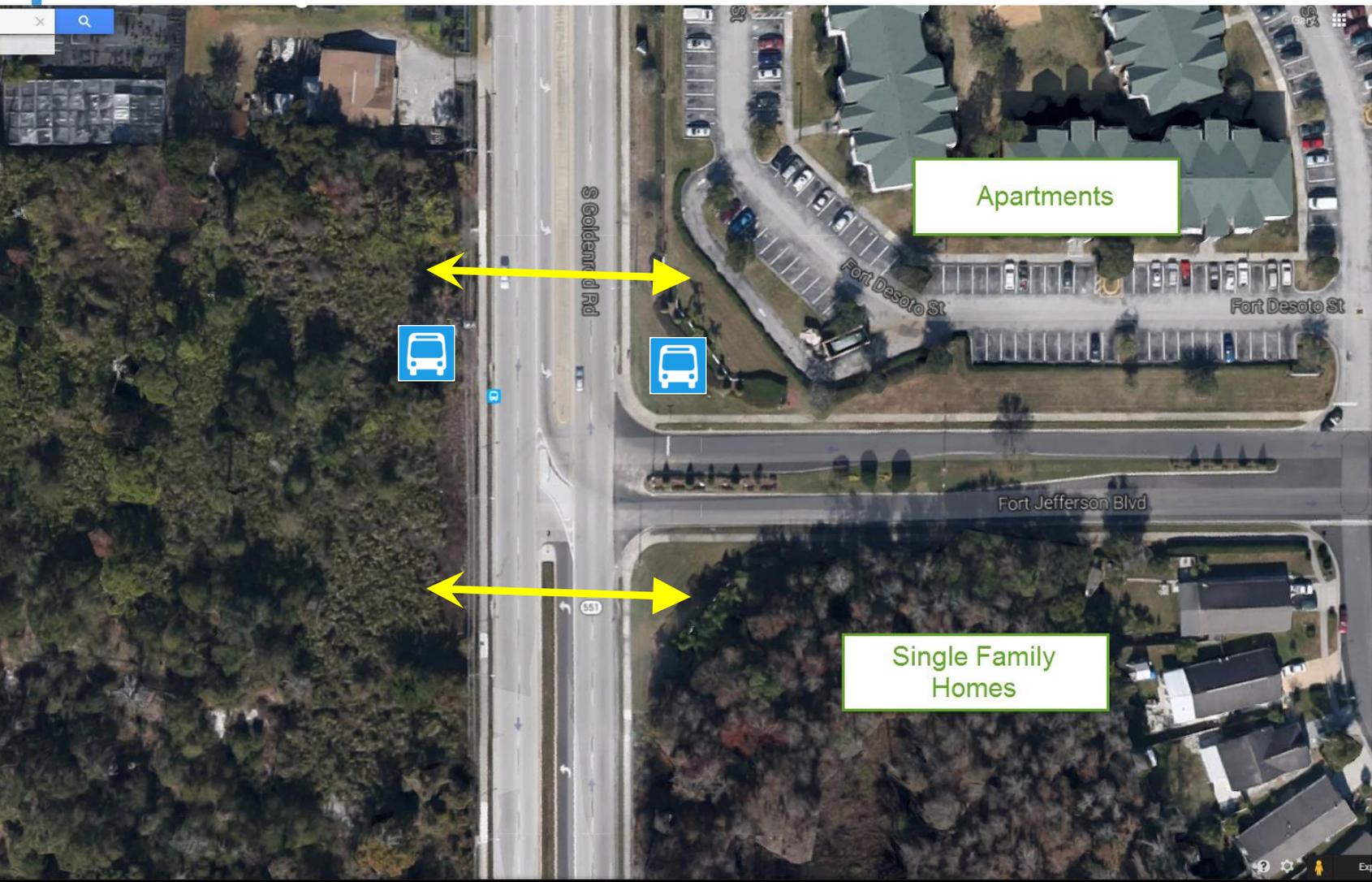
Long Signal Spacing (1/2 Mile) –The Cons



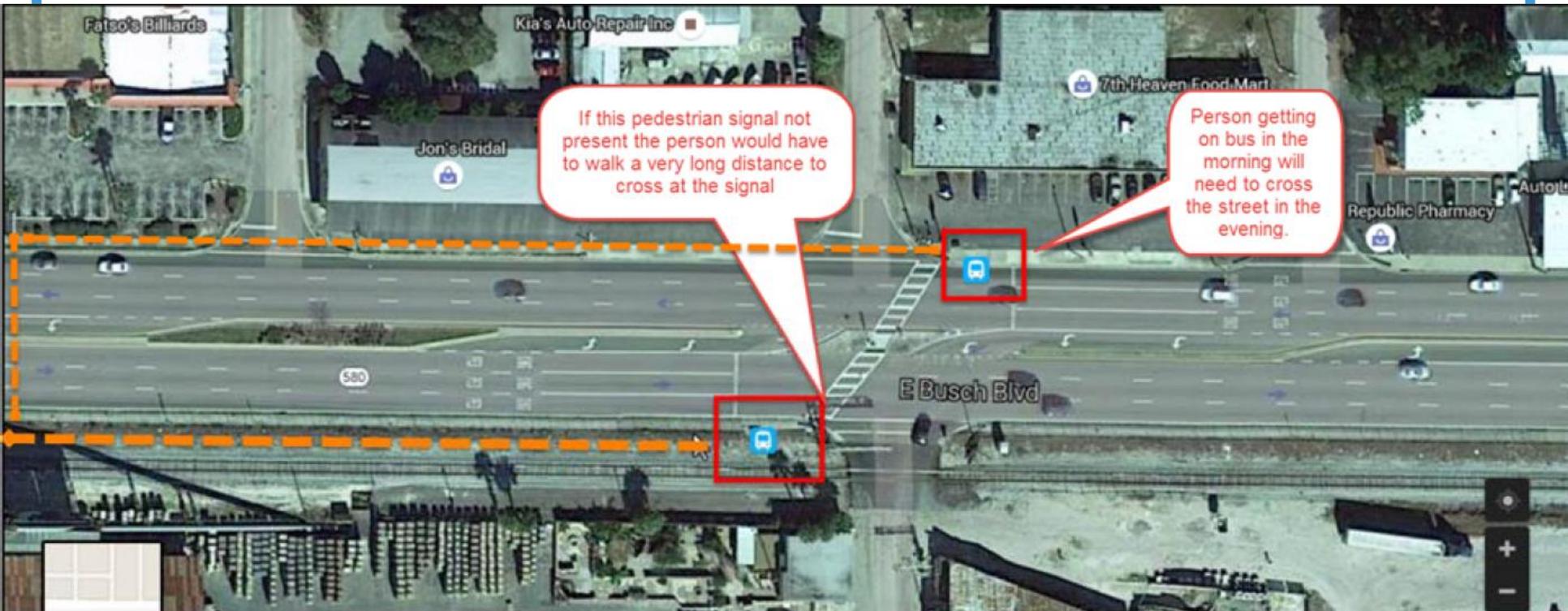
**Misses
Target for
Pedestrians
and Transit
Riders**

- No Sidewalk
- No Mid Block Crossing

Pedestrian Problems with Directional Median Openings



Directional Median Openings and Pedestrians





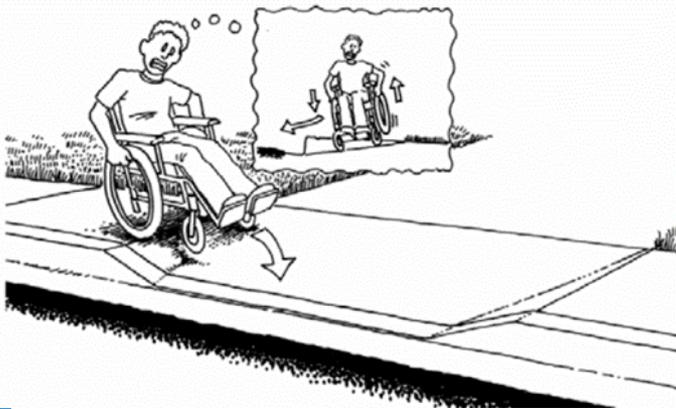
Access Management Needs to Serve Pedestrians



Driveways are for Pedestrians Too



Our Design Standards should include required driveway sidewalks into sites within and one mile from of urban areas



This grade is bad for pedestrians and deadly for people using wheelchairs.

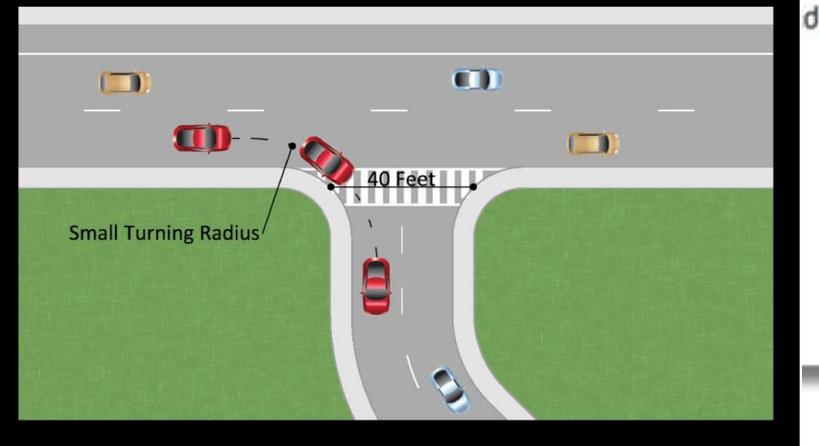
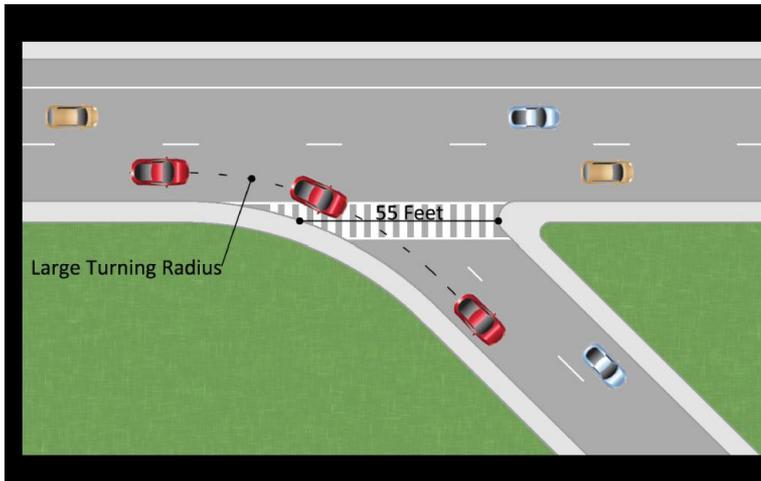


RESTRICTING CURB RADIUS TO BLEND AUTO AND PEDESTRIAN TRAFFIC.

6.3.3 Corner Radii

Corner design deserves special consideration as it directly impacts pedestrian crossing distances and vehicle turning speeds. Corner radius is the actual dimension of the curb, while turning radius is the effective dimension of the motor vehicle turn (see Figure 6.4). Smaller corner radii facilitate direct pedestrian desire lines and discourage speeding, creating junctions that are safer for pedestrians, cyclists and motor vehicles.

- In low density residential areas, a maximum corner radius of 5 m should be used at junctions. However 7.5 m may be considered in particular circumstances to accommodate frequent usage by large vehicles such as buses and delivery vehicles.



Source: [Abu Dhabi Street Design Manual 2012](#)

مجلس أبوظبي للتخطيط العمراني
ABU DHABI URBAN PLANNING COUNCIL

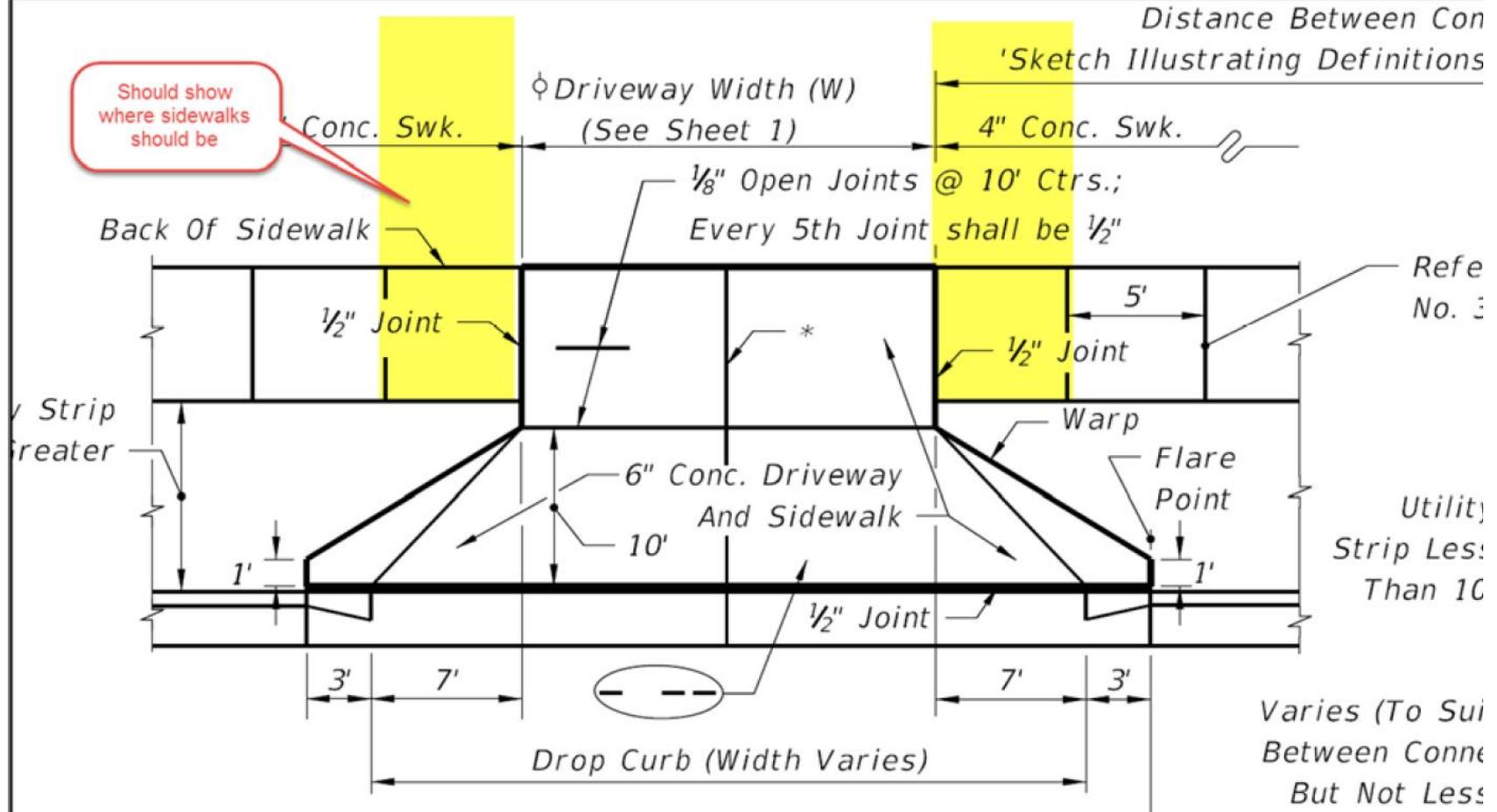


Designed to handle P-Vehicle and Large Trucks and still have “positive guidance”



Distance Between Con
'Sketch Illustrating Definitions

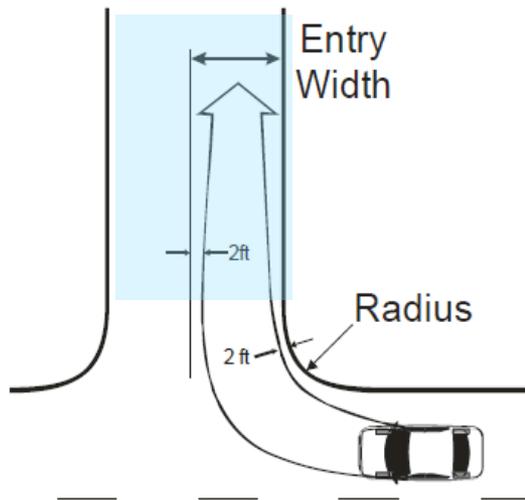
Should show
where sidewalks
should be



PLAN B
TURNOUT WITH SIDEWALK AND
UTILITY STRIP (10' OR GREATER)

Radius and Width Work Together To Help Cars and Pedestrians

Exhibit 15



Radius or Flare (ft.)	Single Lane Width for Entry for Passenger Vehicles (ft.)
Typical flared driveway	22 ft (Pavement striping should be used if entry is this wide)
10 ft Radius	19 ft
15 ft Radius	17 ft
20 ft Radius	14 ft
25 ft Radius	14 ft
Over 25 ft Radius	12-14 ft

Source: adapted from *Access Management for Streets and Highways*, Flora and Keith, FHWA, 1982 p 63

Driveway Information Guide

FLORIDA DEPARTMENT OF TRANSPORTATION 2008

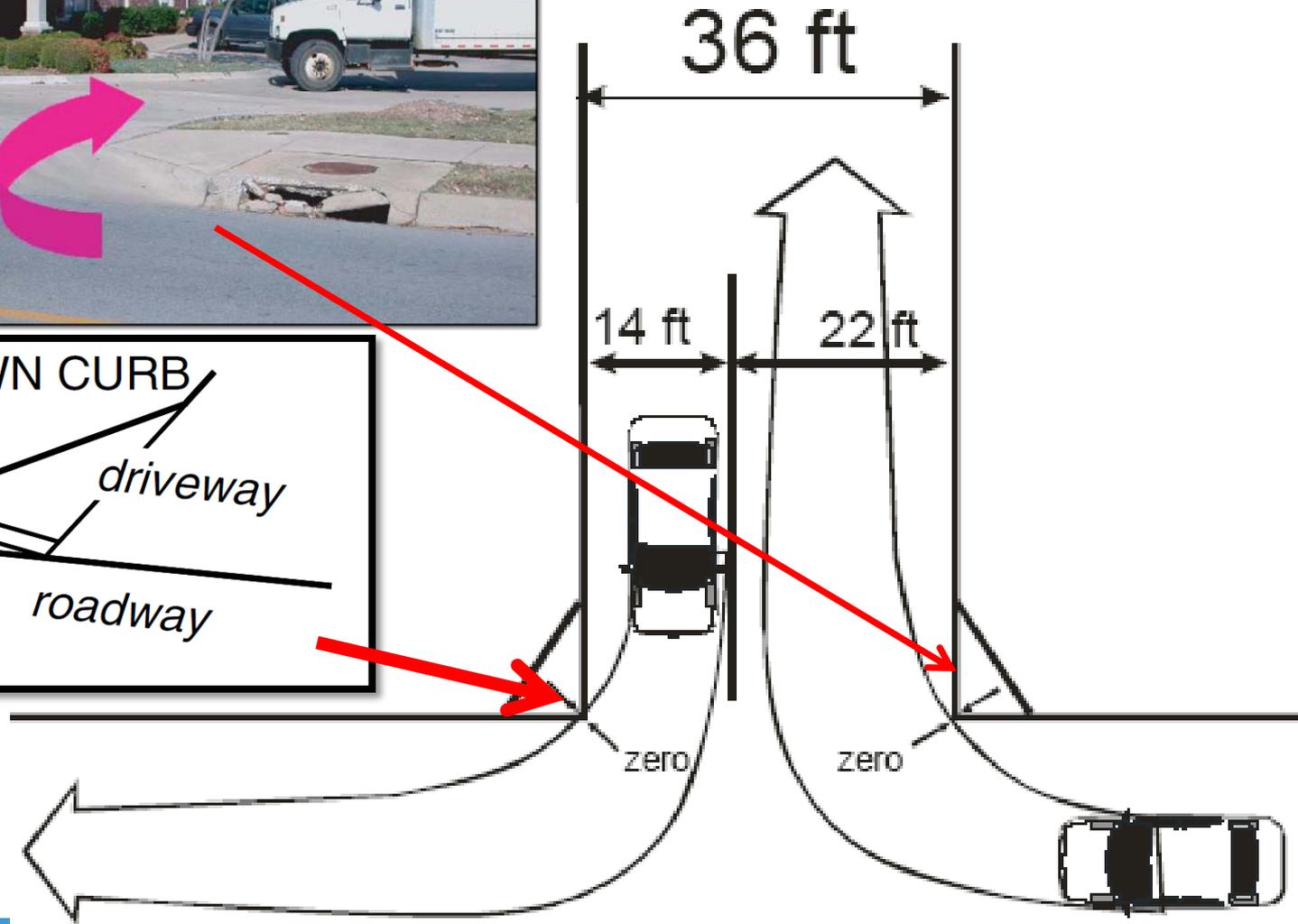
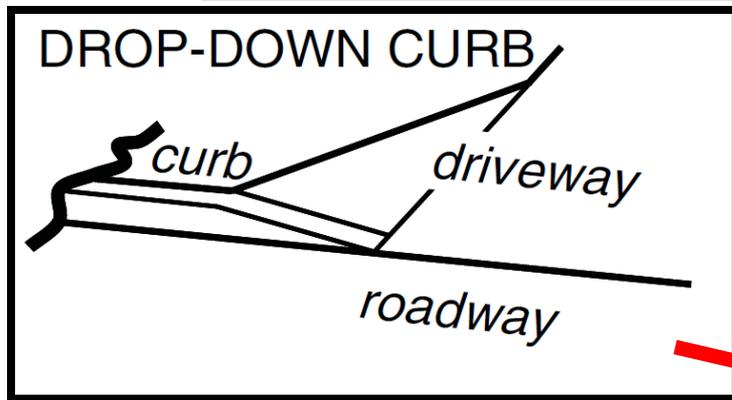
The purpose of this document is to guide the professional through the existing rules, standards and current accepted practice. The background behind the guidelines is also provided.

Unless stated otherwise or referenced, this is not a set of Department Standards but is a comprehensive guide to assist the professional in making better decisions for driveway placement and design.

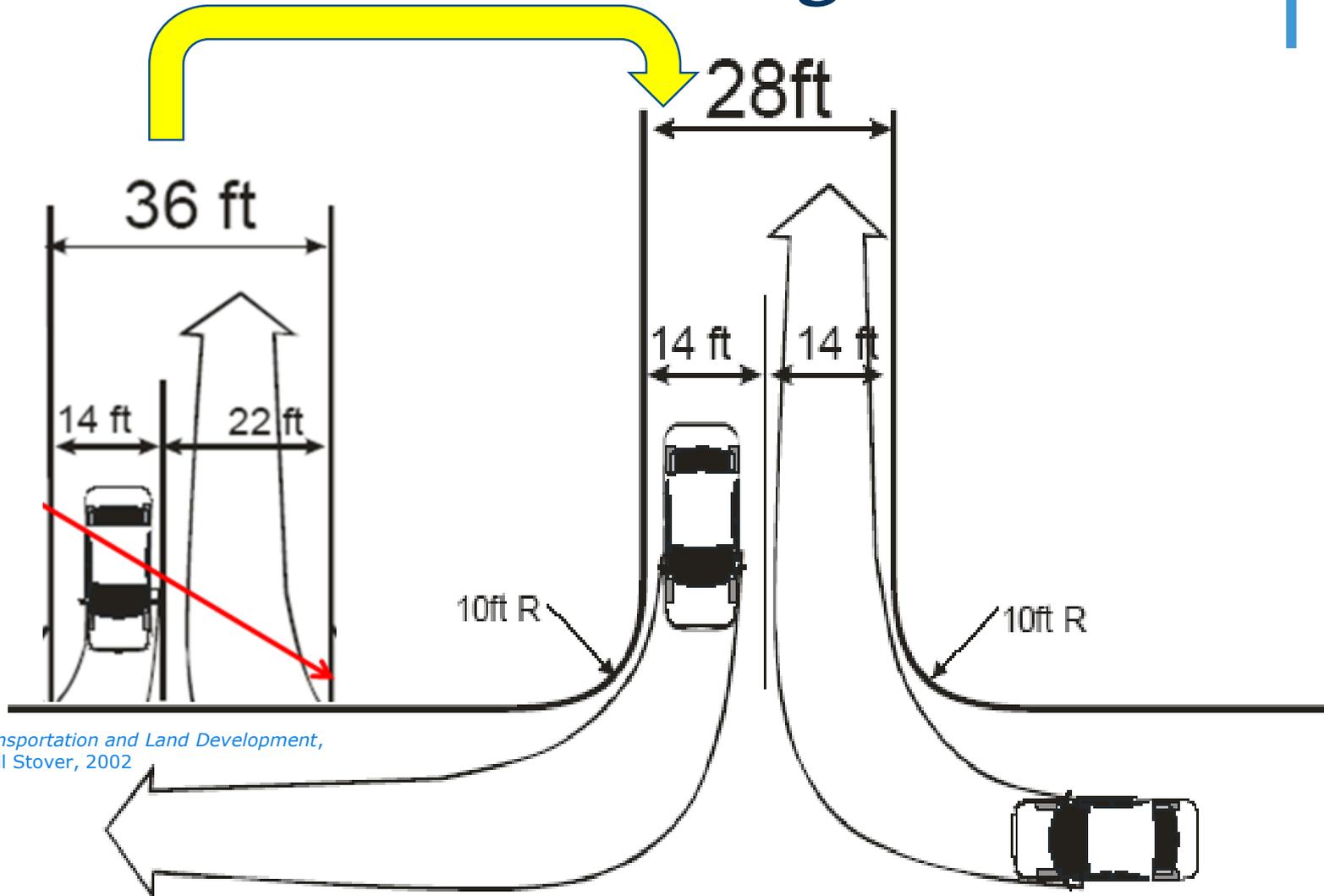
<http://www.dot.state.fl.us/planning/systems/programs/sm/accm/an/pdfs/driveway2008.pdf>

A Flared Driveway Can Be Like Having No Radius

(people don't want to drive over the curb)



Small Radius Driveway Can "BUY" Us A Shorter Pedestrian Crossing



Source: Adapted from *Transportation and Land Development*,
Vergil Stover, 2002

For Additional Information Refer To FDOT Rules Chapters 14-96 And 14-97
SKETCH ILLUSTRATING DEFINITIONS

a 10 ft radius is superior to a 10 ft flare - why should this have to be specially approved by an FDOT engineer?

These are usually very small businesses or developments

We should consider 10 ft radii here

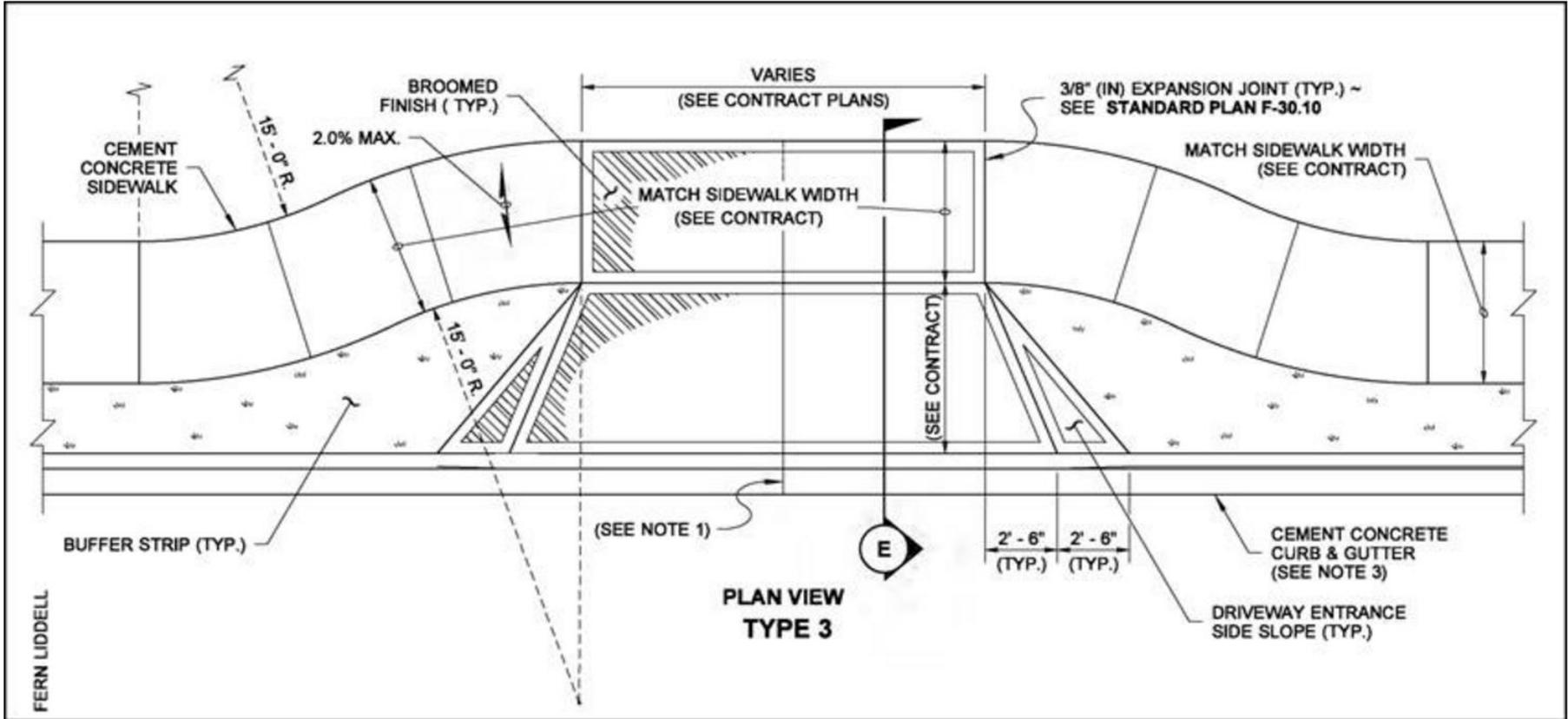
DESCRIPTION	URBAN (CURB & GUTTER)					
	1-20 Trips/Day or 1-5 Trips/Hour	21-600 Trips/Day or 6-60 Trips/Hour	601-4000 Trips/Day or 61-400 Trips/Hour	1-20 Trips/Day or 1-5 Trips/Hour	21-600 Trips/Day or 6-60 Trips/Hour	601-4000 Trips/Day or 61-400 Trips/Hour
FLARE (Drop Curb) F	12' Min. 24' Max.	24' Min. 36' Max. ☆	24' Min. 36' Max. ☆	12' Min. 24' Max.	24' Min. 36' Max. ☆	24' Min. 36' Max. ☆
RETURNS (Radius) R & U	N/A	△	25' Min. 50' Std. 75' Max.	15' Min. 25' Std. 50' Max.	25' Min. 50' Std. 75' Max.	25' Min. 50' Std. (Or 3-Centered Curves)
ANGLE OF DRIVE Y	60°-90°					
DIVISIONAL ISLAND (Throat Median)	4'-22' Wide					
SETBACK G	12' Min. All categories. See General Note No. 5.					

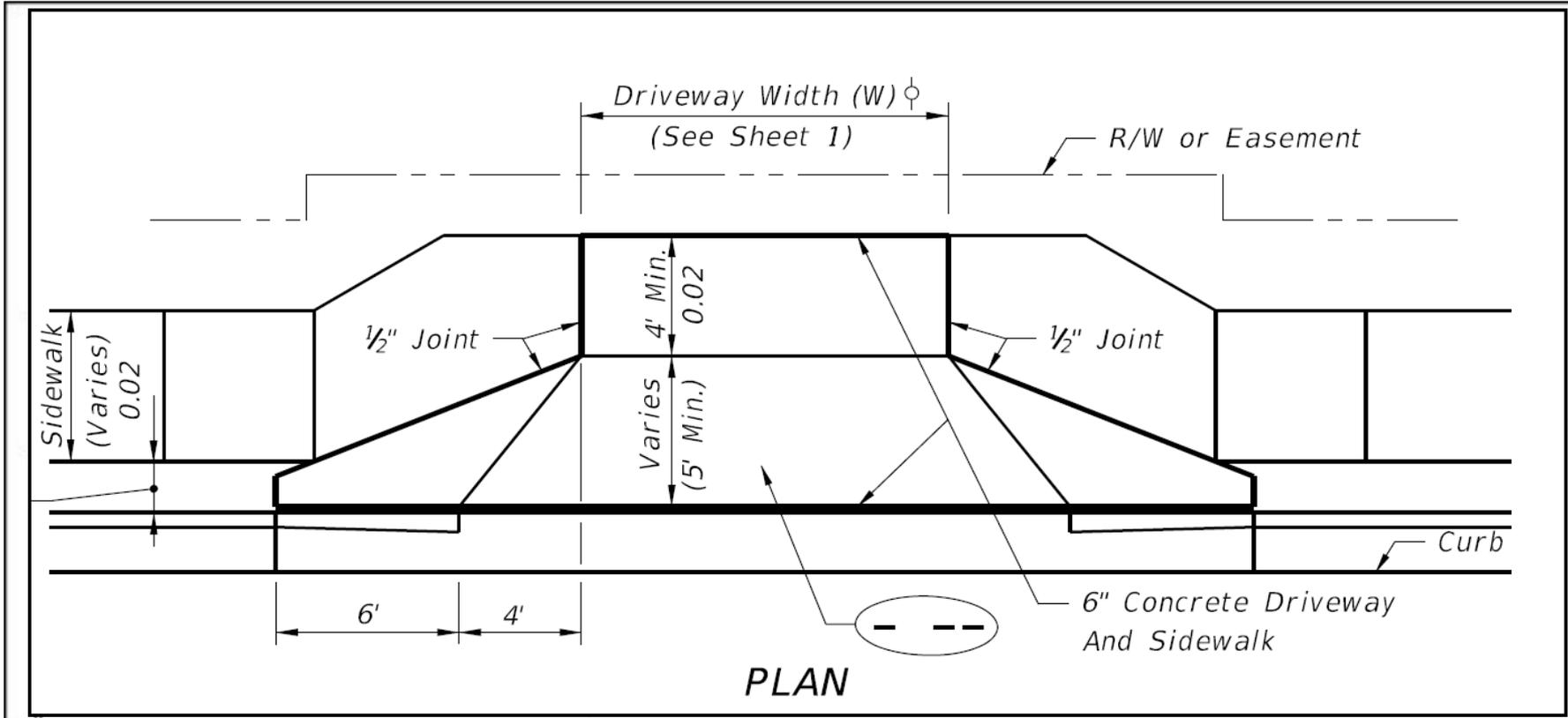
- ☑ Street or road intersection design, with possible auxiliary lanes and channelization, may be necessary. Intersection design, with possible auxiliary lanes and channelization, should be considered for connections with more than 4000 trips/days.
 - ☐ "2-Way" refers to one "in" movement and one "out" movement i.e., not exclusive left or right turn lanes on the connection.
 - ☆ When more than 2 lanes in the turnout connection are required, the 36' max. width may be increased to relieve interference between entering and exiting traffic which adversely affects traffic flow. These cases require documented site specific study and design.
 - △ Small radii may be used in lieu of flares as approved by the Department.
- DESIGN NOTE: 1-Way connections will be designed to effectively eliminate unpermitted movements.

Driveways

NOT INTENDED FOR FULL INTERSECTION DESIGN
 SUMMARY OF GEOMETRIC REQUIREMENTS FOR TURNOUTS

C:\p\proj\ict\road\adar\roadway\04-19-12\19-AM-r98608-4/28/2012

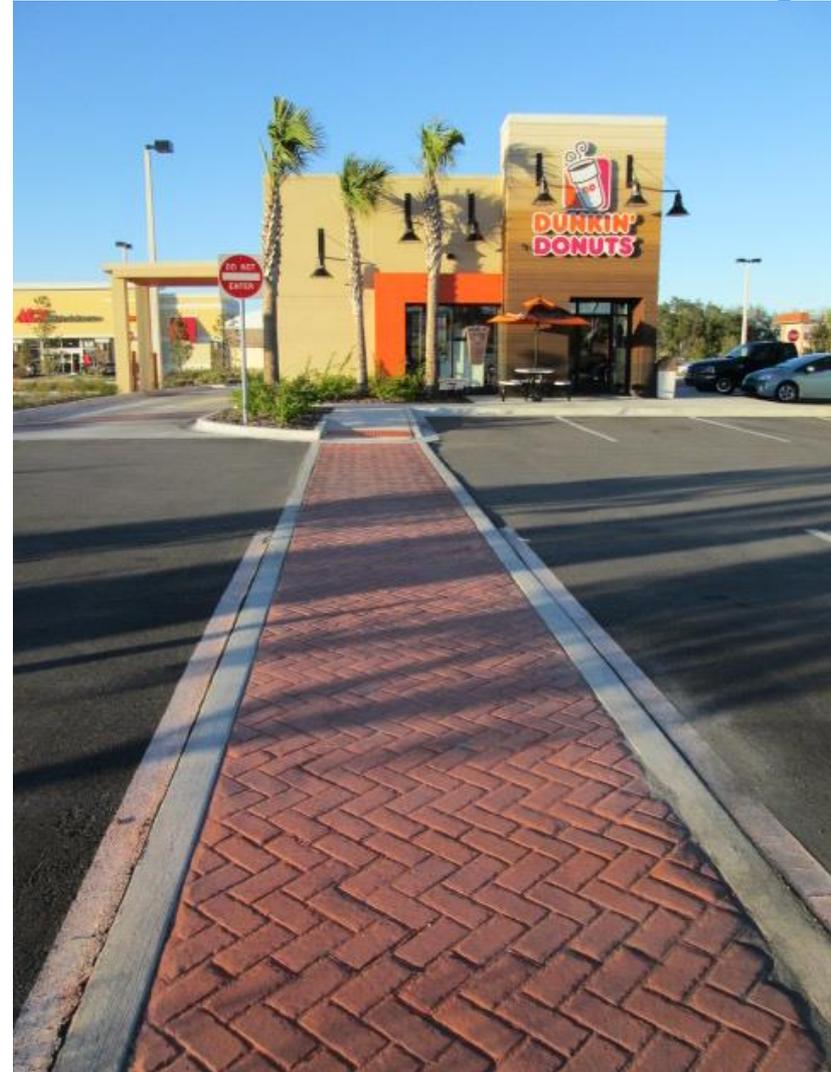




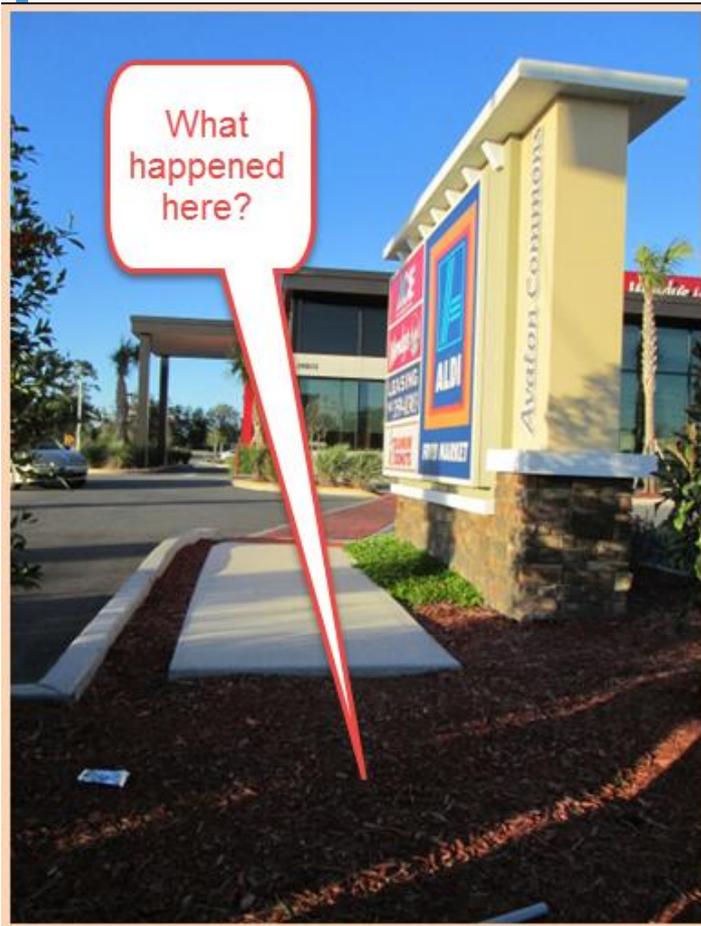
We need more seamless pedestrian paths

- **Accessible paths for users of *all abilities***
- **Connectivity to the state system**

Credit: Deborah Tyrone



Pedestrian Access in Site Plan



Credit: Deborah Tyrone

Limited Pedestrian Access to New Development



Credit: Deborah Tyrone

Sidewalk Now Impossible Without Moving Utilities



Credit: Deborah Tyrone

Current: Florida Administrative Code Rule 14-96 on Permitting

14-96.001 Purpose.

This rule chapter is adopted to implement the State Highway System Access Management Act for the regulation and control of **vehicular** access and connection points of ingress to, and egress from, the State Highway System, and other transportation facilities under the Department's jurisdiction except for limited access facilities.

Possible Administrative Rule Change

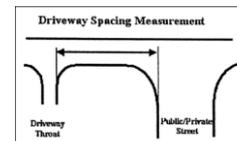
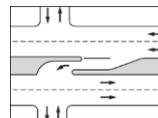
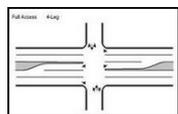
Consideration

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, using all modes, and preserve the functional integrity of the State Highway System. Further, this rule chapter and its access classification system will be used in such a way that balances the needs of vehicles and pedestrians. Just as this rule and standards apply to vehicular access, these standards will be used to assure safe and convenient access of pedestrians to developments and businesses.

Access Management in Context:

Only Two Different Divisions Considered in 1988



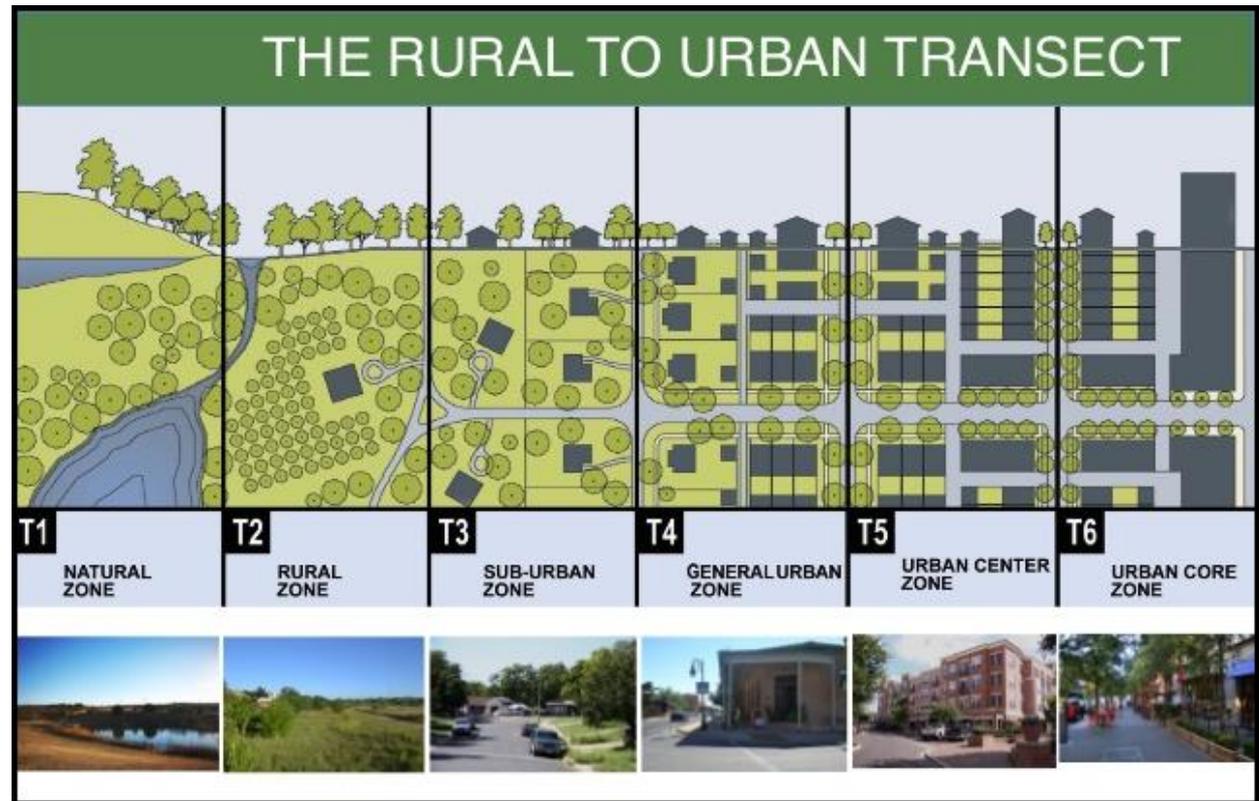
CLASS	MEDIANS	MEDIAN OPENINGS		CONNECTION		
		FULL	DIRECTIONAL	MORE THAN 45MPH	45MPH OR LESS	
Most Strict	2	Restrictive w/ Service Roads	2,640	1,320	1,320	660
	3	Restrictive	2,640	1,320	660	440
	4	Non-Restrictive			660	440
	5	Restrictive	2,640 <i>(More than 45MPH)</i>	660	440	245
	6	Non-Restrictive	1,320 <i>(45MPH or Less)</i>			
Least Strict	7	Both	660	330	125	125

Generally Developing of Undeveloped

Generally Developed

Transportation Needs And Access Vary with Area Type

The
Transect
Will Be
Important



Source: Transect: Duany Plater-Zyberk

Miami's Transect

The
Transect
Will Be
Important
“T Zones”



<http://maps.miamigis.com/Miami21Docs/T4.PDF>



2010 ITE Document

<http://library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad>

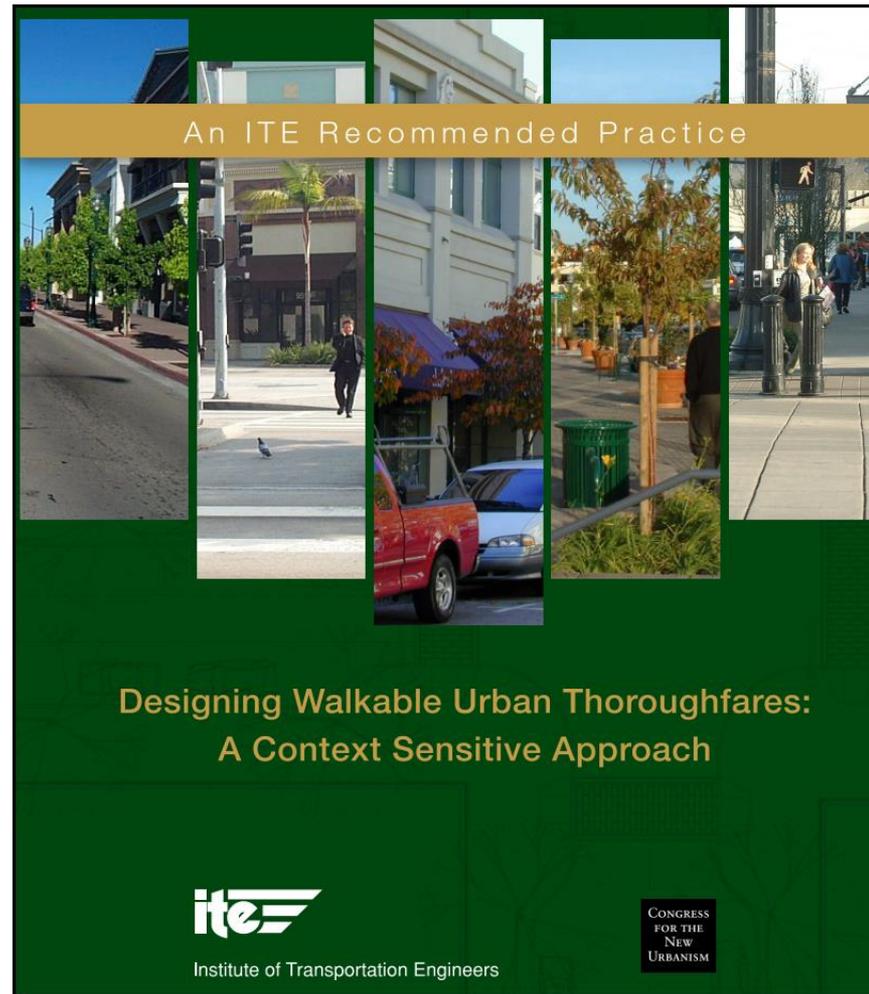


Table 4.1 Context Zone Characteristics

Context Zone	Distinguishing Characteristics	General Character	Building Placement	Frontage Types	Typical Building Height	Type of Public Open Space	Transit (Where Provided)
C-1 Natural	Natural landscape	Natural features	Not applicable	Not applicable	Not applicable	Natural open space	None
C-2 Rural	Agricultural with scattered development	Agricultural activity and natural features	Large setbacks	Not applicable	Not applicable	Agricultural and natural	Rural
C-3 Suburban	Primarily single family residential with walkable development pattern and pedestrian facilities, dominant landscape character. Includes scattered commercial uses that support the residential uses, and connected in walkable fashion.	Detached buildings with landscaped yards, normally adjacent to C-4 zone. Commercial uses may consist of neighborhood or community shopping centers, service or office uses with side or rear parking.	Varying front and side yard setbacks	Residential uses include lawns, porches, fences and naturalistic tree planting. Commercial uses front onto thoroughfare.	1 to 2 story with some 3 story	Parks, greenbelts	Local, express bus
C-4 General Urban	Mix of housing types including attached units, with a range of commercial and civic activity at the neighborhood and community scale	Predominantly detached buildings, balance between landscape and buildings, presence of pedestrians	Shallow to medium front and side yard setback	Porches, fences	2 to 3 story with some variation and few taller workplace buildings	Parks, greenbelts	Local, limited stop bus rapid transit, express bus; fixed guideway
C-5 Urban Center	Attached housing types such as townhouses and apartments mixed with retail, workplace and civic activities at the community or sub-regional scale.	Predominantly attached buildings, landscaping within the public right of way, substantial pedestrian activity	Small or no setbacks, buildings oriented to placement and character defining a street wall	Stoops, dooryards, storefronts and arcaded walkways	3 to 5 story with some variation	Parks, plazas and squares, boulevard median landscaping	Local bus; limited stop rapid transit or bus rapid transit; fixed-guideway transit
C-6 Urban Core	Highest-intensity areas in sub-region or region, with high-density residential and workplace uses, entertainment, civic and cultural uses	Attached buildings forming sense of enclosure and continuous street wall landscaping within the public right of way, highest pedestrian and transit activity	Small or no setbacks, building oriented to street, placed at front property line	Stoops, dooryards, forecourts, storefronts and arcaded walkways	4+ story with a few shorter buildings	Parks, plazas and squares, boulevard median landscaping	Local bus; limited stop rapid transit or bus rapid transit; fixed-guideway transit
Districts	To be designated and described locally, districts are areas that are single-use or multi-use with low-density development pattern and vehicle mobility priority thoroughfares. These may be large facilities such as airports, business parks and industrial areas.						As applicable

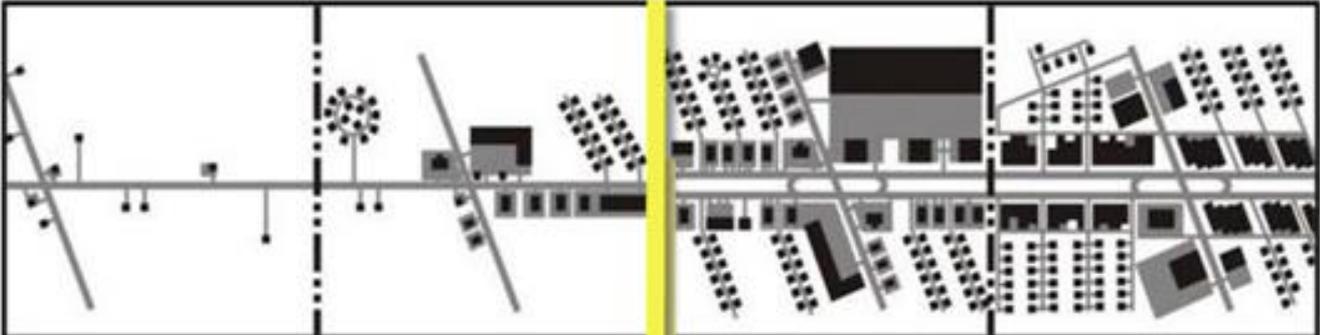
(Based on transect zone descriptions in *SmartCode* Version 9.2, 2008. Source: Duany Plater-Zyberk & Company.)
 Shaded cells represent Context Zones that are not addressed in this report.

ITE's Context Zones "C Zones"

Context Zone	Context Classification	Description	Description
Natural	C1	Natural Zone consists of lands approximating or reverting to a wilderness condition, including lands unsuitable for settlement due to topography, hydrology or vegetation.	Conservation Land, Open Space, or Park
Rural	C2	Rural Zone consists of sparsely settled lands in open or cultivated states. These include woodland, agricultural land, grassland, and irrigable desert. Typical buildings are farmhouses, agricultural buildings, or single family houses	Agricultural or Single Family Residential
Rural Town	C2T	Rural Town Zone consists of small concentrations of uses along rural highways surrounded by Rural and Natural Zones. Typical buildings are shopfronts, restaurants, offices, houses, or industrial buildings.	Retail, Commercial, Single Family or Multi Family Residential, Institutional, or Industrial
Suburban Residential*	C3R	Suburban Residential Zone consists of low density residential areas with deep setbacks. Blocks may be large with street network that is not well connected.	Single Family or Multi Family Residential
Suburban Commercial*	C3C	Suburban Commercial Zone consists of automobile oriented uses. Typical buildings include strip retail, big box retail, shopping malls, or office parks with large parking lots surrounding them. Buildings are set back from the street. Blocks may be large with street network that is not well connected.	Retail, Commercial, Institutional, or Industrial
General Urban Residential** *	C4	General Urban Residential Zone consists of a mixed use but primarily residential urban fabric. It may have a wide range of housing types: detached houses, townhouses, duplexes. etc. Setbacks and landscaping are variable. Blocks are generally short with a well connected street network. Most of the streets have sidewalks on both sides.	Single Family or Multi Family Residential, Neighborhood Scale Retail or Commercial
Urban Center	C5	Urban Center Zone consists of activity centers with higher density mixed use buildings that accommodate retail, offices, row houses and apartments. Buildings are typically fronting streets with no or shallow setbacks. Blocks are generally short with a well connected street network. Most of the streets have sidewalks on both sides.	Retail, Commercial, Single Family or Multi Family Residential, Institutional, Light Industrial
Urban Core	C6	Urban Core Zone consists of the highest density and height, with the greatest variety of uses, and civic buildings of regional importance. Buildings are typically fronting streets with no or shallow setbacks. It may have larger blocks but has streets	Retail, Commercial, Institutional, or Multi Family

FDOT Context Zones

Access Management and the Context Zones.



	Rural	Suburban Fringe / Exurban	Suburban	Compact Urban
Land Use	Residential/agriculture, commercial nodes	Residential subdivisions, commercial strips	Residential/commercial, Redevelop w/ infill TOD	Residential/urban commercial mixed-use
Street	2 lanes, center turn lane select locations	2 or 3 to 5 lanes, center turn lane	5 or 6 to 8 lane blvd, some on-street pkg.	6 or 8 lane blvd with on-street parking
Access	1-1/2 Mile signals, 455' drive spacing w/ service drives	455' drive spacing, retro-fit to eliminate some access near signals	Infill access, retro-fit and new cross-access, esp. signals & poor offsets	Retro-fit to reduce number drives, 1-sided signals

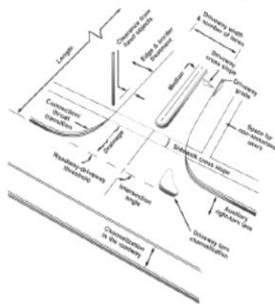
Source: Applying Access Management As Part Of A Complete Streets Approach Across The Transect | Strader 2012

<http://www.accessmanagement.info/sites/default/files//AM12/AM1227Strader/>
Link to presentation

NCHRP REPORT 659

NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

Guide for the Geometric Design of Driveways

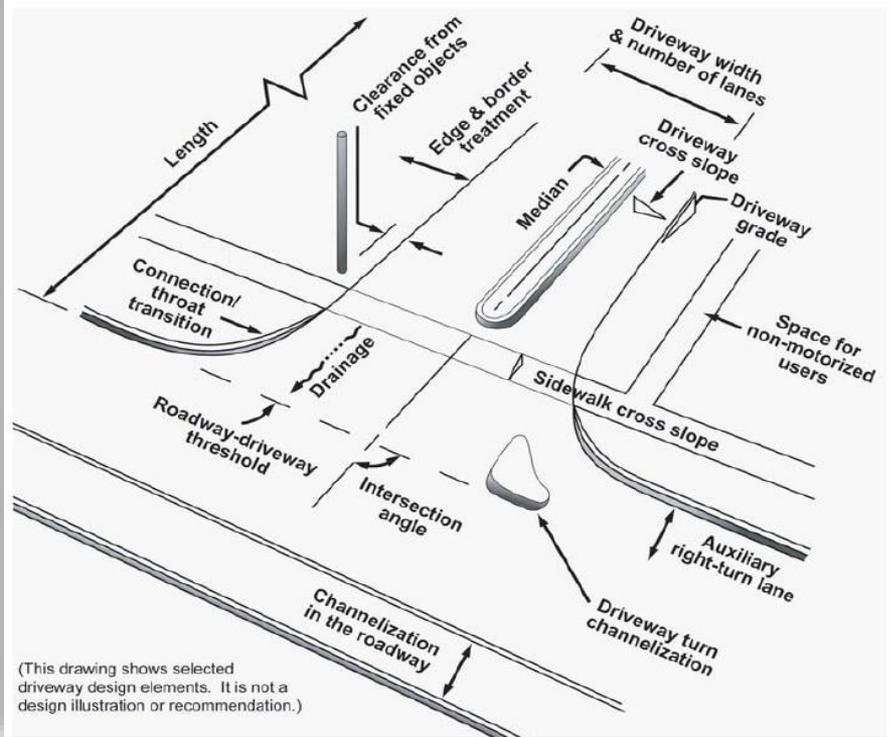


TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

National Guidance



Exhibit 2-1. Some driveway design elements.



onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_659.pdf

Driveway Settings and Modes Served



Driveway Settings and the Importance of Various Modes: Florida DRAFT - Not currently and the Driveway Information Guide

Area Type	Descriptive Attributes	Relative Importance of Mode			
		Auto	Bicycle	Walk	Transit
Dense Major Urban Centers/Complete Streets	<p>Connected buildings</p> <p>Sidewalk paved from curb edge to the face of buildings</p> <p>Shorter blocks</p> <p>Higher pedestrian volumes</p> <p>In some locales, higher volumes of transit vehicles / riders</p> <p>Motor vehicle traffic is often congested / moving slowly</p>	Medium	High to Medium	High	High to Medium
Suburban Developed	<p>May include special districts (outlying business districts not in core)</p> <p>Bicycles and pedestrians are present</p> <p>In some locales, public transit is present</p>	High	High to Medium	High to Medium	High to Medium
Rural	<p>Motor vehicles are predominate mode</p> <p>A few bicycles and pedestrians are present</p> <p>In some locales, occasional public transit is present</p>	High	Low	Low	Low

Adapted from Exhibit 3-1: Driveway settings and the importance of various modes taken from NCHRP Report 679

Exurban	Motor vehicles are predominate mode Bicycles, pedestrians, and/or transit are infrequent	High	Low	Low	Low
Rural (farm or ranch)	Motor vehicles are predominate mode Higher speeds need longer access spacing	High	Very low	Very low	Very low

Land Use Context Zones	Description	Modal Context for Driveway Location and Design Considerations	Relative Importance of Mode as it Relates to Driveway Design Placement				
			Auto/Van/Single Unit Vehicle (occasionally)	Bicycle	Walking	Public Transportation	Freight Distribution Delivery and the ability to easily use large trucks
C1 Natural	Single Use: Natural preserves and parks Agricultural and Single Family Residential	Motor vehicles are the predominant mode a few bicycles and pedestrians are present in some locations, occasional public transportation is present	High	Low	Low	Low	High - agriculture and delivery
C2 Rural	Single Use: Agricultural and Single Family Residential	Motor vehicles are the predominant mode a few bicycles and pedestrians are present in some locations, occasional public transportation is present	High	Low	Low	Low	High - agriculture and delivery
C2T Rural Town	Mixed Use or Single Use: Retail, Commercial, Single Family or Multi Family Residential, or Industrial	Sidewalk paved from utility strip or in some cases the curb edge to face of building, shorter block sizes, higher pedestrian volumes, many times on street parking	High to medium	Medium	High	Medium	Medium-delivery to b
C3R Suburban Residential**	Single Use: Single Family, or Multi Family Residential	Bicycles and pedestrians are present. Bus transit transportation is usually present. Entrances into subdivisions will usually be of local Street design which would include radial returns.	High	Medium	Medium	Medium	Medium
C3C Suburban Commercial***	Single Use: Retail, Commercial, Industrial	May include special districts (outline business districts not in core). Bicycles and pedestrians are present. . Bus transit transportation is usually present	High	Medium	Medium	Medium	Medium to high-espe industrial areas and c centers
C4 General Urban	Mixed-Use or Single Use: Single Family or Multi-Family Residential, Neighborhood Scale Retail or Commercial		High	Medium	Medium to high	Medium to high	Medium to high-espe industrial areas and c centers
C5 Urban Center	Mixed Use or Single Use: Retail, Commercial, Single Family or Multi Family Residential, Light or Medium Industrial	Connected buildings, sidewalk paved from curb edge to face of building, shorter blocks, higher pedestrian volumes, higher volumes of transit bus vehicles and the possibility of fixed rail public transportation, motor vehicle traffic is often congested and moving slowly during peak hours	Medium to low	Medium to high	High	High	Medium - provisions t vehicles needed for d commercial areas
C6 Urban Core	Mixed Use or Single Use: Retail, Commercial, or Multi Family Residential	Connected buildings, sidewalk paved from curb edge to face of building, shorter blocks, higher pedestrian volumes, higher volumes of transit bus vehicles and the possibility of fixed rail public transportation, motor vehicle traffic is often congested and moving slowly during peak hours	Medium to low	Medium to high	High	High	Medium - provisions t vehicles needed for d commercial areas

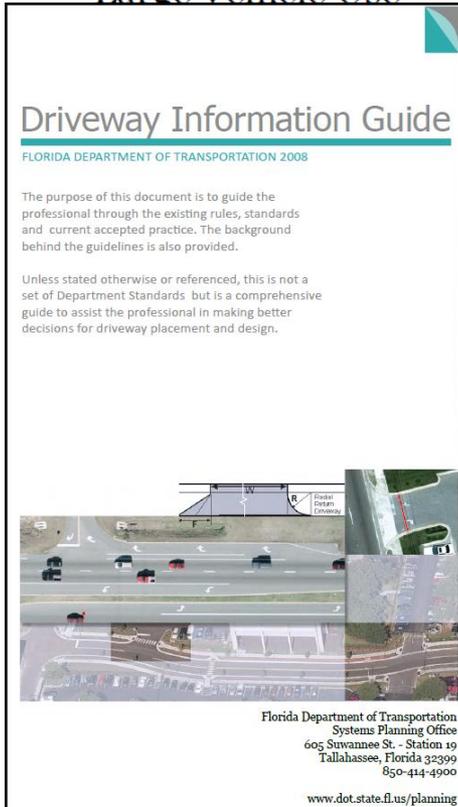
Context for Driveway Location Considerations	Relative	Land Use Context Zones	Description	Modal Context for Driveway Location and Design Considerations	General Driveway Features and considerations
	Auto/Van/Single Unit Vehicle (occasionally)				
Motor vehicles are the predominant mode a few bicycles and pedestrians are present in some locations, occasional public transportation is present	High	C1 Natural	Single Use: Natural preserves and parks Agricultural and Single Family Residential	Motor vehicles are the predominant mode a few bicycles and pedestrians are present in some locations, occasional public transportation is present	Wide turning radius with necessary for the design vehicle (possibly Typical multi-unit tractor trailer) only in one direction
Motor vehicles are the predominant mode a few bicycles and pedestrians are present in some locations, occasional public transportation is present	High	C2 Rural	Single Use: Agricultural and Single Family Residential	Motor vehicles are the predominant mode a few bicycles and pedestrians are present in some locations, occasional public transportation is present	Wide turning radius with necessary for the design vehicle only in one direction
Driveways from utility strip or in some cases the curb edge to face of building, shorter block sizes, higher pedestrian volumes, many times on street parking	High to medium	C2T Rural Town	Mixed Use or Single Use: Retail, Commercial, Single Family or Multi Family Residential, or Industrial	Sidewalk paved from utility strip or in some cases the curb edge to face of building, shorter block sizes, higher pedestrian volumes, many times on street parking	Driveways should be minimized in this area to allow for a more consistent pedestrian environment. Vehicular access should be through the side and back
Bicycles and pedestrians are present. Bus transit is usually present. Entrances into subdivisions and local Street design which would include radial returns.	High	C3R Suburban Residential**	Single Use: Single Family, or Multi Family Residential	Bicycles and pedestrians are present. Bus transit is usually present. Entrances into subdivisions will usually be of local Street design which would include radial returns.	Medium turning radii into neighborhoods with attention paid to the pedestrian environment through the use well marked crosswalks and consider the use of small sized radii, and the use of a text rise to surface to allow off tracking to the typical multiunit tractor trailer
Special districts (outline business districts not in core). Bicycles and pedestrians are present. . Bus transit is usually present	High	C3C Suburban Commercial***	Single Use: Retail, Commercial, Industrial	May include special districts (outline business districts not in core). Bicycles and pedestrians are present. . Bus transit is usually present	Wide turning radii using the design vehicle to be able to allow to design vehicles (possibly Typical multi-unit tractor trailer) at the same time exiting and entering, especially in industrial areas.
	High	C4 General Urban	Mixed-Use or Single Use: Single Family or Multi-Family Residential, Neighborhood Scale Retail or Commercial		Small to medium-sized radii on driveways. Consider the use of small sized radii, and the use of a text rise to surface to allow off tracking to the typical multiunit tractor trailer
Connected buildings, sidewalk paved from curb edge to face of building, shorter blocks, higher pedestrian volumes, higher volumes of transit bus vehicles and the possibility of fixed rail public transportation, motor vehicle traffic is often congested and moving slowly during peak hours	Medium to low	C5 Urban Center	Mixed Use or Single Use: Retail, Commercial, Single Family or Multi Family Residential, Light or Medium Industrial	Connected buildings, sidewalk paved from curb edge to face of building, shorter blocks, higher pedestrian volumes, higher volumes of transit bus vehicles and the possibility of fixed rail public transportation, motor vehicle traffic is often congested and moving slowly during peak hours	Driveways should be minimized in this area to allow for a more consistent pedestrian environment. When driveways are built, we should consider using the "typical dustpan" design which 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
Connected buildings, sidewalk paved from curb edge to face of building, shorter blocks, higher pedestrian volumes, higher volumes of transit bus vehicles and the possibility of fixed rail public transportation, motor vehicle traffic is often congested and moving slowly during peak hours	Medium to low	C6 Urban Core	Mixed Use or Single Use: Retail, Commercial, or Multi Family Residential	Connected buildings, sidewalk paved from curb edge to face of building, shorter blocks, higher pedestrian volumes, higher volumes of transit bus vehicles and the possibility of fixed rail public transportation, motor vehicle traffic is often congested and moving slowly during peak hours	Driveways should be minimized in this area to allow for a more consistent pedestrian environment. When driveways are built, we should consider using the "typical dustpan" design which establishes that the driver is now entering a pedestrian environment. As much as possible, large vehicle access should be through the side

Mode as it Relates to Driveway Design and Placement	General Driveway Features and considerations
-----------------------------------------------------	----------------------------------------------

Walking	Public Transportation	Freight Distribution and Delivery and the ability to easily use large trucks	
Low	Low	High - agriculture and machinery delivery	Wide turning radius with necessary for the design vehicle (possibly Typical multi-unit tractor trailer) only in one direction
Low	Low	High - agriculture and machinery delivery	Wide turning radius with necessary for the design vehicle only in one direction
High	Medium	Medium-delivery to businesses	Driveways should be minimized in this area to allow for a more consistent pedestrian environment. Vehicular access should be through the side and back
Medium	Medium	Medium	Medium turning radii into neighborhoods with attention paid to the pedestrian environment through the use well marked crosswalks and consider the use of small sized radii, and the use of a text rise to surface to allow off tracking to the typical multiunit tractor trailer
Medium	Medium	Medium to high-especially in industrial areas and commercial centers	Wide turning radii using the design vehicle to be able to allow to design vehicles (possibly Typical multi-unit tractor trailer) at the same time exiting and entering, especially in industrial areas.
Medium to high	Medium to high	Medium to high-especially in industrial areas and commercial	Small to medium-sized radii on driveways. Consider the use of small sized radii, and

Exhibit 10

Suggested Driveway Design Criteria Based on Truck or Large Vehicle Use



<http://www.dot.state.fl.us/planning/systems/programs/sm/accman/pdfs/driveway2008.pdf>

Commercial and office uses (shopping center, office complex, convenience store)		
Number of Trucks or Buses Per Hour	Operation to Design for	Design Vehicle³
≤ 2	Simultaneous 2-way	P ¹ or a Standard Passenger Vehicle
≥ 3	Simultaneous 2-way ²	Single Unit vehicle (typical FedEx or UPS Truck)
Industrial Uses (distribution centers, warehousing)		
	Simultaneous 2-way	Typical multi-unit tractor trailer
Other Uses		
Truck stop	Simultaneous 2-way ³	Largest vehicle ⁴
Transit Center/ Bus Terminals	Simultaneous 2-way	Largest bus
Recreational with RVs and trailers	Simultaneous 2-way	Motor home with trailer

¹A standard passenger car (P vehicle) can enter while another standard passenger car (P vehicle) is waiting to exit.

²A standard delivery Single Unit truck (SU vehicle) can enter when a standard passenger car (P vehicle) is waiting to exit.

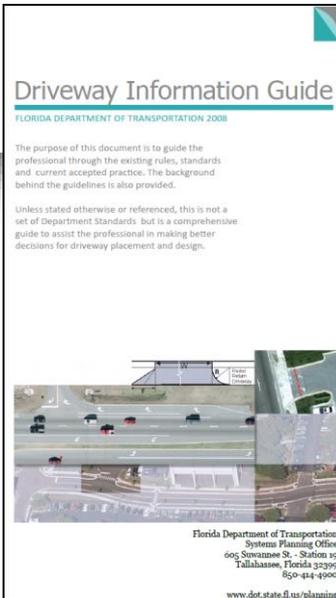
³Designed so that larger vehicles can off-track through the driveway.

⁴Interstate 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).

Commercial and office uses (shopping center, office complex, convenience store)

Number of Trucks or Buses Per Hour	Operation to Design for	Design Vehicle ³
≤ 2	Simultaneous 2-way	P ¹ or a Standard Passenger Vehicle
≥ 3	Simultaneous 2-way	Single Unit vehicle such as typical FedEx or



- ¹A standard passenger car (P vehicle) can enter while another standard passenger car (P vehicle) is waiting to exit.
- ²A standard delivery Single Unit truck (SU vehicle) can enter when a standard passenger car (P vehicle) is waiting to exit.
- ³Designed so that larger vehicles can off-track through the driveway.
- ⁴Interstate 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).

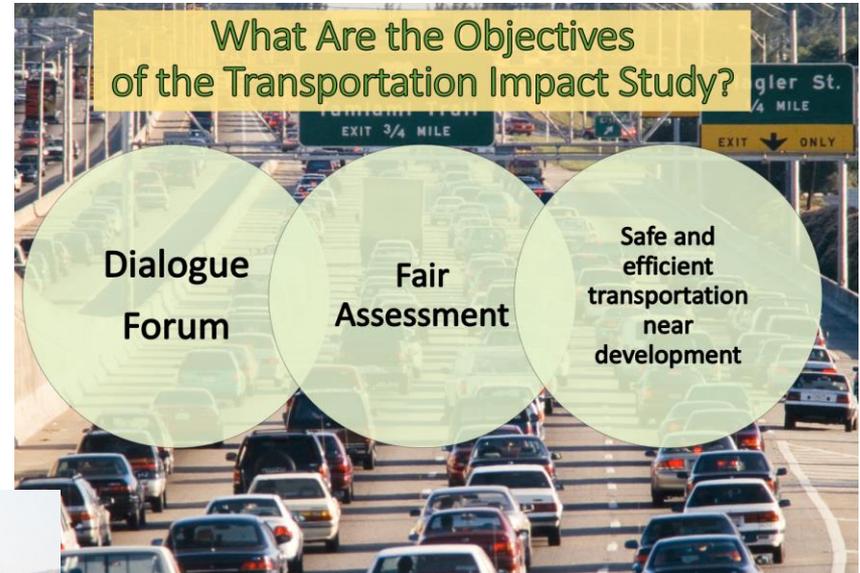
<http://www.dot.state.fl.us/planning/systems/programs/sm/aceman/pdfs/driveway2008.pdf>

Mode as it Relates to Driveway Design and Placement

General Driveway Features and considerations

Medium to high	Medium to high	Medium to high-especially in industrial areas and commercial centers	Small to medium-sized radii on driveways. Consider the use of small sized radii, and the use of a text rise to surface to allow off tracking to the typical multiunit tractor trailer
High	High	Medium - provisions for large vehicles needed for delivery to commercial areas	Driveways should be minimized in this area to allow for a more consistent pedestrian environment. When driveways are built, we should consider using the "typical dustpan" design which 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
High	High	Medium - provisions for large vehicles needed for delivery to commercial areas	Driveways should be minimized in this area to allow for a more consistent pedestrian environment. When driveways are built, we should consider using the "typical dustpan" design which 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

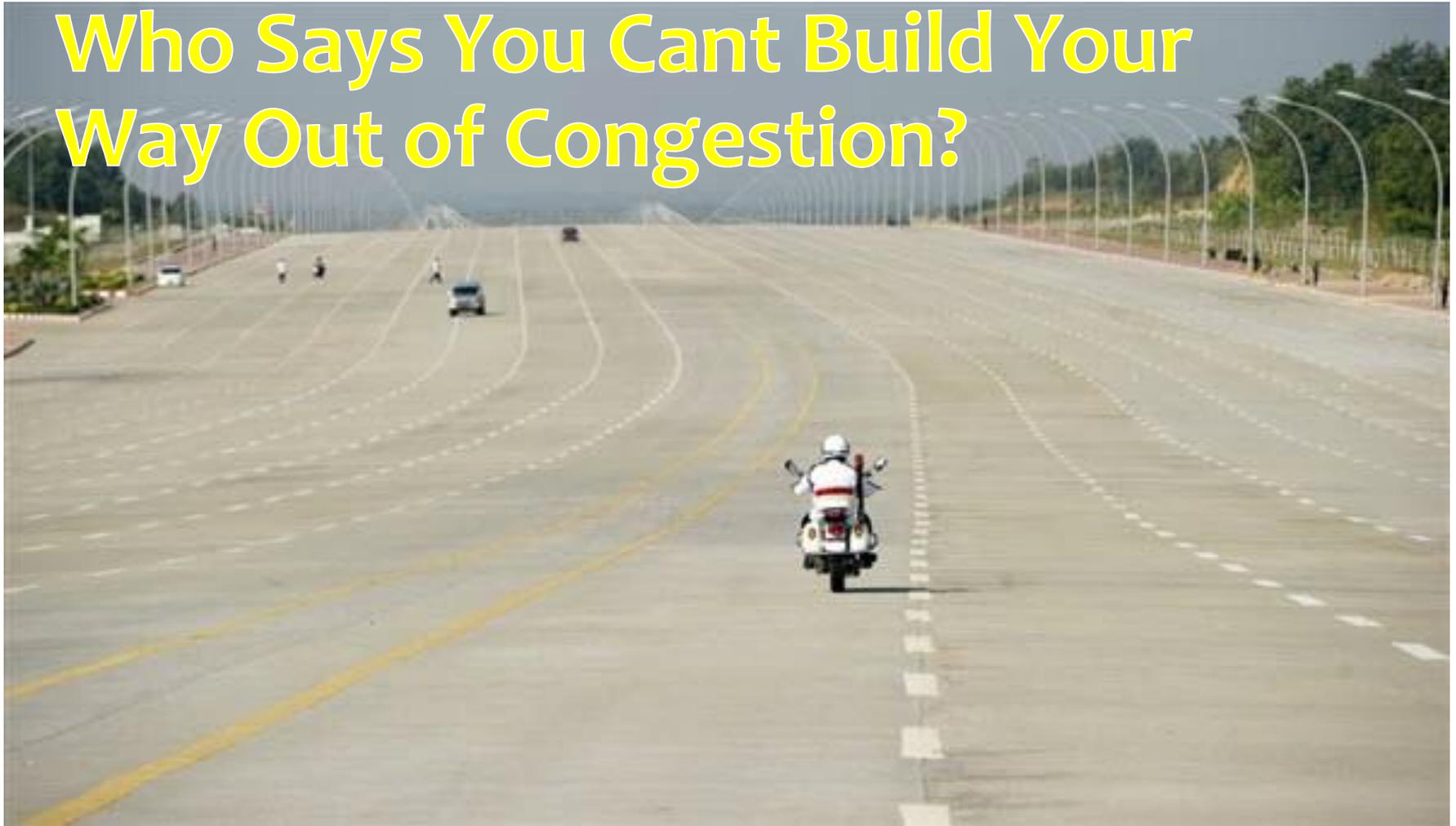
What's Changing in the Field of Impact Studies?



TRANSPORTATION
SITE IMPACT
HANDBOOK



Who Says You Cant Build Your Way Out of Congestion?



Yazahdani Road in Myanmar/Burma

Credit Saul Loeb/Reuters

<http://www.theatlantic.com/international/archive/2014/02/a-dictators-guide-to-urban-design/283953/>
The Atlantic Magazine, "A Dictator's Guide to Urban Design"

From Mike on Traffic:

Who Says You Can't Build Your Way Out of Congestion?

I once heard an older transportation engineer say –
“of course we can build our way out of congestion, they just haven't given us the money yet.”

Maybe it's a good thing they haven't let us transportation engineers take over the world



Yazahdani Road in Myanmar/Burma

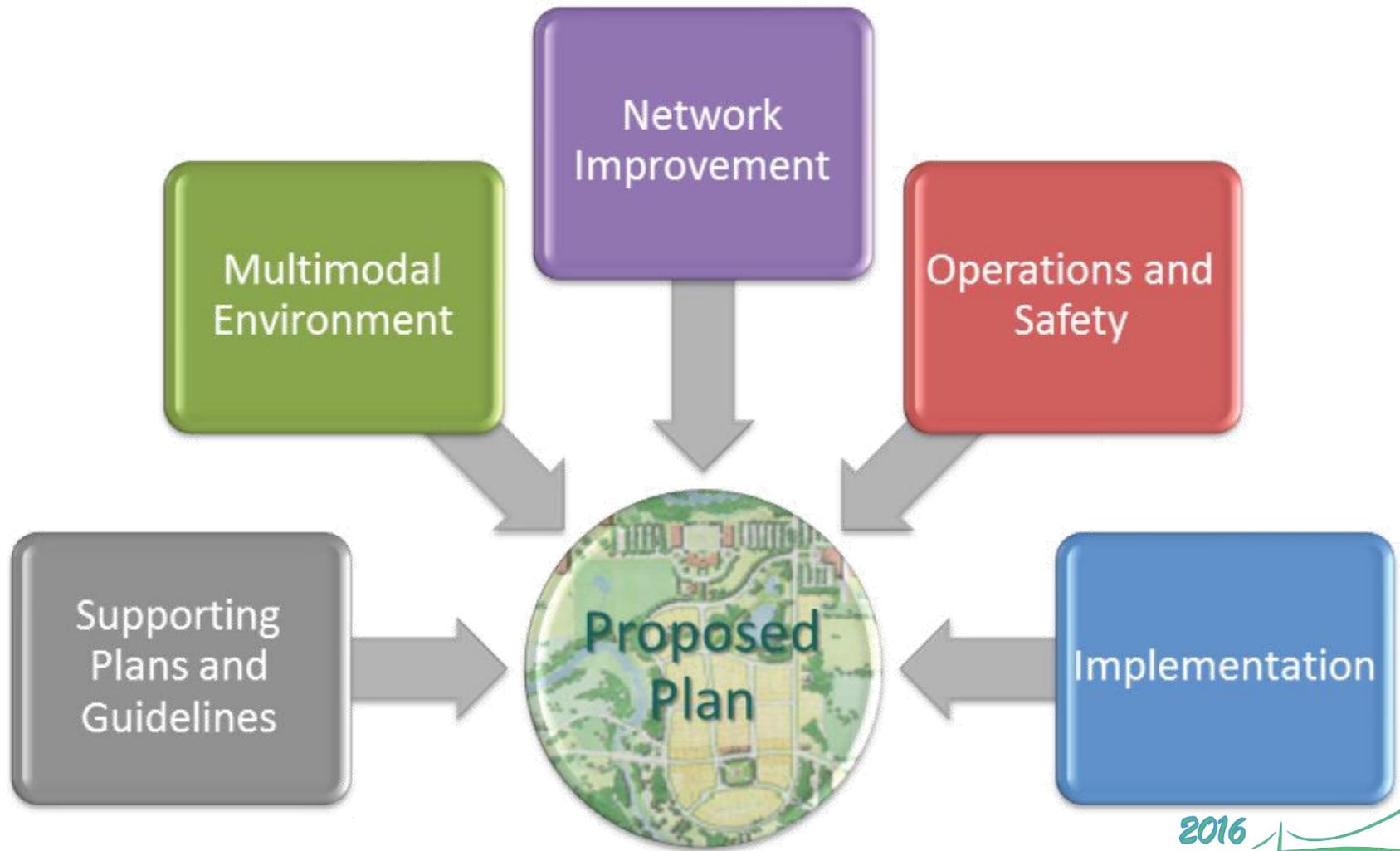
Source: <http://www.mikeontraffic.com/who-says-you-cant-build-your-way-out-of-congestion/>



**Will a Safety Review
Improve Your TIS?**

Source:
Mike on Traffic

Categories for Review



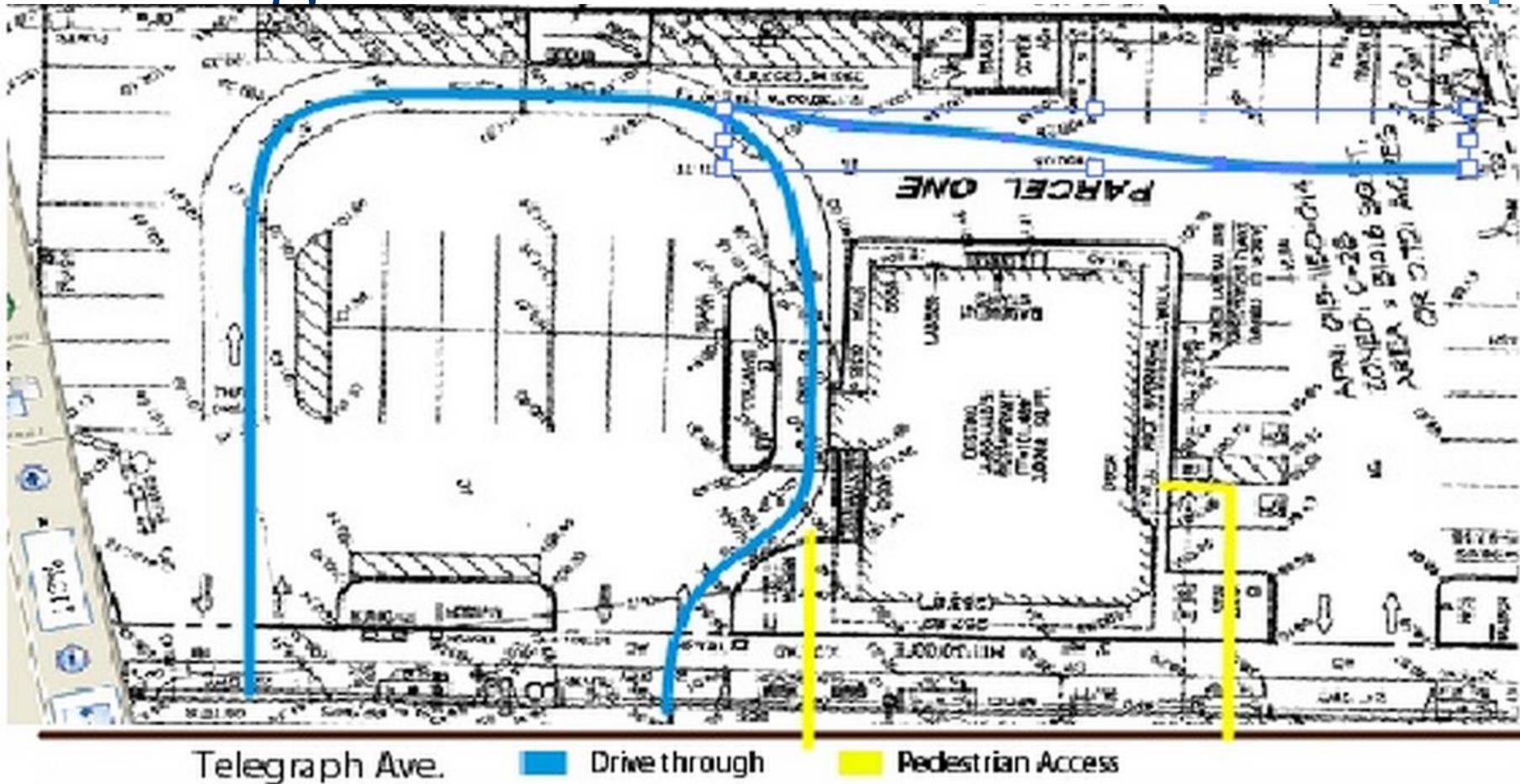
16
MAY

Bye-bye drive-through on Telegraph: A pedestrian friendly solution to the Temescal McDonald's redesign

You might be wondering what happened after the City Council directed the Temescal McDonald's owner and the appellants to meet to try to find a compromise. Well, I have some very good news to share.

The applicant and McDonald's owner, Ed Smith, met with a small group of the appellants last Thursday and came to an agreement on some design issues. The details are still being hammered out, so I don't have a design to share here yet, but, most importantly, **the drive-through will no longer be next to the Telegraph sidewalk – it will be moved to the back of the building.**

Redesigned



<http://abetteroakland.com/can-pedestrian-friendly-neighborhoods-and-fast-food-coexist/2011-05-03>

Telegraph Ave
Oakland, California
Street View - Feb 2016





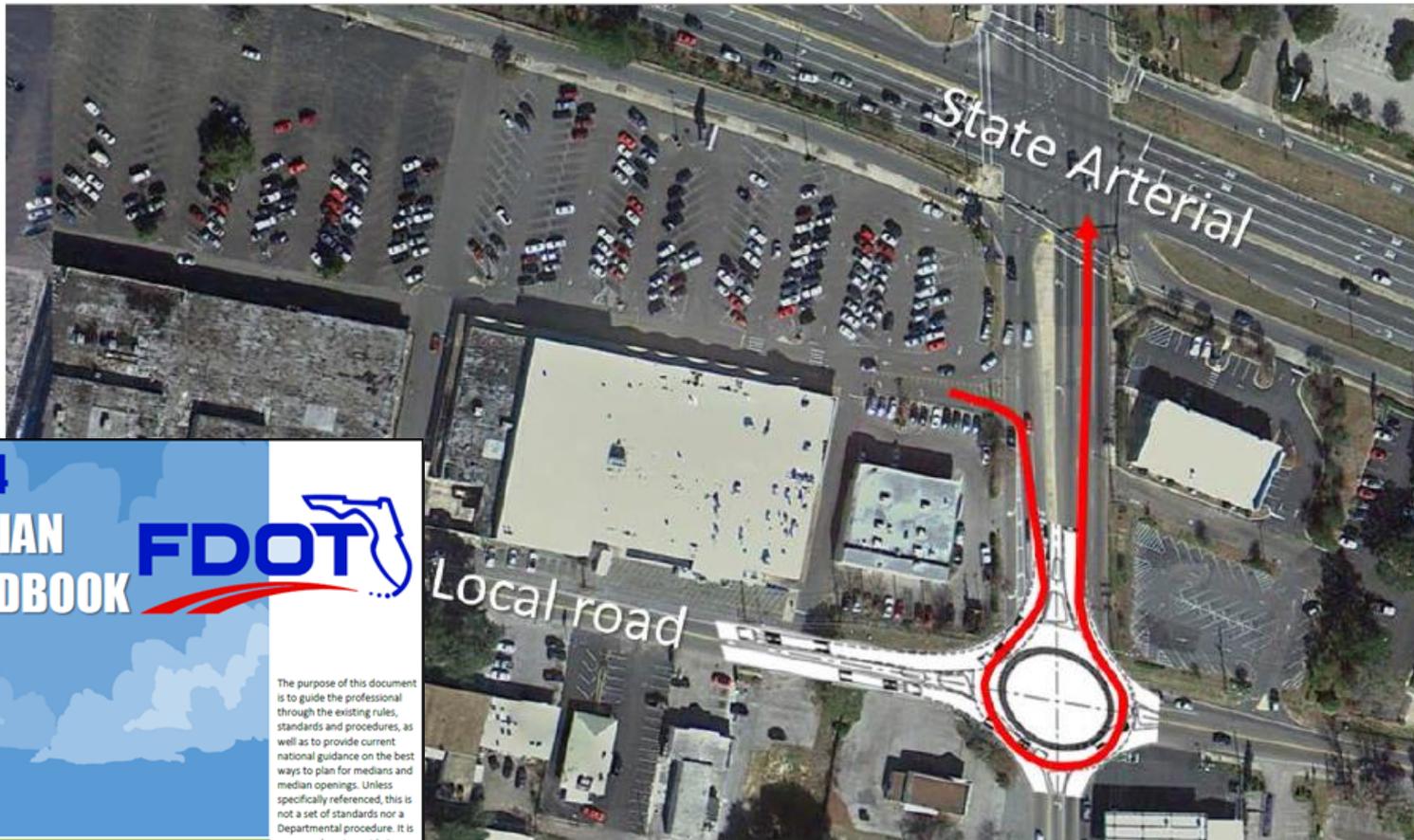


6.0 Roundabouts and Access Management

Roundabouts can provide many benefits when included as part of an overall access management strategy. Roundabouts achieve one primary principal of access management by reducing the number of conflict points. The result is that serious injuries/fatalities are significantly reduced.

Exhibit 96

Example of proposed roundabout near arterial



2014
MEDIAN
HANDBOOK



The purpose of this document is to guide the professional through the existing rules, standards and procedures, as well as to provide current national guidance on the best ways to plan for medians and median openings. Unless specifically referenced, this is not a set of standards nor a Departmental procedure. It is a comprehensive guide to allow the professional to make the best decisions on median planning. The primary thrust of this handbook is the unsignalized median opening. Even though much of this material can be used with signalized intersection planning, issues of signalized queues and signal timing are not covered in detail.

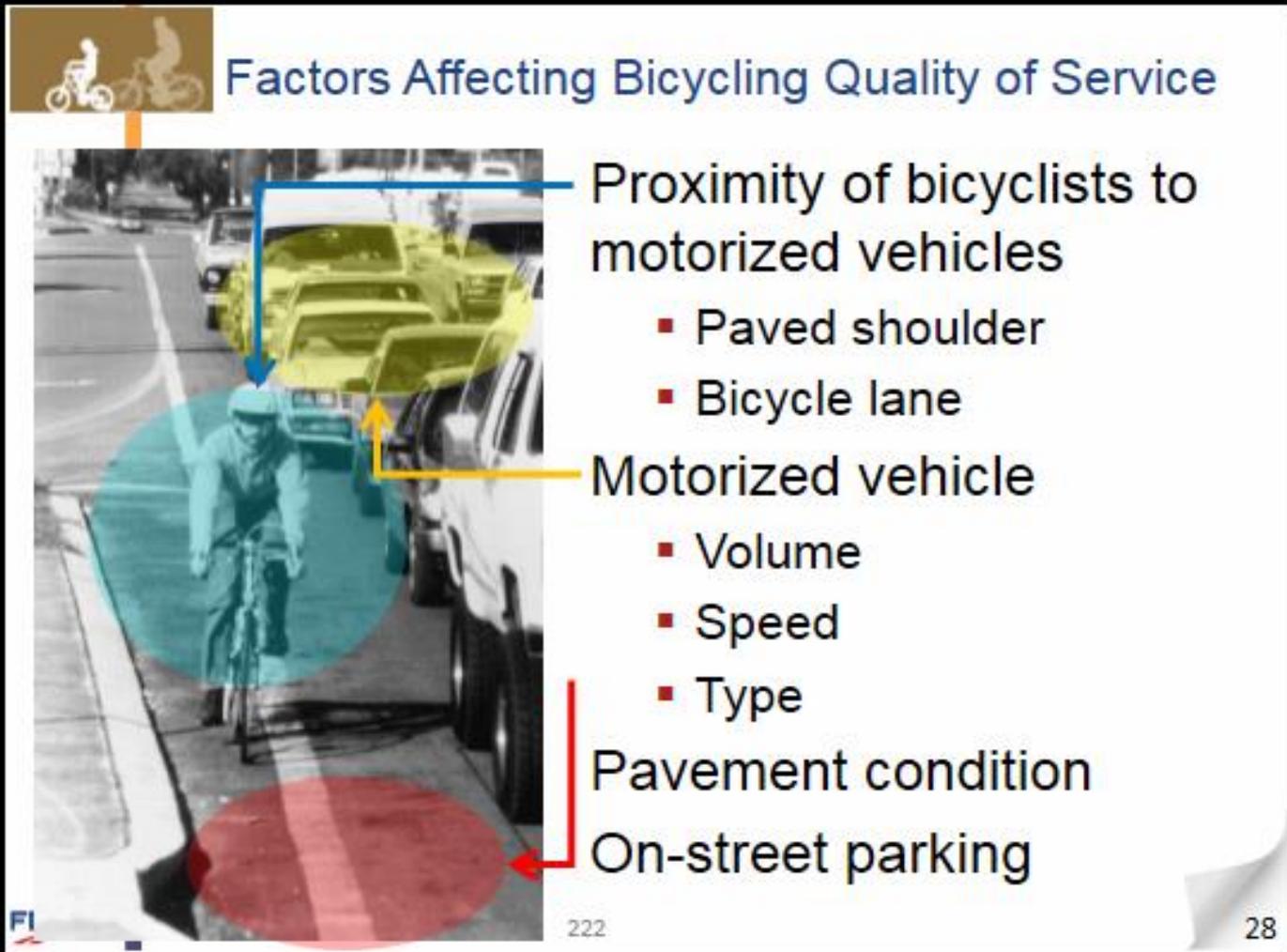
<http://www.dot.state.fl.us/planning/systems/programs/sm/accom/pdf/fdotmedianhandbook.pdf>

SEP 2014 | 81

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
850-414-4900 dot.state.fl.us/planning/systems

SYSTEMS
PLANNING

Data to Support Our Analysis



The diagram features a photograph of a cyclist on a city street. A blue arrow points from the text 'Proximity of bicyclists to motorized vehicles' to a yellow highlighted area containing a line of cars. A yellow arrow points from 'Motorized vehicle' to a white car. A red arrow points from 'On-street parking' to a red highlighted area on the sidewalk. A teal circle highlights the cyclist. A small 'FI' logo is in the bottom left corner of the image area.

Factors Affecting Bicycling Quality of Service

- Proximity of bicyclists to motorized vehicles
 - Paved shoulder
 - Bicycle lane
- Motorized vehicle
 - Volume
 - Speed
 - Type
- Pavement condition
- On-street parking

FI 222 28

Trip-Generation Rates for Urban Infill Land Uses in California

Phase 2: Data Collection

FINAL REPORT

Prepared For:

The California Department of Transportation (Caltrans)
Headquarters Divisions of Transportation Planning
and Research & Innovation

Prepared By:

Kimley-Horn and Associates, Inc.

In Association With:

Economic & Planning Systems
Gene Bregman & Associates

June 15, 2009



Source: [Link](#)



NCHRP

REPORT 758

NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

Trip Generation Rates for Transportation Impact Analyses of Infill Developments



Source: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_758.pdf

Site Name: Bachenheimer Building.

Site Location: 2111 University Avenue, Berkeley, CA 94704

Land Use Type: Residential with ground floor commercial

Site Characteristics:	Quantity
Studios Units:	0 D.U.
1 Bedroom Units:	12 D.U.
2 Bedrooms Units:	32 D.U.
3 + Bedrooms Units:	0 D.U.
Total	44 D.U.
Ground Floor Commercial:	3,000 Sq. Ft.
Residential Occupancy:	100%
Commercial Occupancy:	100%
Number of parking spaces:	30
Number of spaces per unit:	0.68
Density of Site:	155 units/acre



Site Description:

Meets Residential Criteria: Yes
 Meets Employment Criteria: Yes
 Meets Transit Proximity Criteria: Yes

Area Type: CBD
 Transect / Context Zone Type: Urban Center (T/CZ-5)

Predominant Land Use within 0.5 miles: Non-Residential Distance from CBD: Within CBD
 Connectivity Index (Measure of Walking Environment): High Residential Density (within 0.5 mile): 11.63 units/gross land acre
 % of blocks within 0.5 miles with sidewalks: 100% Employment Density (within 0.5 mile): 36.23 workers/gross land acre

Survey Date: 10th May, 2007

ITE Land Use Codes: ITE 223 Mid-Rise Apartments
ITE 820 Shopping Center

Residential Trip Rate Comparison	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
ITE Trip Rate	0.09	0.21	0.30	0.23	0.16	0.39
Directional Distribution	31%	69%	100%	58%	42%	100%
Surveyed Trip Rate	0.00	0.00	0.00	0.03	0.01	0.04
Directional Distribution				70%	30%	100%
Surveyed Mode Split	AM Peak - % Trips			PM Peak - % Trips		
	Auto	0%		Auto	7%	
	Transit	11%		Transit	27%	
	Walk/Bicycle	89%		Walk/Bicycle	66%	

Commercial Trip Rate Comparison	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
ITE Trip Rate	0.63	0.37	1.00	1.79	1.94	3.73
Directional Distribution	63%	37%	100%	48%	52%	100%
Surveyed Trip Rate	0.00	0.00	0.00	1.72	2.28	4.00
Directional Distribution				43%	57%	100%
Surveyed Mode Split	AM Peak - % Trips			PM Peak - % Trips		
	Auto	0%		Auto	38%	
	Transit	0%		Transit	0%	
	Walk/Bicycle	0%		Walk/Bicycle	62%	

Note: The commercial shop was closed during the AM peak hour

Site Name: Bachenheimer Building.

Site Location: 2111 University Avenue, Berkeley, CA 94704

Site Name: Bachenheimer Building.

Site Location: 2111 University Avenue, Berkeley, CA 94704

Land Use Type: Residential with ground floor commercial

Site Characteristics:

Quantity

Studios Units:	0 D.U
1 Bedroom Units:	12 D.U
2 Bedrooms Units:	32 D.U
3 + Bedrooms Units:	0 D.U
Total	44 D.U

Ground Floor Commercial: 3,000 Sq. Ft.

Residential Occupancy: 100%

Commercial Occupancy: 100%

Number of parking spaces: 30

Number of spaces per unit: 0.68

Density of Site: 155 units/acre



Site Description:

Meets Residential Criteria: Yes

Meets Employment Criteria: Yes

Meets Transit Proximity Criteria: Yes

Area Type: CBD

Transect / Context Zone Type: Urban Center (T/CZ-5)

Surveyed Trip Rate	0.00	0.00	0.00	1.72	2.28	4.00
Directional Distribution				43%	57%	100%

Surveyed Mode Split	AM Peak - % Trips			PM Peak - % Trips		
	Auto	0%		Auto	38%	
Transit	0%		Transit	0%		
Walk/Bicycle	0%		Walk/Bicycle	62%		

Note: The commercial shop was closed during the AM peak hour

ITE Land Use Codes: ITE 820 Shopping Center

Residential Trip Rate Comparison

AM Peak Hour			PM Peak Hour		
In	Out	Total	In	Out	Total

ITE Trip Rate
Directional Distribution

--	--	--	--	--	--

Surveyed Trip Rate
Directional Distribution

--	--	--	--	--	--

Surveyed Mode Split

AM Peak - % Trips		PM Peak - % Trips	
Auto		Auto	
Transit		Transit	
Walk/Bicycle		Walk/Bicycle	

Commercial Trip Rate Comparison

AM Peak Hour			PM Peak Hour		
In	Out	Total	In	Out	Total

ITE Trip Rate
Directional Distribution

0.63	0.37	1.00	1.79	1.94	3.73
63%	37%	100%	48%	52%	100%

Surveyed Trip Rate
Directional Distribution

5.92	6.17	12.09	1.96	2.05	4.01
49%	51%	100%	49%	51%	100%

Surveyed Mode Split

AM Peak - % Trips		PM Peak - % Trips	
Auto	-	Auto	40%
Transit	-	Transit	48%
Walk/Bicycle	-	Walk/Bicycle	12%

Surveyed Mode Split

AM Peak - % Trips		PM Peak - % Trips	
Auto		Auto	
Transit		Transit	
Walk/Bicycle		Walk/Bicycle	

Commercial Trip Rate Comparison

AM Peak Hour			PM Peak Hour		
In	Out	Total	In	Out	Total





Placemeter automates counts and is able to capture a wide variety of information, such as how quickly people are walking past a store.

<https://vimeo.com/69091237>

See the video

Source: [Placemeter](#)

I  **Florida**



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