Name: _____

Access Management for Corridors

Access Management Training 2013

Introduction

Instructors and Audience Introductions

- Work area and experience
- Access management experience

Questions You Would Like Answered from Training

- Question/Comment "Parking Lot"
- Discuss with group. Request expectations and write them down for everyone to see

2

Housekeeping

- Phones
- Agenda overview
  - Breaks / meals
- Participation
- PDH Credits

3

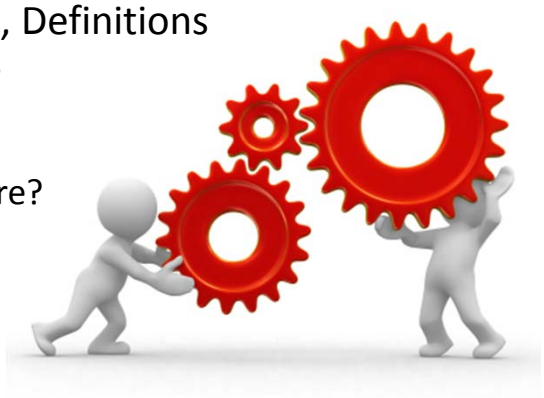
Workshop Agenda

Access Management Goals and Principles	Development Review Exercise
Access Management Resources and Context Sensitive Solutions	Planning Level Exercise
Access Management Process – Data Collection and Decisions in Context	PD&E Level Exercise
Access Management Process – Public Involvement	Public Involvement Exercise

4

Session 1: Concepts

- Goals, Principles, Definitions
  - What and Why?
- Rules and Tools
  - When and Where?
- Procedure
  - How?
- Who?
  - You!



5

Access Management Goals and Principles

Traditional Goals of Access Management

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

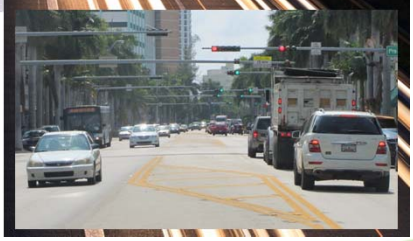
Expanded Goals of Access Management

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

7

Traditional Goals of Access Management

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



8

Multi-modal focus

- Considers vehicles, pedestrians, cyclists, and transit

Enhance mobility with:

- Reduced conflict
- Enhanced safety considerations using *Highway Safety Manual* (*HSM*) and other principles

Expanded public involvement

- Considers FS 335.199 (Senate Bill 1842) and expanded stakeholder outreach

Expanded Goals of Access Management

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

9

Driveways Are For Pedestrians Too

10

Class Goal

To use access management strategies when improving a **corridor**

- Capacity Improvements
- Operational Improvements
- Safety Improvements

Demonstrate how to use

11

Access from the Beginning

Access should be considered from the start of the process

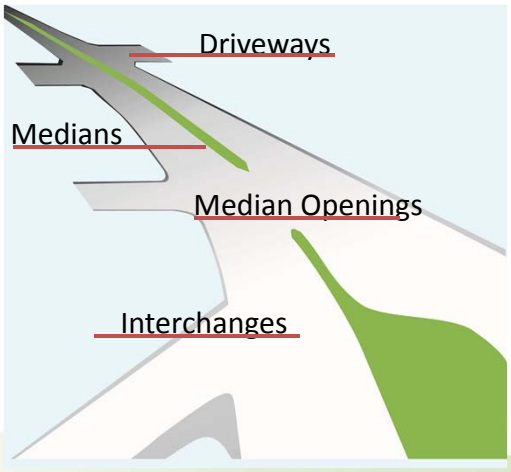
Decisions made w/o access considerations may seem to save time and money at first,

but will eventually increase costs and slow the process down

12

Defining Access Management

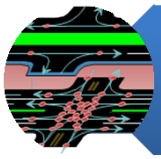
Access management is the careful planning of the location, type and design of access.



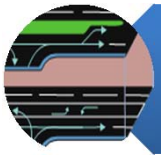
Median Handbook pg 10

13

Access Management Definitions



What are **Conflict Points**?

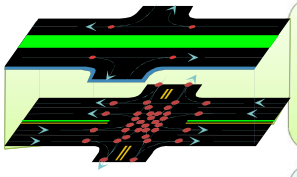


What are **Directional Median Openings**?

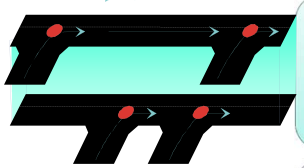
What is Access Management **Classification**?

14

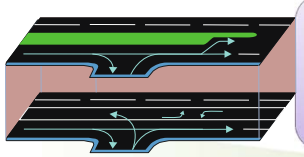
What Are The Principles of Access Management?



Limit the number of conflict points for all modes



Separate the conflict points for all modes



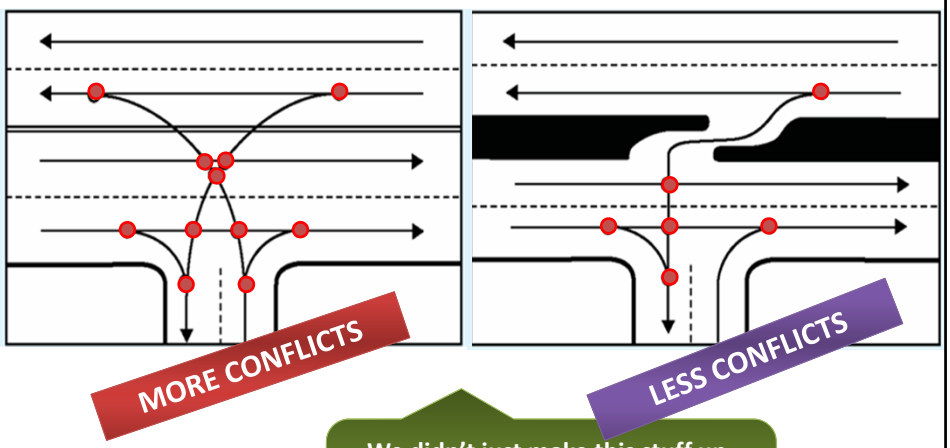
Provide reasonable access at each property

15

Before Access Management

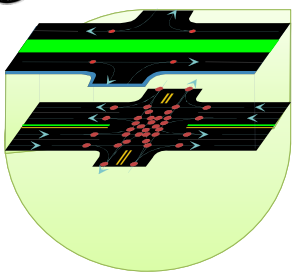
After Access Management

More conflicts means more crashes



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

16

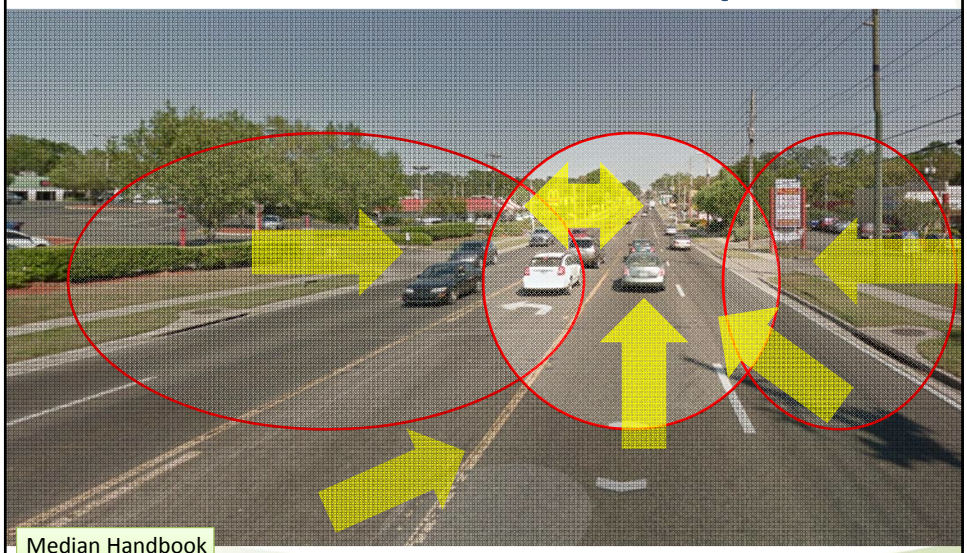


Limiting Conflict Points

- Reducing Number of Median Openings
- More Restrictive Median Openings
  - Directional vs Full
- Reducing and Aligning Driveways
- Better Driveway Design

17

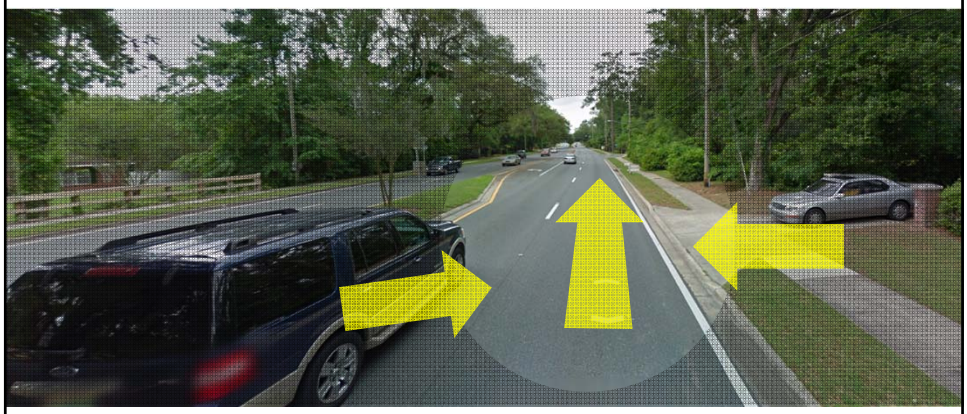
Center Turn Lane Driver Perspective



Median Handbook pg 13

18

Median - Driver Perspective

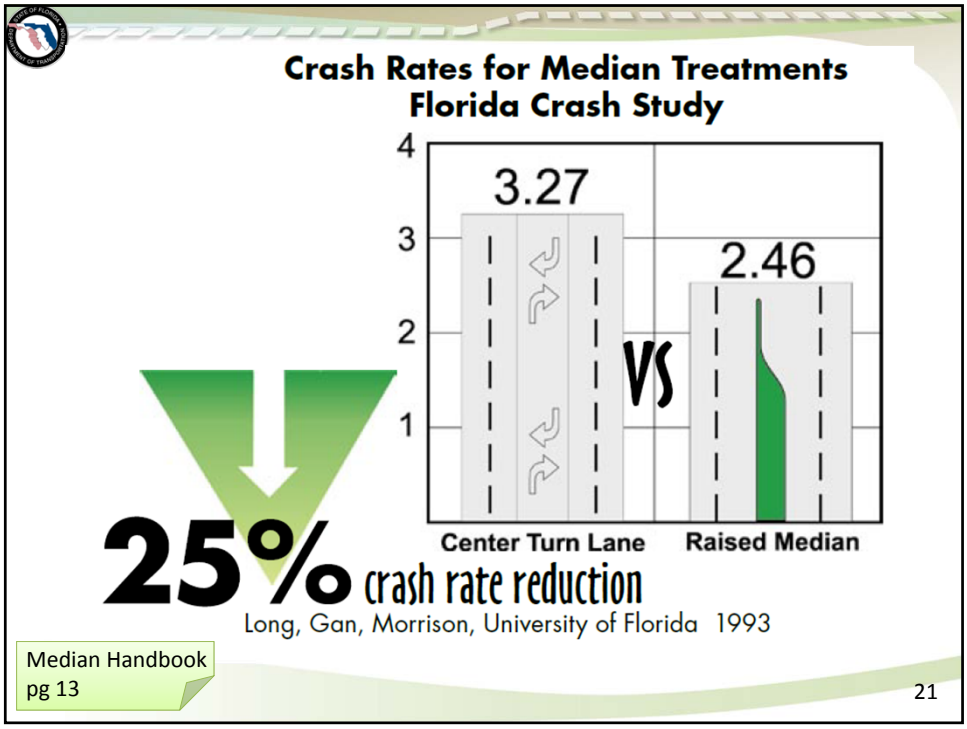


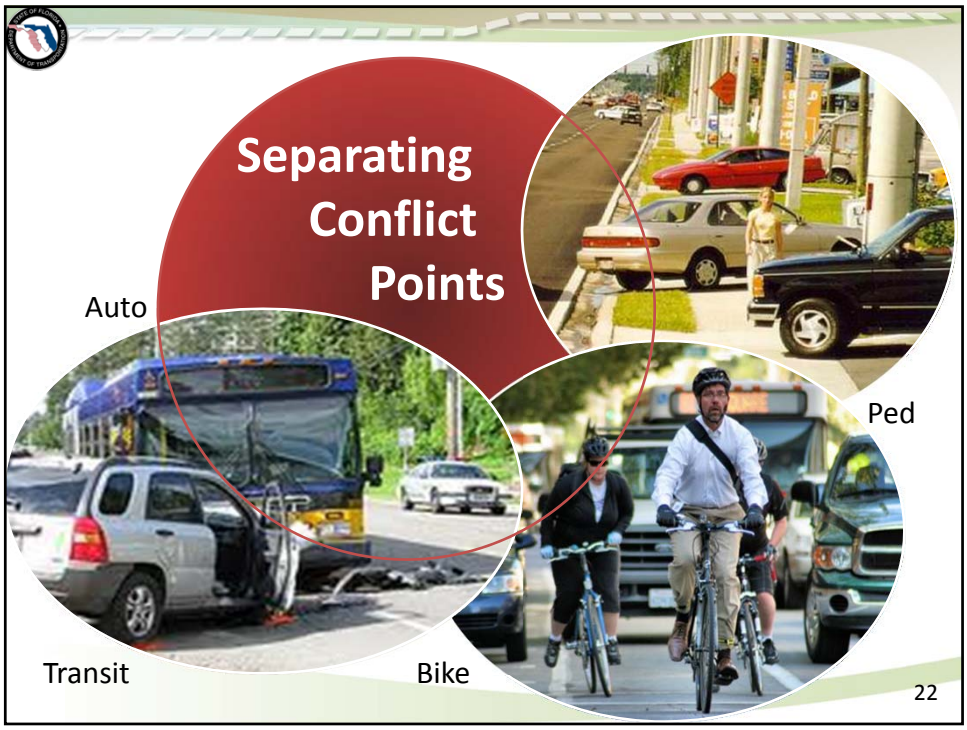
Median Handbook
pg 14

19

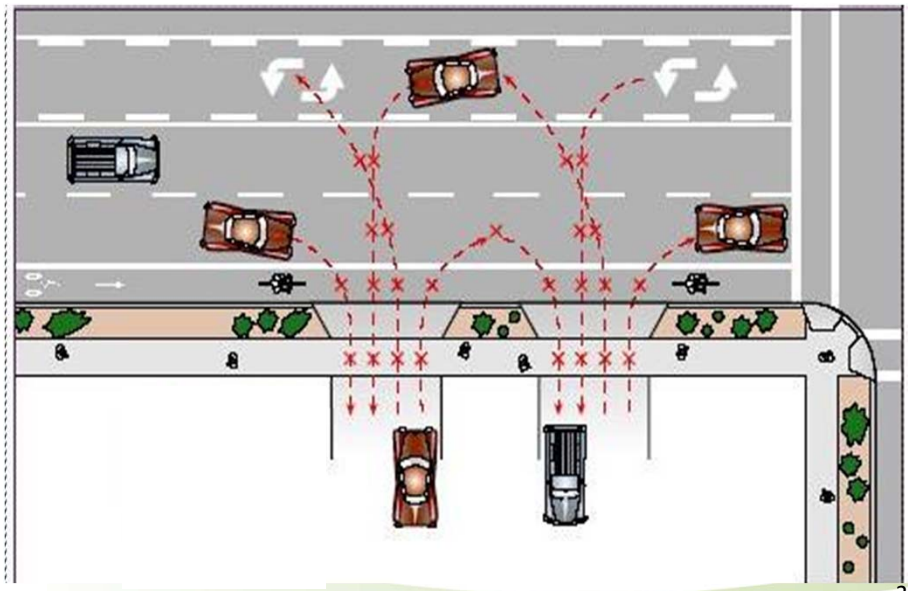
Two-Way Left Turn Lanes Pedestrians Conflicts

20


Crash Rates for Median Treatments
Florida Crash Study
4
3
2
1
3.27
2.46
VS
Center Turn Lane
Raised Median
25% crash rate reduction
Long, Gan, Morrison, University of Florida 1993
Median Handbook
pg 13
21


Separating
Conflict
Points
Auto
Ped
Transit
Bike
22

Separating Conflicts - Pedestrians



Source: Oregon DOT

23

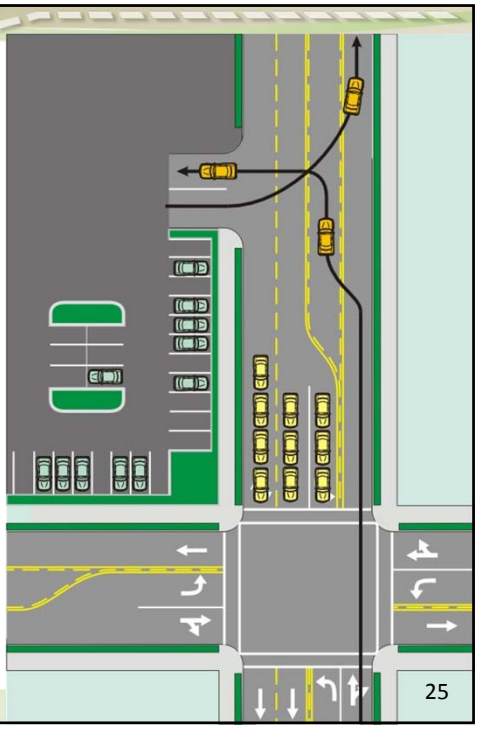
Separating Conflicts - Bicycles

Examples for separating vehicular/bike

24

Separating Conflicts

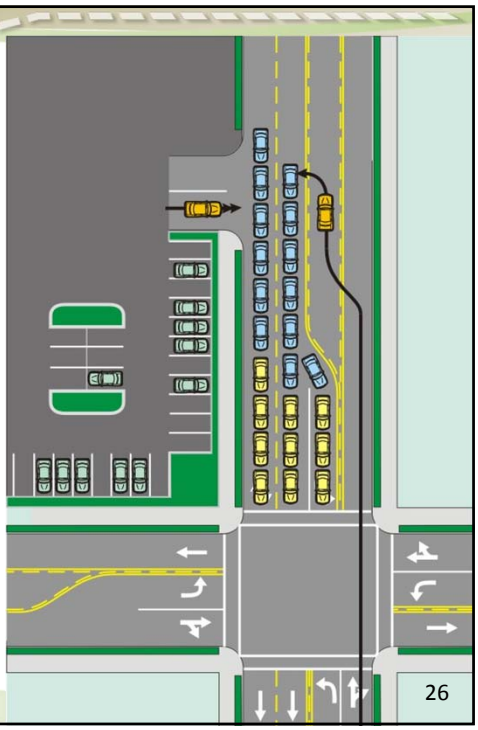
- Vehicular Queuing
  - Existing Traffic Conditions



25

Separating Conflicts

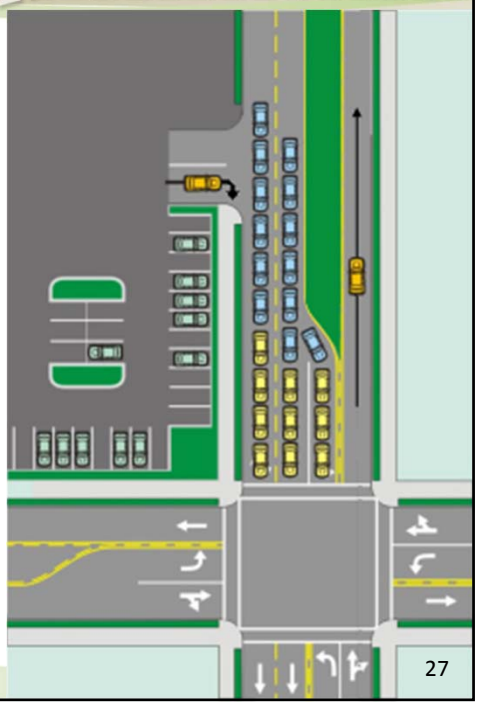
- Vehicular Queuing
  - Existing Traffic Conditions
  - Future Traffic Conditions



26

Separating Conflicts

- Vehicular Queuing
  - Existing Traffic Conditions
  - Future Traffic Conditions
- Median Modification
  - Eliminates main street left turn access
  - Side street right in/right out

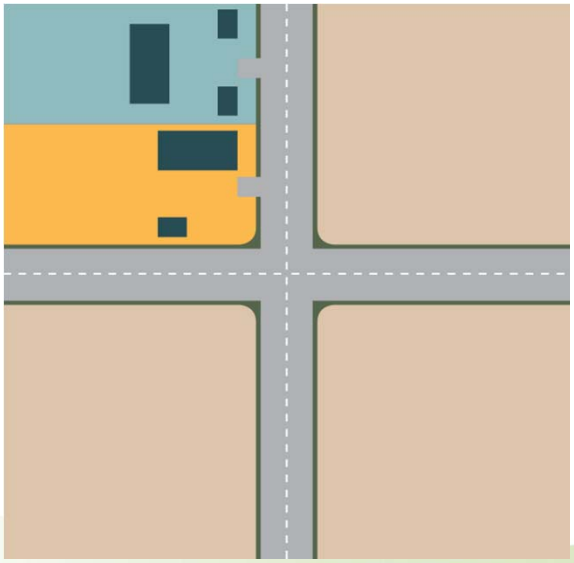


27

Importance of Site Planning

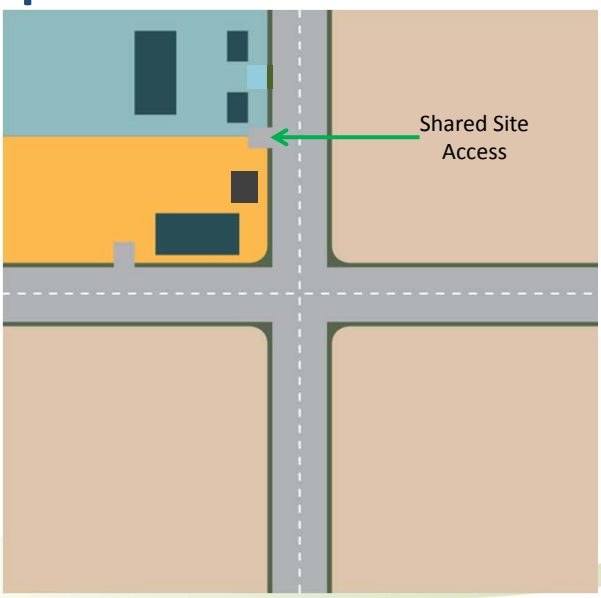
Future Development

Previously Proposed Site & Access Plan



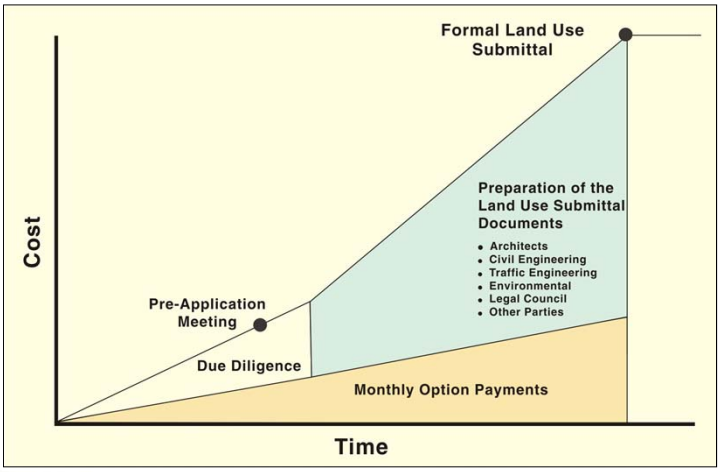
28

Importance of Site Planning

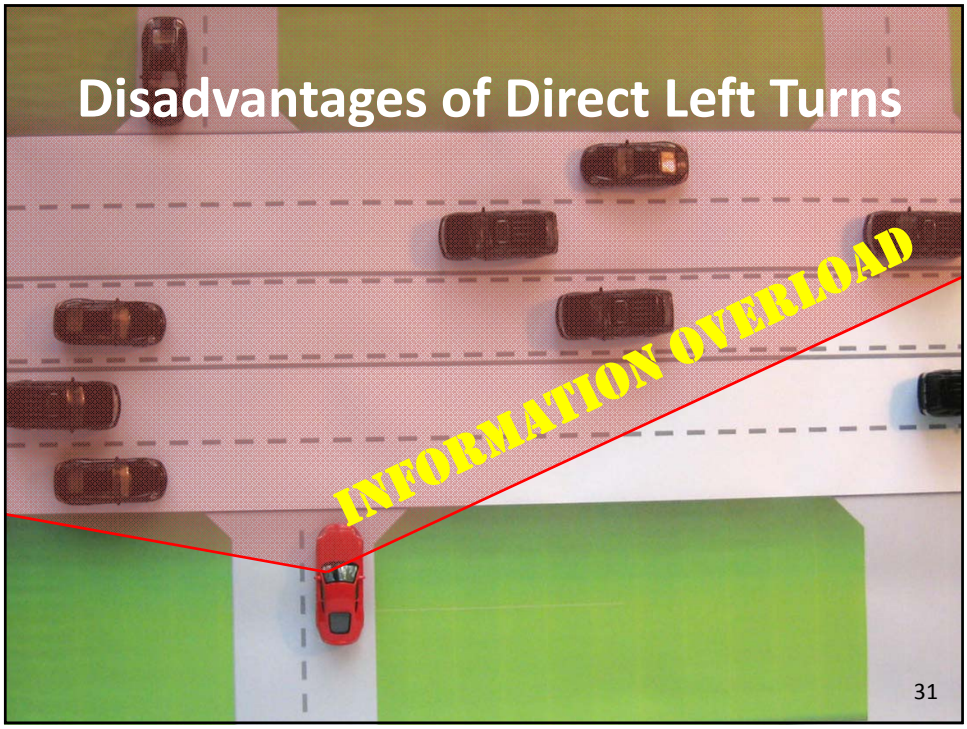


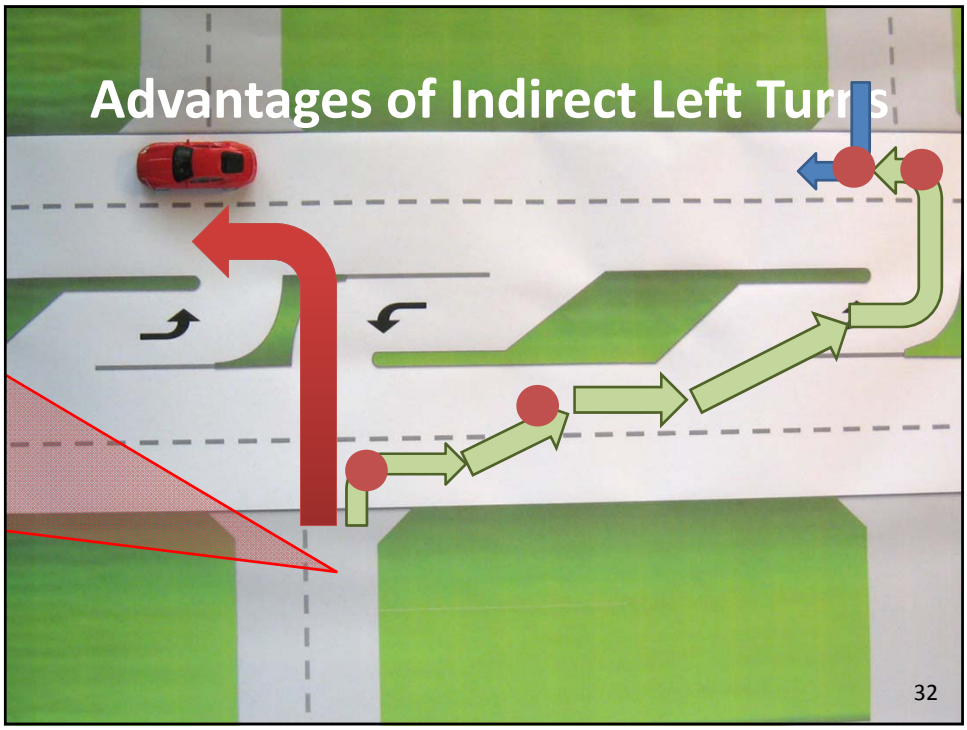
29

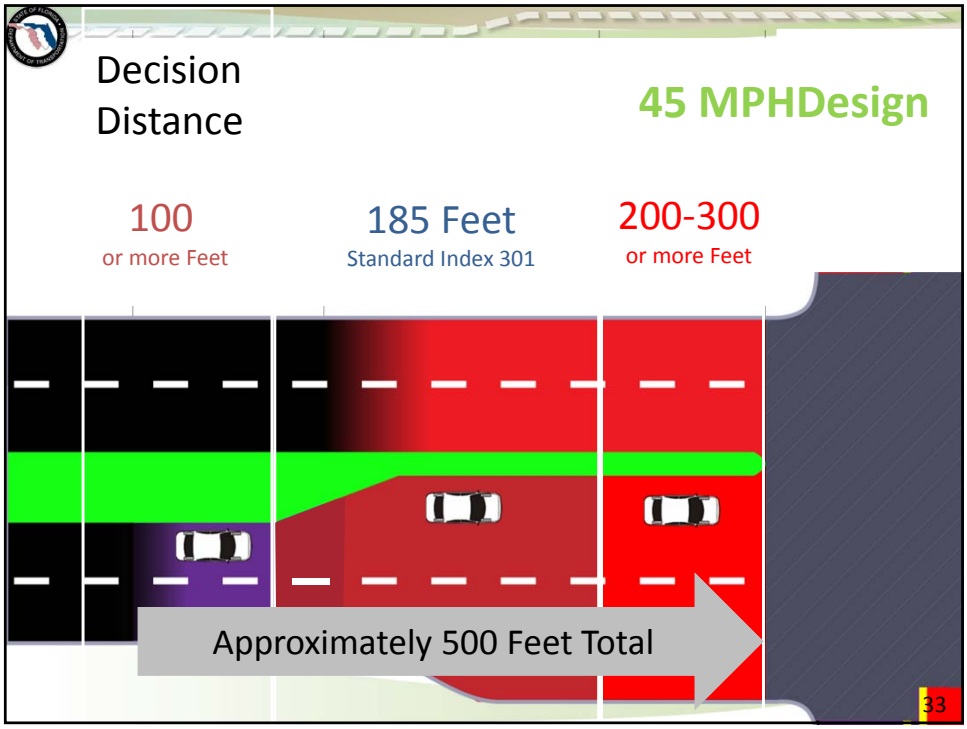
The Development Process from a Timeline and Cost Perspective

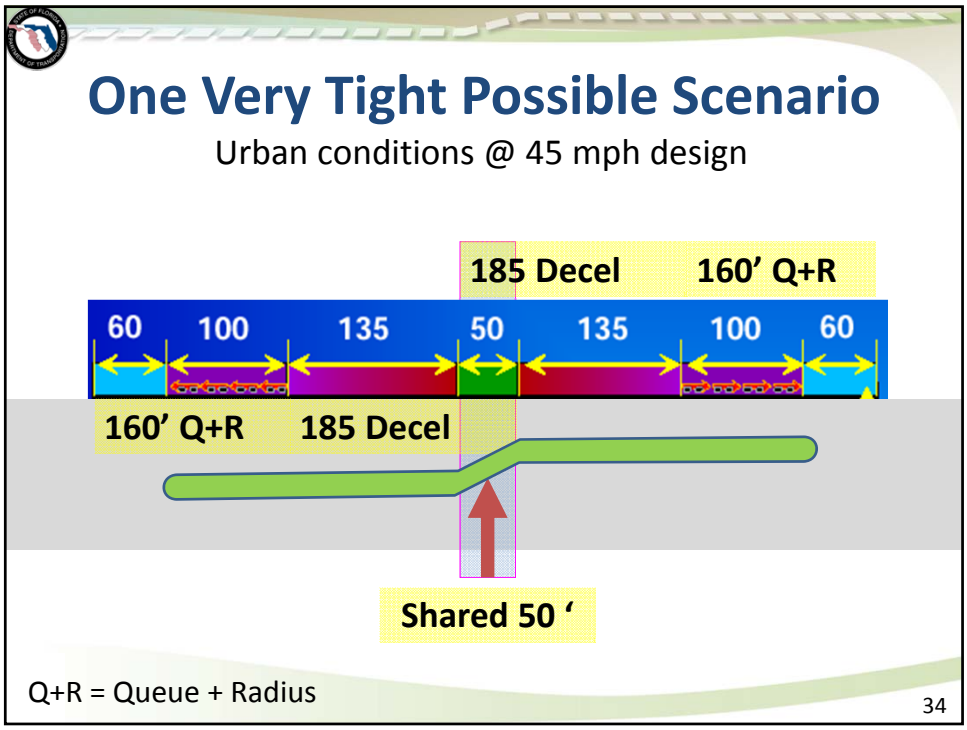


30


Disadvantages of Direct Left Turns
INFORMATION OVERLOAD
31


Advantages of Indirect Left Turns
32


Decision Distance
45 MPHDesign
100
or more Feet
185 Feet
Standard Index 301
200-300
or more Feet
Approximately 500 Feet Total
33


One Very Tight Possible Scenario
Urban conditions @ 45 mph design
185 Decel
160' Q+R
60
100
135
50
135
100
60
160' Q+R
185 Decel
Shared 50 '
Q+R = Queue + Radius
34

What are the Florida Statutes on Access?

Sections 335.181-335.188 the "State Highway System Access Management Act"

Rule 14-96
– Connection Permits

Rule 14-97
– Classification System and Access Management Standards

Driveway Info Guide pg 14, 72-74, 88

Median Handbook pg 15, 18, 20, 26

35

Does Everyone Get a Driveway?

" A property owner shall be granted a permit for an access connection to the abutting state highway, unless the permitting of such access connection ***would jeopardize the safety*** *of the public or have a negative impact upon operational characteristics of the highway."*

335.184(3)FS

36

Yes…**But**

FDOT Can Limit the Types of Turns

"Nothing in this subsection limits the department's authority to restrict the operational characteristics of a particular means of access."

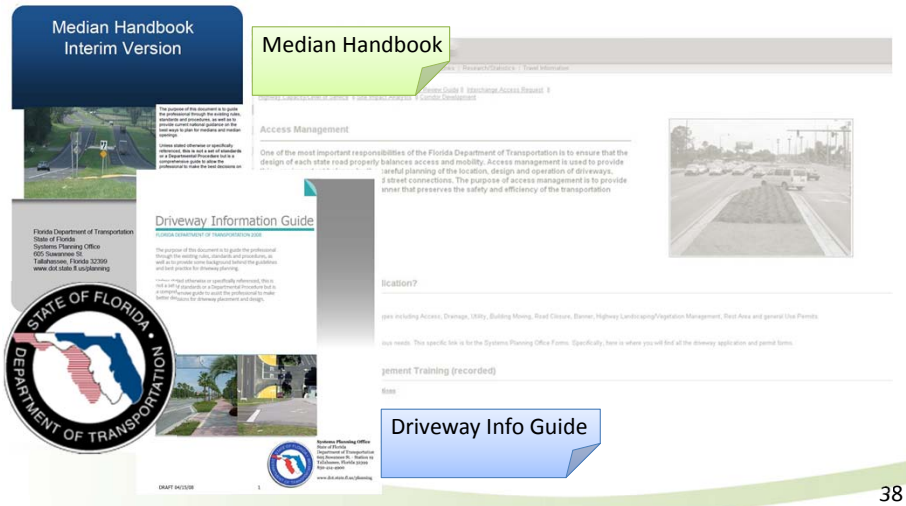
335.184(3)(d)FS

Lefts are not a right

37

FDOT Access Management Resources

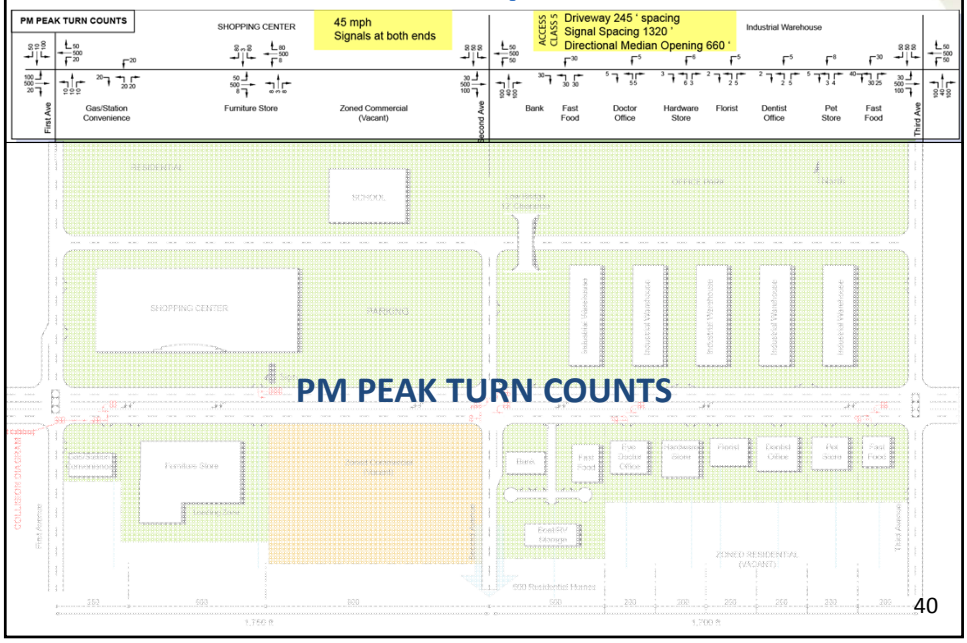
http://www.dot.state.fl.us/planning/systems/sm/accman/



38

Example

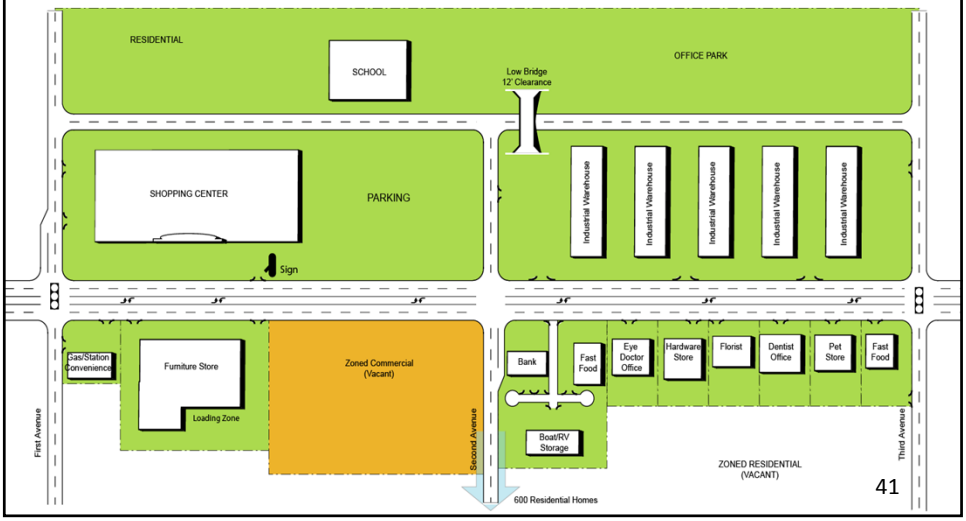
Example



40

Example

Posted 45 mph



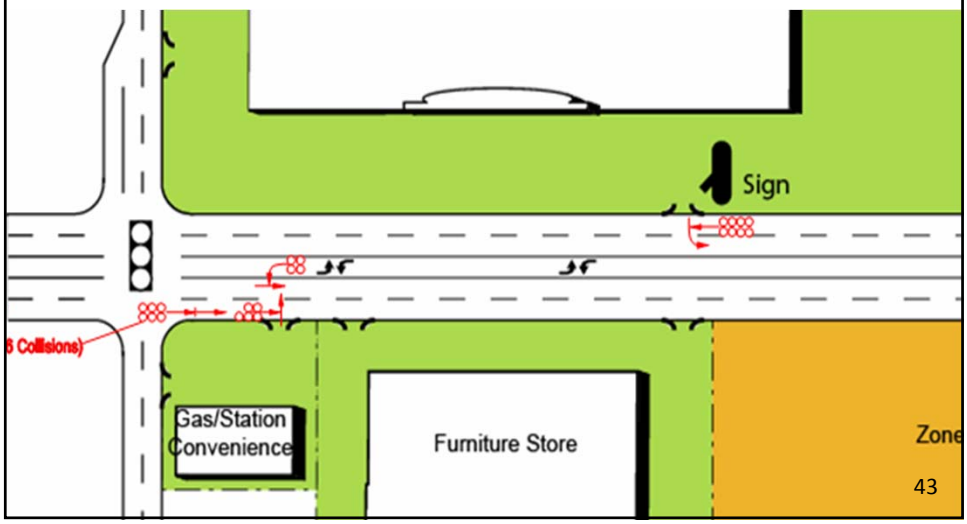
41

Example

5 Lane Section – Signals at both ends

42

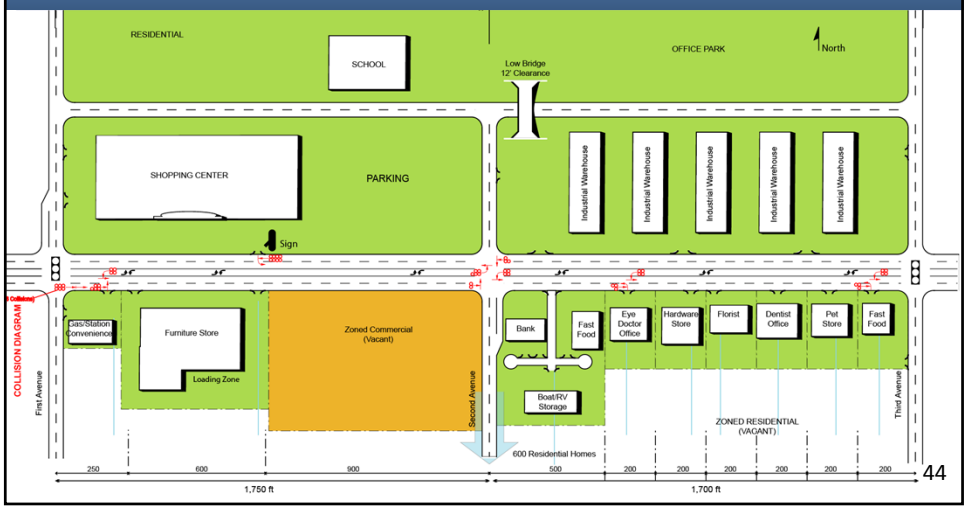
Example
Collision Diagrams – 3 Years of Crash Data



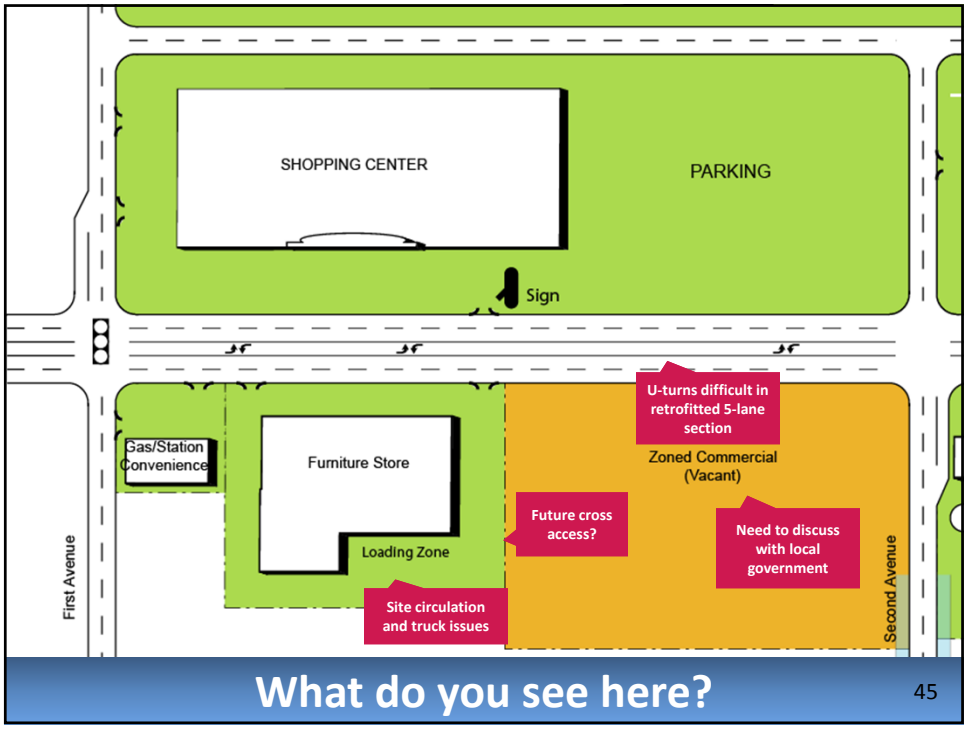
43

Example

Take a few minutes and see how many problems and opportunities you can find



44



What do you see here?

45

Workshop #1 – Home Depot in New Smyrna Beach

- **Background Information**
  - SR 44 is a major E-W highway that connects I-4, I-95 and New Smyrna Beach
  - 4 lane facility w/full median openings
  - 0.40 mile-long study corridor
  - Posted speed limit of 55 mph
  - Access Class 3 (2,640 feet between full median openings and signals, 1,320 feet between directional median openings)

46

Workshop #1 – Home Depot in New Smyrna Beach

- **Land Uses**
  - Study corridor is mostly rural, undeveloped land with a few residential properties
  - Future Land Use (FLU) east of Home Depot zoned as retail w/possibility of Walmart
  - Future land use west of Home Depot zoned as residential
- **Objective**
  - Development review exercise
  - Review traffic study and proposed access management plan for new Home Depot

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Workshop #1 – Home Depot in New Smyrna Beach

- **Task**
  - FDOT reviews traffic impact analysis and proposed median modifications for new Home Depot
  - Your task is to provide an acceptable access management plan for SR 44 from Oliver Dr. to Wild Orange Dr.
- **Scenario**
  - Divide your group in half with one team representing the developer and the other team representing FDOT

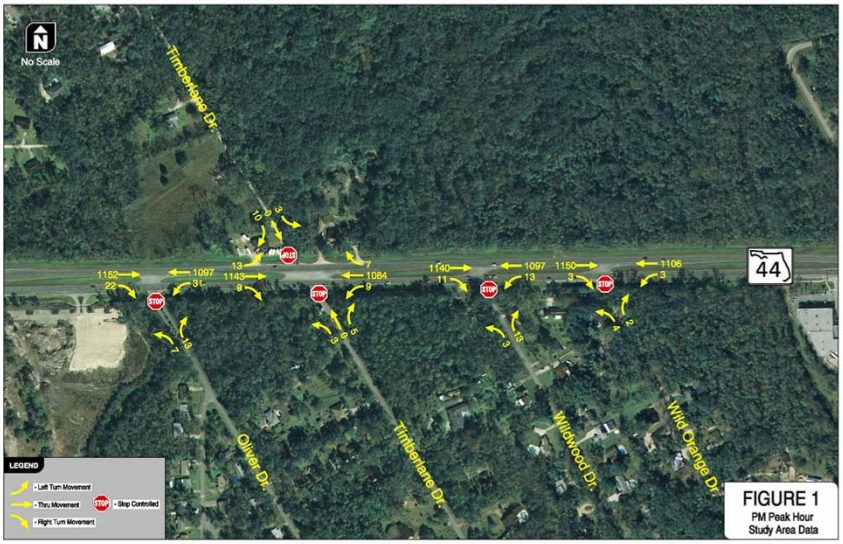
48

Workshop #1 – Home Depot in New Smyrna Beach

- **Materials**
  - Turning movement counts at the major intersections during the PM peak hour (Figure 1)
  - Future turning movement volumes at SR 44/Timberlane Drive and SR 44/Future Street for Home Depot (Figure 2)
  - Scenario 1 access management plan (Figure 3)
  - Executive Summary from the transportation impact analysis
  - Site plan for the proposed Home Depot
  - Future land use map

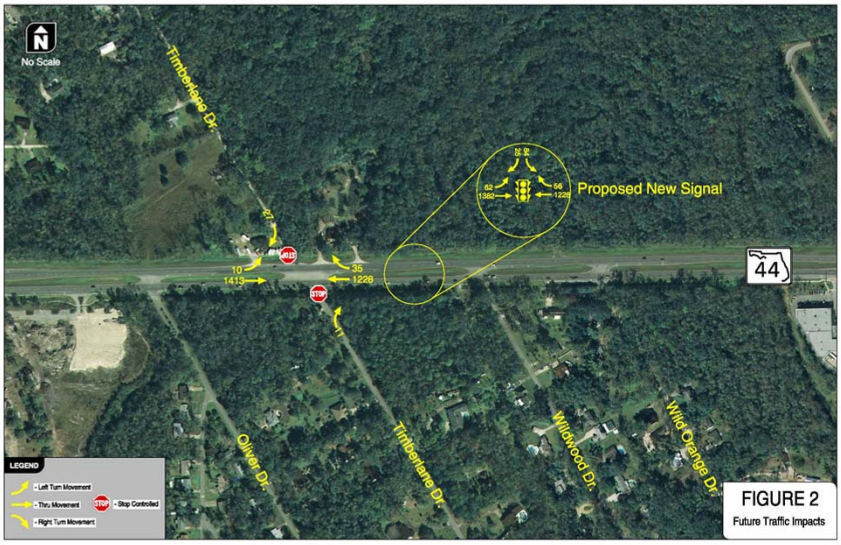
49

Workshop #1 – Home Depot in New Smyrna Beach



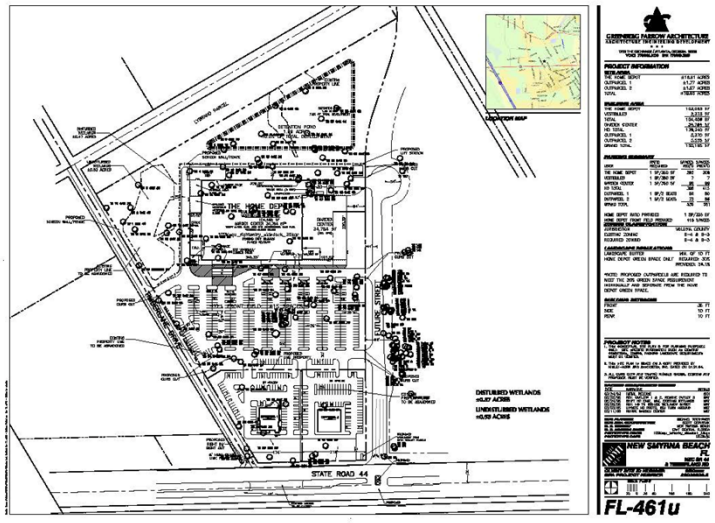
50

Workshop #1 – Home Depot in New Smyrna Beach



51

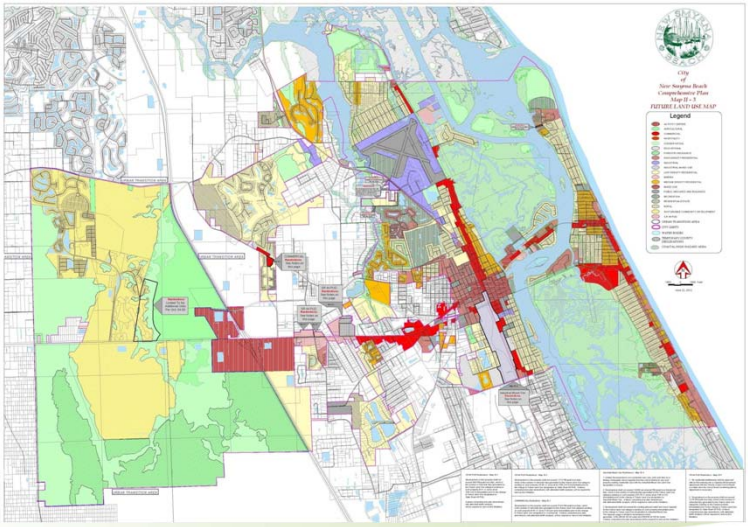
Workshop #1 – Home Depot in New Smyrna Beach



52

Workshop #1 – Home Depot in New Smyrna Beach

Map II-4 Future Land Use



53

Workshop #1 – Home Depot in New Smyrna Beach

- **Tasks**
  - Review the traffic impact analysis and proposed median modifications and provide any comments/modifications
  - Current median openings at Timberlane Drive and Wildwood Drive are proposed to be closed and a signalized median opening will be made to accommodate the future roadway on the eastern end of the Home Depot site
  - The developer team and the FDOT team must reach an agreement on an acceptable access management plan with which to proceed

54

Access Management Resources and Context Sensitive Solutions

Rules & Tools Are Changing

- FS 335.199 (“Bennett Bill”/SB 1842)
- *Highway Safety Manual*
- 2010 HCM Multi-Modal LOS Evaluation
- Context Sensitive Solutions (Enhanced Goals)

56

SB 1842 – Created FS 335.199

"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."

Effective November 17, 2010

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FS 335.199 Requirements

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

58

Brian Blanchard's guidance on SB 1842 regarding changes to medians:

Senate Bill 1842 requires the Department to notify all affected property owners and local governments when it proposes projects on the State Highway System that 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 notification must occur at least 180 days before the project design is finalized. Related to these projects, the bill requires FDOT (a) to consult with applicable local government on its final design and allows the local government to present alternatives to relieve impacts to commercial business properties; (b) to hold at least one public hearing to determine how the project will affect access to businesses and the potential economic impact of the project on the local business community; and (c) to take all comments into consideration in final design of the project.

This bill applies to any proposed work program project beginning design on or after November 17, 2010. The language of the bill states "whenever the Department of Transportation proposes any project", so this language ***does not apply to permit applications. However, for permit applications that affect medians and median openings, the effected people and businesses should be informed and involved by the permittee as soon as possible.***

This provision requires at least one public hearing (advertised and recorded). As man know, the decision whether to construct a median is usually made during the Planning Efficient Transportation Decision Making (ETDM)/Project Development & Environment Phases of a project. During these phases of a project, the FDOT works with a commu an emphasis on their participation in the decision-making process concerning the projec and basic concepts. . These phases involve local government representatives, public in business interest input as well as other interested parties along the corridor and others the corridor. The ETDM/PD&E phases document these activities for major projects thro

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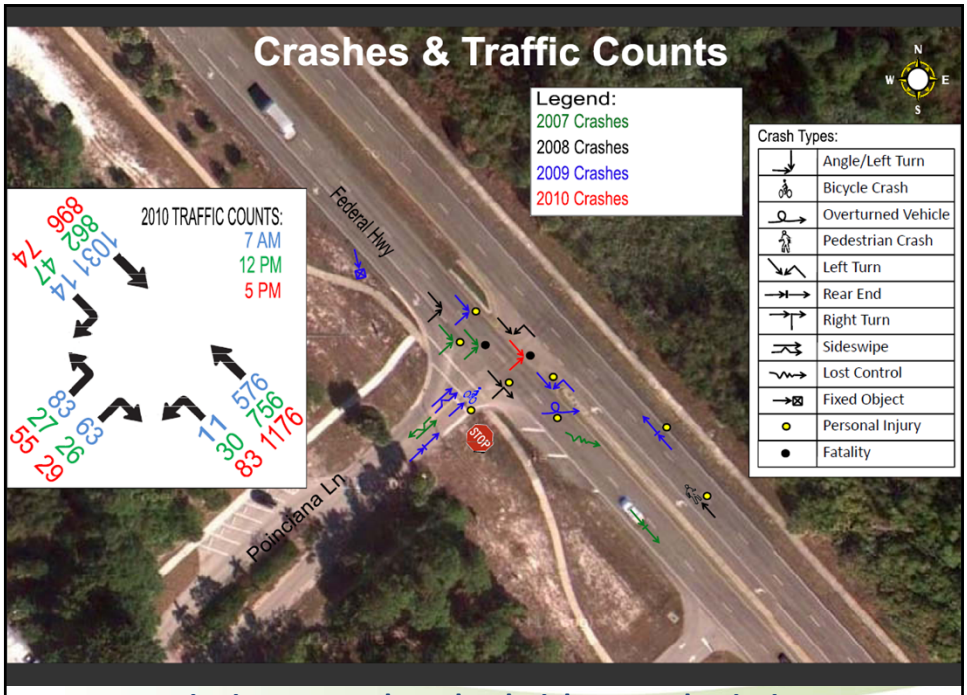
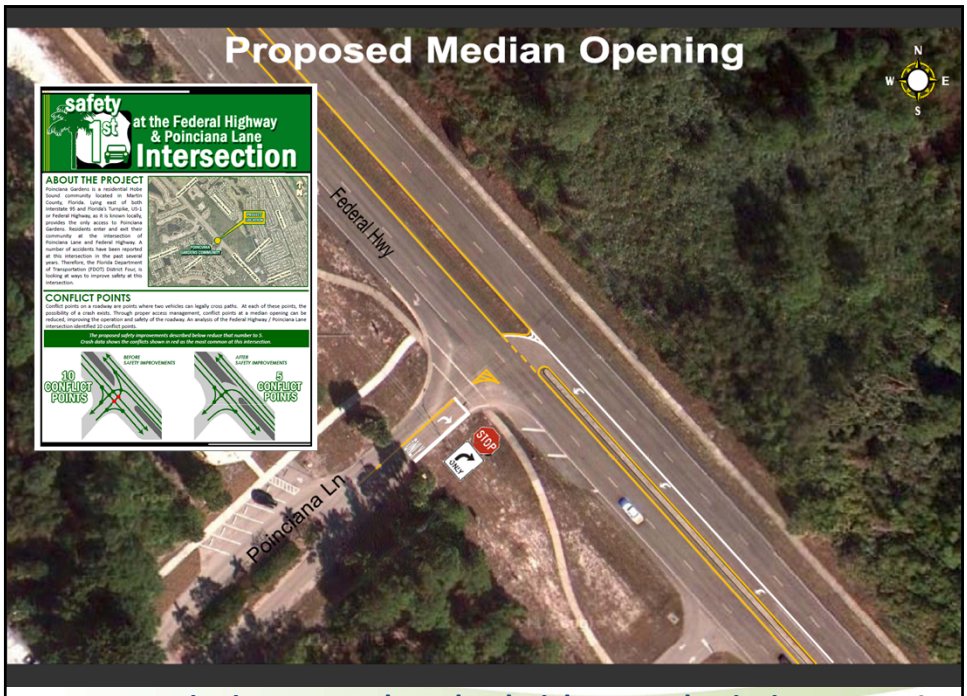
D4 Example of Notice for Median Change

Recent District 4 Example Federal Highway and Poinciana Lane 61

Recent District 4 Example Federal Highway and Poinciana Lane 62

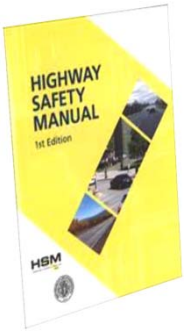


Recent District 4 Example Federal Highway and Poinciana Lane 63



Recent District 4 Example Federal Highway and Poinciana Lane 64

Highway Safety Manual



Chapter 13.4.2.6: Raised Median

- Provide raised median where no median exists
  - Urban (Two-lane and Multilane) and Rural (Multilane)
  - Shows crash reduction with raised median

Chapter 13.4.2.7: Change the Width of an Existing Median

- Rural multilane and urban arterials

Can use Part C predictive methodology for four lane roadways

Chapter 13.14: Access Management and Driveways

65

HSM on Raised Medians

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])	Unspecified	All types (Injury)	0.78[7]	0.02
			All types (Non-injury)	1.09[7]	0.02
	Rural (Multilane[a,f])		All types (Injury)	0.88	0.03
			All types (Non-injury)	0.82	0.03

Base Condition: Absence of raised median.

Chapter 13.4.2.6: Raised Median

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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		All types (Injury)	0.78'	0.02

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

HSM on 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 Handbook Chapter 4

Chapter 13.4.2.7: Median Width

Example Problem

- *HSM* sample problem – You have been asked to evaluate the safety impacts of changing from a 5 lane with two-way left turn lane roadway to a 4 lane divided roadway with a raised median. Using Part C of the *HSM*, you can make predictions based on the following information:
  - AADT is 30,000 vehicles/day
  - Roadway length is 1 mile

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Urban Highway Five Lane with Two-Way Left Turn Lane Roadway Segments

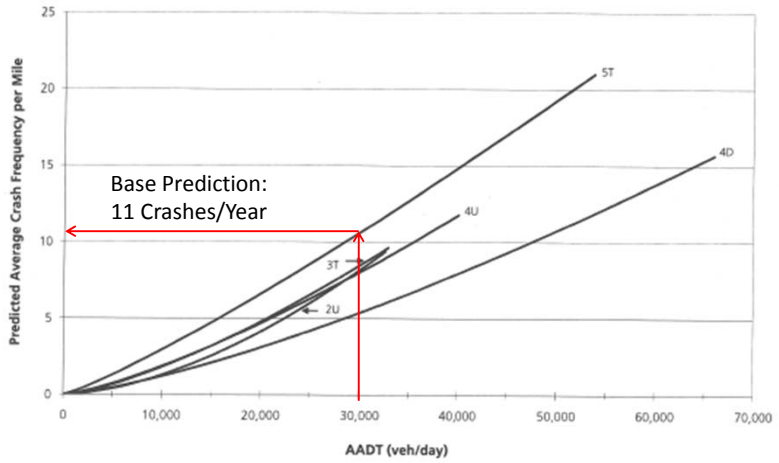

Figure 12-3. Graphical Form of the SPF for Multiple Vehicle Nondriveway collisions (from Equation 12-10 and Table 12-3)

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Urban Highway Four-Lane Divided Roadway Segments

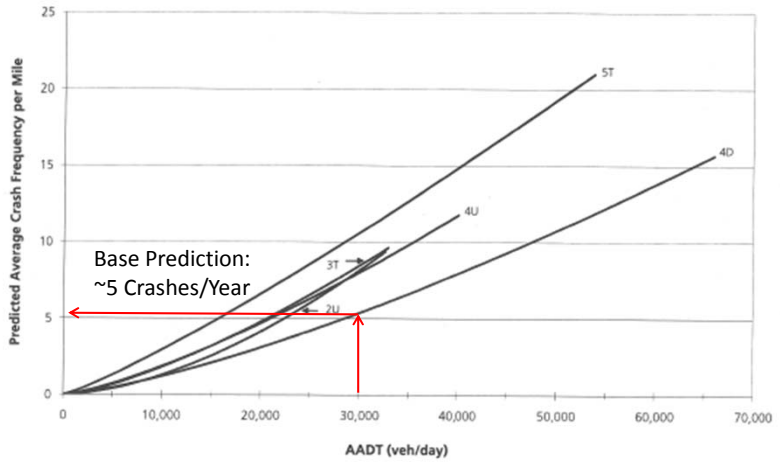

Figure 12-3. Graphical Form of the SPF for Multiple Vehicle Nondriveway collisions (from Equation 12-10 and Table 12-3)

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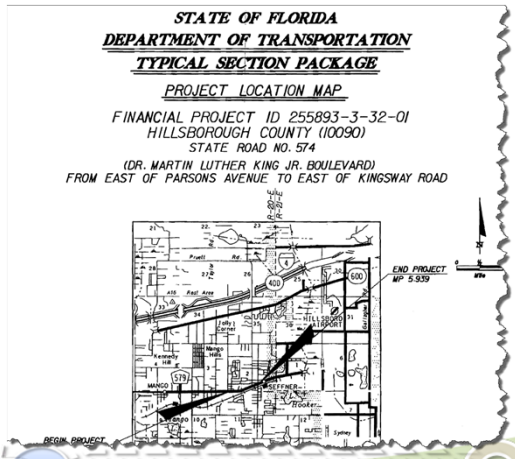
Highway Safety Manual Case Study:

Implementing the Predictive Method in Florida

SR 574



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HSM
Highway Safety Manual

HSM
Highway Safety Manual

Draft Highway Safety Manual Case Study: Implementing the Predictive Method in Florida for SR 574

HSM Reference

The American Association of State Highway and Transportation Officials' (AASHTO's) *Highway Safety Manual* (HSM) Part C (Chapters 10-12) Predictive Method can be used to estimate crash frequency and severity. The predictive method uses equations known as Safety Performance Functions (SPFs) to estimate the expected average crash frequency as a function of traffic volume and roadway characteristics (e.g., number of lanes, median width, intersection

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From Benefit Cost Spreadsheet

	Multi-Vehicle Driveway Crashes								
AADT	N(majority)	N(minority)	N(other)	N(total)	FI(SV)	PDO(SV)	Ficost	PDOcost	Present Value
26800	0.326	0.523	3.168	4.017	1.081	2.937	$170,953	$29,727	$192,962
27342.05	0.333	0.536	3.243	4.113	1.106	3.006	$175,013	$30,433	$189,946
27895.06	0.341	0.548	3.320	4.210	1.133	3.078	$179,169	$31,156	$186,977
28459.26	0.350	0.561	3.399	4.310	1.159	3.151	$183,423	$31,895	$184,055
29034.87	0.358	0.575	3.480	4.413	1.187	3.226	$187,778	$32,653	$181,178
29622.12	0.366	0.588	3.563	4.517	1.215	3.302	$192,237	$33,428	$178,347
30221.24	0.375	0.602	3.647	4.625	1.244	3.381	$196,802	$34,222	$175,559
30832.49	0.384	0.617	3.734	4.734	1.274	3.461	$201,475	$35,034	$172,815
31456.1	0.393	0.631	3.823	4.847	1.304	3.543	$206,259	$35,866	$170,114
32092.32	0.402	0.646	3.913	4.962	1.335	3.627	$211,157	$36,718	$167,456
32741.41	0.412	0.662	4.006	5.080	1.366	3.713	$216,171	$37,590	$164,838
33403.63	0.422	0.677	4.101	5.200	1.399	3.801	$221,304	$38,482	$162,262
34079.24	0.432	0.693	4.199	5.324	1.432	3.892	$226,559	$39,396	$159,726
34768.52	0.442	0.710	4.298	5.450	1.466	3.984	$231,939	$40,332	$157,230
35471.73	0.452	0.727	4.401	5.580	1.501	4.079	$237,447	$41,289	$154,772
36189.18	0.463	0.744	4.505	5.712	1.537	4.176	$243,085	$42,270	$152,353
36921.13	0.474	0.762	4.612	5.848	1.573	4.275	$248,857	$43,274	$149,972
37667.88	0.485	0.780	4.722	5.987	1.610	4.376	$254,766	$44,301	$147,628
38429.74	0.497	0.798	4.834	6.129	1.649	4.480	$260,816	$45,353	$145,321
39207.01	0.509	0.817	4.948	6.274	1.688	4.587	$267,009	$46,430	$143,050
40000									$3,336,562

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converted to a present value using a four percent discount rate. The resulting values for the two design alternatives are provided in the following table.

CRASH TYPE	4 LANE, DIVIDED	5 LANE WITH TWLTL
Multi-Vehicle	$1,492,000	$2,856,000
Single Vehicle	$155,000	$235,000
Driveways	$561,000	$3,337,000
Total	**$2,208,000**	**$6,428,000**

Based on these results, the four-lane divided alternative was predicted to have a crash cost savings of approximately $4.2 million compared to the five-lane with two-way left-turn lane alternative. A benefit-cost ratio was calculated by dividing the crash cost savings by the difference in ROW costs[2]. The resulting benefit-cost ratio was equal to 2.64, illustrating that the benefit obtained through improvement in crash costs more than offset the differential in ROW

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Final Benefit Cost

BENEFIT-COST RATIO: 4-LANE DIVIDED TO 5-LANE

4-LANE CRASH COST = $2,208,397
5-LANE CRASH COSTS = $6,427,529

4-LANE RIGHT OF WAY COSTS = $2,200,000
5-LANE RIGHT OF WAY COSTS = $600,000

B/C = 2.64

Benefit/Cost Ratio:

Societal Costs (due to crashes)
$6,427,529 (5 lane)
- $2,208,397 (4 lane)
= $4,219,132 (cost difference)

Additional Cost to Build 4-Lane (ROW)
$2,200,000 (4 lane)
- $600,000 (5 lane)
= $1,600,000 (cost difference)

$4.2M (benefit) / $1.6M (cost)
= 2.6

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Apalachee Before and After Study 2012

Apalachee Parkway

Before and After Study 2012

BEFORE

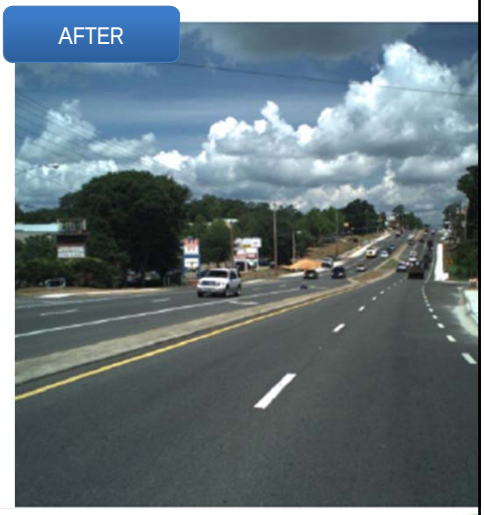
Source : Debbie Dantin

Apalachee Parkway

Before and After Study 2012

BEFORE

AFTER



Small part of an ongoing study being done on median projects, before and after

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http://cosharepoint.dot.state.fl.us/Sites/AccessMgmt/Before%20After%20Median%20Study/ApalacheeParkwayMedianDesignSafetyEvaluation.pdf

Apalachee Parkway Safety Study

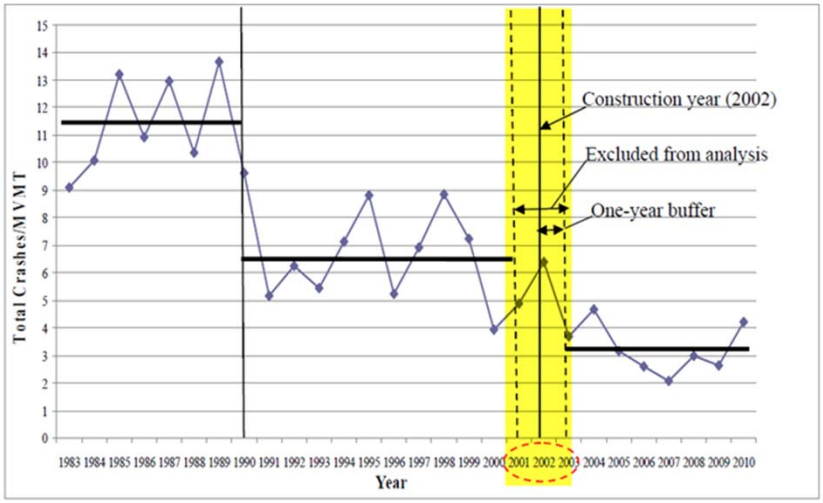

Figure 4. Total Crash Rates by Year

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http://cosharepoint.dot.state.fl.us/Sites/AccessMgmt/Before%20After%20Median%20Study/ApalacheeParkwayMedianDesignSafetyEvaluation.pdf

HSM on Access Management

- Urban and suburban arterials
- Focus on driveway density;
  reducing driveways reduces crashes

Table 13-58. Potential Crash Effects of Reducing Access Point Density (8)

Treatment	Setting (Road Type)	Traffic Volume	Crash Type (Severity)	CMF	Std. Error
Reduce driveways from 48 to 26–48 per mile	Urban and suburban (Arterial)	Unspecified	All types (Injury)	0.71	0.04
Reduce driveways from 26–48 to 10–24 per mile				0.69	0.02
Reduce driveways from 10–24 to less than 10 per mile				0.75	0.03

Base Condition: Initial driveway density per mile based on values in this table (48, 26–48, and 10–24 per mile).

Chapter 13.14: Access Management

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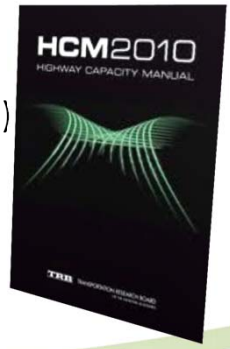
HCM 2010
Multi-Modal LOS Evaluation

- Chapter 17 – Urban Streets takes into account various access management elements and their impacts on autos, pedestrian, and bicycle modes
- Segment Components Considered:
  - Access point flow rate (from driveways)
  - Restrictive median length
  - Median type and curb presence
  - Number of access point approaches



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HCM 2010
Multi-Modal LOS Evaluation

- Increased access points and their respective flow rates decrease auto and bicycle LOS
- Median presence improves auto LOS
- Median width plays factor in pedestrian LOS
  - 6’ or wider median increases perceived pedestrian LOS
- Buffer between sidewalk and parking improves pedestrian LOS

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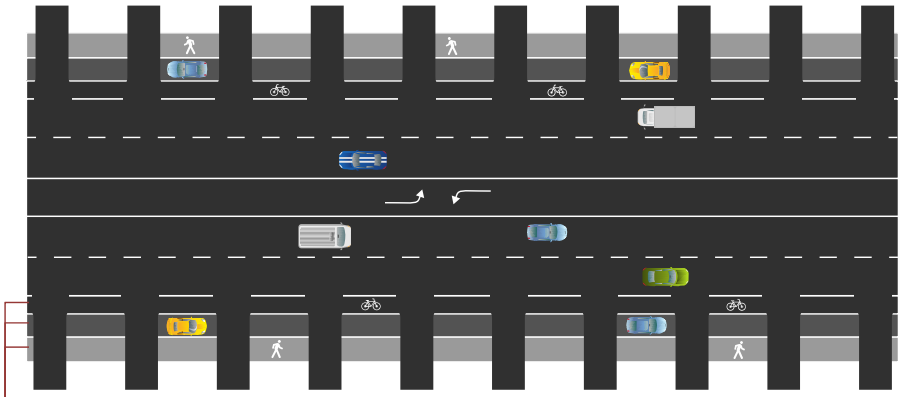
MMLOS Example – Existing Condition



Corridor Information	1 Mile in Length	No Curb	Two 12’ Travel Lanes – Each Direction	TWLTL	20 Access Points

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MMLOS Example – Existing Condition

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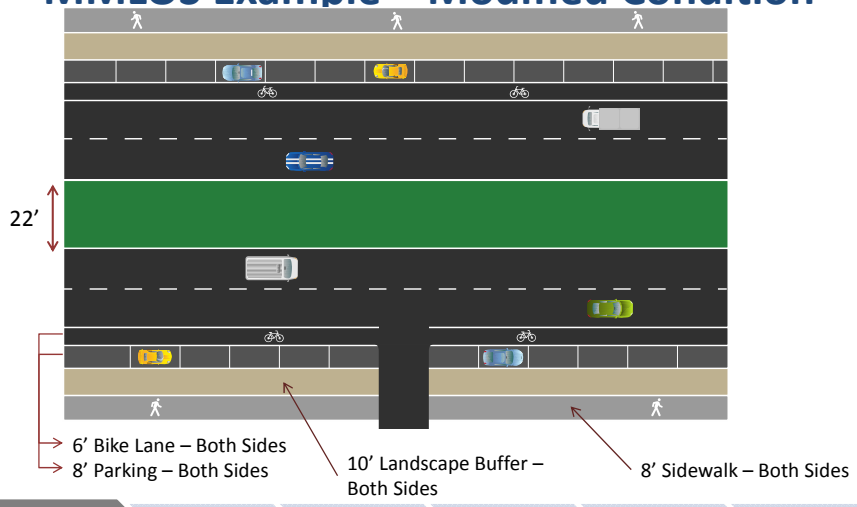
MMLOS Example – Modified Condition



Corridor Information	1 Mile in Length	Curb – Both Sides	Two 12’ Travel Lanes – Each Direction	22’ Raised/Grass Median	1 Access Point

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MMLOS Example – Results

Mode	Existing [Score (LOS)]	Modified [Score (LOS)]
Auto	**78.0% (B)**	**80.0% (B)**
Transit	**1.45 (A)**	**1.32 (A)**
Bike	**3.04 (C)**	**2.56 (B)**
Pedestrian	**2.67 (B)**	**2.53 (B)**

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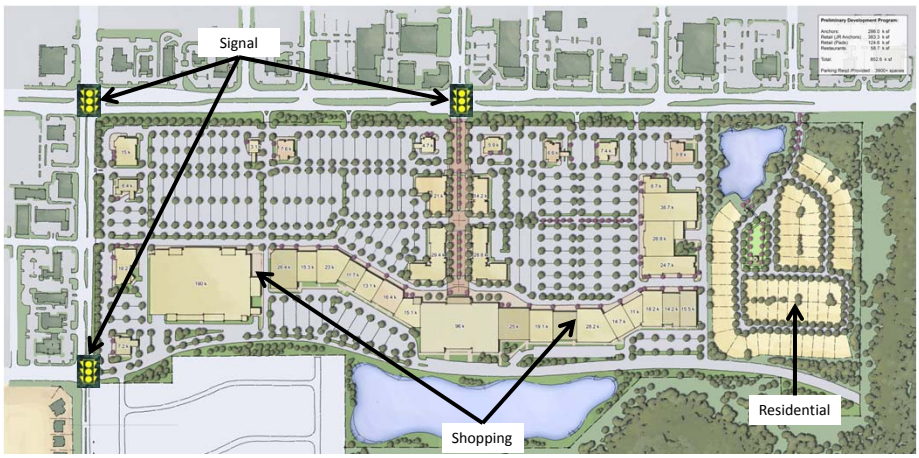
Interactive Discussion



Scenario 1

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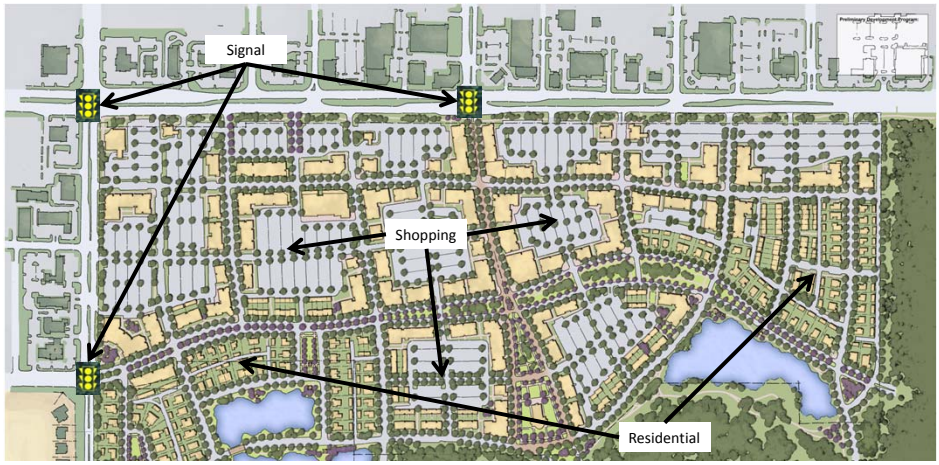
Interactive Discussion



Scenario 2

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Interactive Discussion

Review site plans for Scenarios 1 and 2

- Access to main and cross roads
- Internal circulation and parking layout implications on access

Consider these issues

- How do access needs change in different land use context?
- How should we balance access management needs with local community land development/economic development goals?

How does land use planning effect access management

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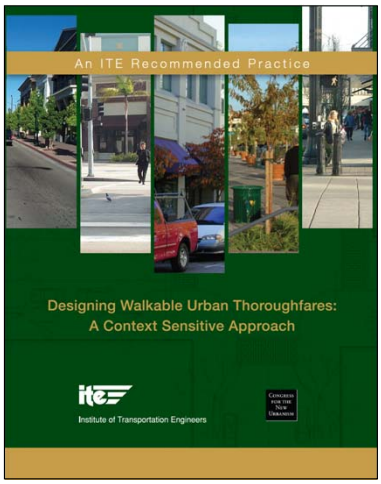
Context Sensitive Solutions

Context sensitive solutions (CSS) is a collaborative, interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its setting. It is an approach that leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining ***safety, mobility, and infrastructure conditions.***



Results of Joint AASHTO / FHWA Context Sensitive Solutions Strategic Planning Process, Summary Report, March 2007

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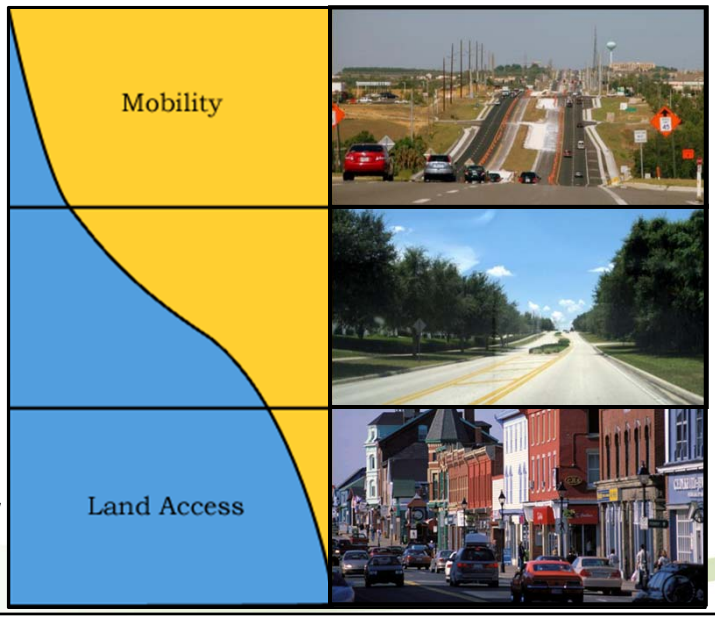
What is Mobility?



Source: AASHTO Green Book

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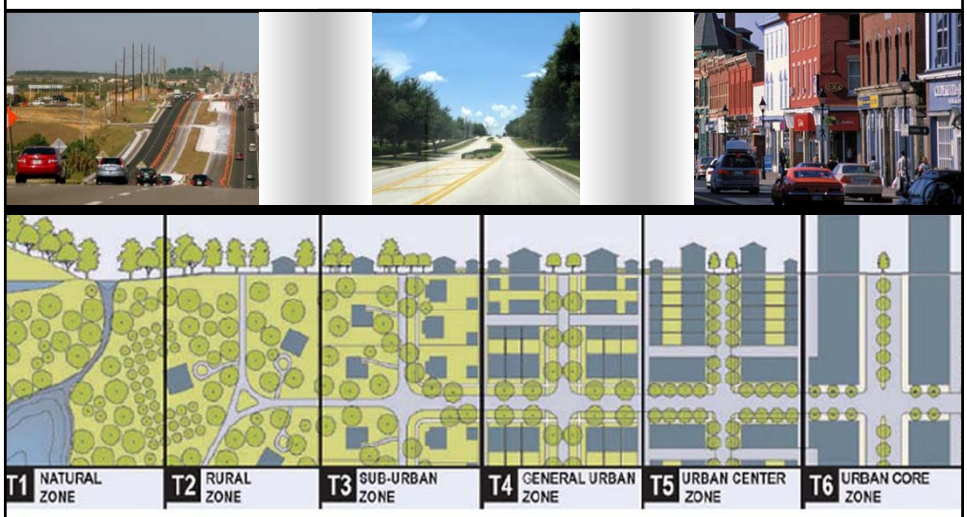
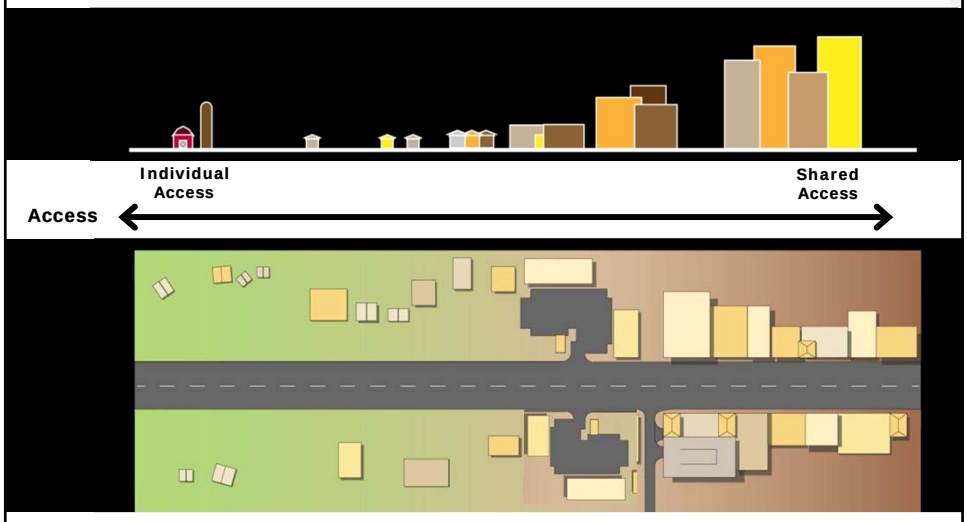
Mobility Varies with Land Use



Source: Photos AASHTO Green Book Transect: Duany Plater-Zyberk

93

Mobility Varies with Parking Accessibility



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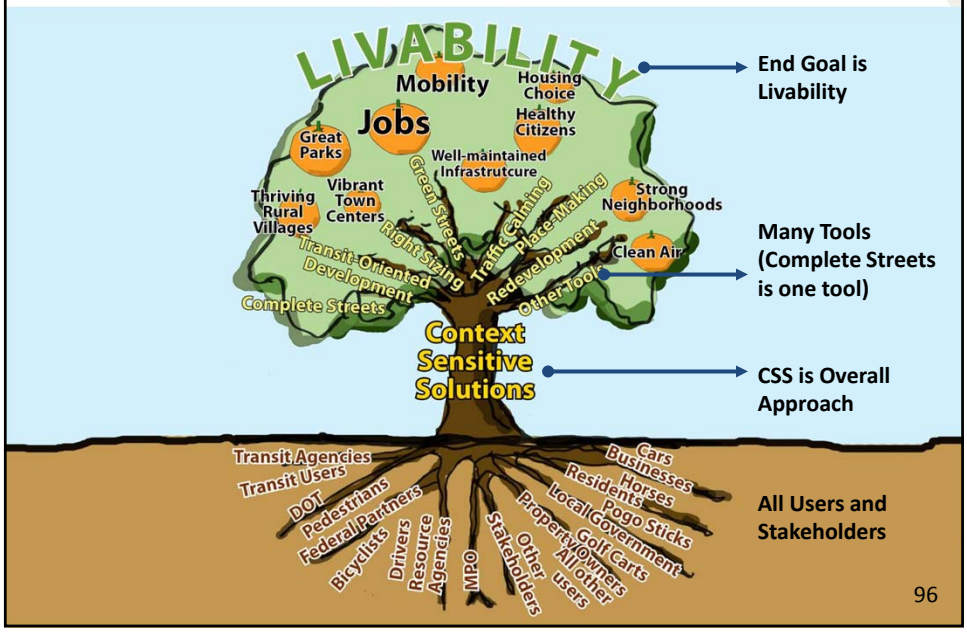
Mobility

"Mobility is the **ease** with which people and goods move throughout their community, state, and world."	"Mobility is valuable because it provides **access to jobs, services** and the good things in life."

Florida Mobility Measures (http://www.dot.state.fl.us/planning/statistics/mobilitymeasures/) 95

What is CSS?



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Context Sensitive Solutions

Problem | Problems agreed upon by a **full range of stakeholders**

Place | Solutions in **harmony with the community** and preserve the environmental, aesthetic, historic, and natural resource values

People | Cater to **all users**

Process | Effectively and efficiently use **resources**

Source: Results of Joint AASHTO/FHWA Context Sensitive Solutions Strategic Planning Process Summary Report, March 2007 (www.contextsensitivesolutions.org)

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

Alt. Motorized Transp.

Disabled

Employers

Retailers

Freight

Emergency Vehicles

Institutional (schools, churches, etc.)

Residents

Bicyclist

Motorist

Elderly

Children

Pedestrian

Transit user

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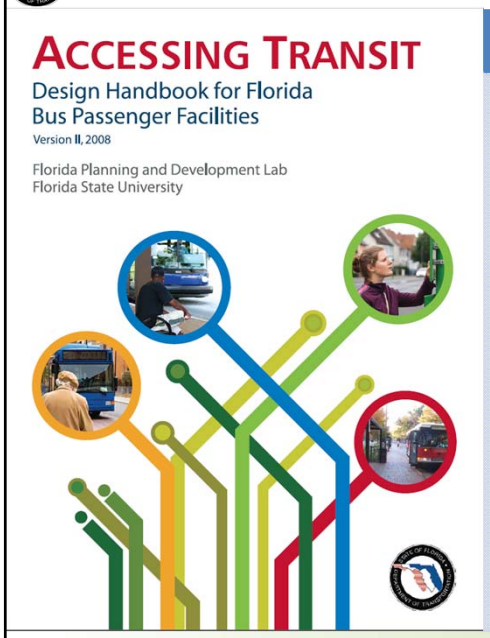

Section 2.8

- Far-side bus stops generally preferred
  - Provide better vehicle and pedestrian sight distance
  - Fewer conflicts for buses, cars, pedestrians and bicycles
- Near-side bus stops ok when far-side stops cannot be provided
  - At least 100 feet in advance of the intersection
  - Avoid at intersections with dedicated right turn lanes and where right-on-red is permitted
- Mid-block stops are generally to be avoided

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Mid-Block Crossings

MUTCD Guidance

- Provide active warning of pedestrian presence when:
  - > 40 mph
  - ADT ≥ 12,000 veh/day w/o raised median
  - ADT ≥ 15,000 veh/day with raised median

FDOT Traffic Engineering Manual Section 3.8

- ≤ 40 mph
  - Signing and pavement markings
  - Rectangular Rapid Flashing Beacon
- ≥ 45 mph
  - Pedestrian Hybrid Beacon or Traffic Signal

Flagler Avenue, Miami

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Workshop #2 – Arthur Godfrey Rd.

- **Background Information**
  - Arthur Godfrey Rd./41st St. is a 4 lane facility w/center painted median and left turn lanes
  - Connects the Julia Tuttle/I-195 Causeway over Biscayne Bay with Miami Beach
  - Provides local trips to the many businesses and restaurants along the study corridor
  - Speed limit on the I-195 Causeway is 55 mph dropping to 30 mph upon entering Arthur Godfrey Road / 41st Street
  - Corridor length is 0.35 miles
  - Five transit routes and six transit stops located along corridor
  - Access Class 7 (660 feet between full and 330 feet between directional median openings, 1,320 feet between signals)

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Workshop #2 – Arthur Godfrey Rd.

- Located within the corridor:
  - Transit Facilities
  - School Zones
  - Pedestrian Facilities
  - Mid-block Crossings

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Workshop #2 – Arthur Godfrey Rd.

- **Land Uses**
  - Retail businesses, restaurants and offices along study corridor that are accessed by high volume of pedestrians
  - Two schools located within the study area: Nautilus Middle School and North Beach Elementary School
  - Students from Nautilus Middle School walk along Jefferson Ave. and cross Arthur Godfrey Rd. / 41st St. to access the Burger King
- **Objective**
  - Planning level exercise
  - Define an appropriate access management plan for a corridor that has high mix of traffic and pedestrian volume

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You are tasked with changing a center painted median to a raised median within a dense urban environment

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Workshop #2 – Arthur Godfrey Rd.

- **Materials**
  - Crash data for the study corridor (Figures 1a and 1b)
  - Aerial depicting speed limits (Figure 2)
  - Pedestrian and turning movement counts at the major intersections during the PM peak hour (Figure 3)
  - Aerial focused on the study corridor and the surrounding land uses (Figure 4)
  - Photographs of study corridor

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Workshop #2 – Arthur Godfrey Rd.

Figure 1a - 2007 to 2010 Crashes from Alton Road to Meridian Avenue

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Workshop #2 – Arthur Godfrey Rd.

Figure 1b - 2007 to 2010 Crashes from Meridian Avenue to Prairie Avenue

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Workshop #2 – Arthur Godfrey Rd.

FIGURE 2
Corridor Speed Limits

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Workshop #2 – Arthur Godfrey Rd.

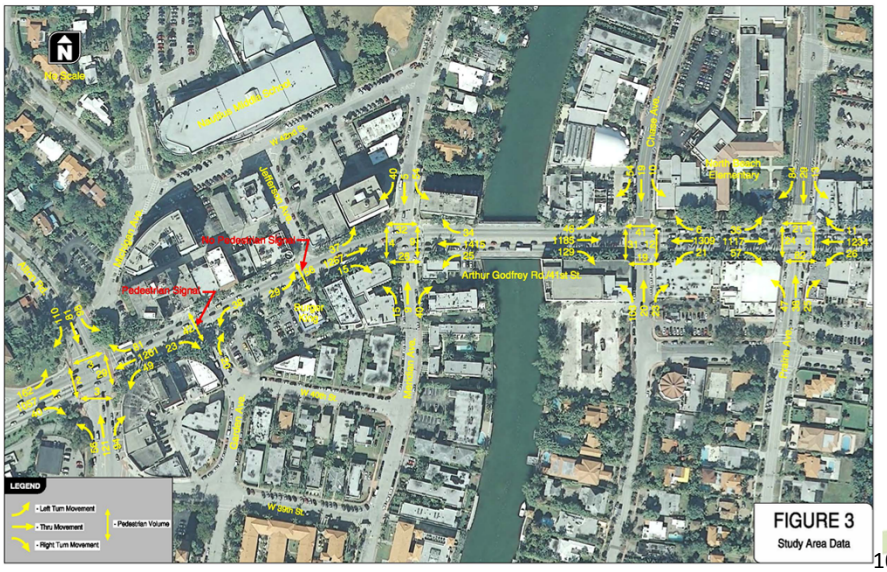

FIGURE 3
Study Area Data

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Workshop #2 – Arthur Godfrey Rd.

- **Question 1**
  - What are the top 3 access management issues in the corridor?
- **Question 2**
  - Based on the issues you have noted in Q1, what median treatment plan would you develop?
- **Question 3**
  - Review the plan you have developed. Based on your solution, what are the potential impacts to pedestrians, cyclists, transit, etc.? Knowing the potential impacts to other roadway users, do you have any modifications to the original plan you have created?

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Access Management Process

Access Management Process

Data Collection and Analysis

- Volumes
- Crashes
- Geometrics

Decision in Context

- Mobility
  - Roadway network
  - Transit facilities
  - Pedestrian facilities
  - Road Users
- Medians
- Driveways
- Adjacent land use

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Access Management Process

Public Involvement

- Remember audience and objectives
- Bottom up approach – workshop environment
- Public opinion

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Access Management Process – Data Collection

Data Collection and Analysis

Volumes

- Cars, Trucks, Transit, Bicycles, Pedestrians, Golf Carts?

Crash History

- Types, Time of Day, Previous Mitigation Strategies

Geometrics

- Median and Driveway Spacing, Radii, Grade, Sight Distance

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Do I Really Need To See The Corridor?

- **Yes!**
  - Corridor details such as this median combination should be identified and analyzed

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Do I Really Need To See The Corridor?

Yes! – Some Google aerials and street views are out of date

–Don't risk your credibility on this

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Do I Really Need To See The Corridor?

Field Review

- Existing/future signal locations
- Median opening placement and type
- Design constraints – safety, queuing
- Pedestrian and bicycle facilities
- Transit facilities
- Business/property access

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Reviewing Aerials Before Site Visit

1. Exclusive left or right turn lanes (measure their storage lengths and include it on the sketch)
2. Through lanes (and/or shared lanes if turn lanes aren't provided)
3. Stop sign locations
4. Traffic signals
5. Medians
6. Shoulders
7. Sidewalks/trails/paths/crosswalks
8. On-street bike lanes
9. Nearby parking lots
10. On-street parking
11. Street names

Adapted from "Mike on Traffic"

http://www.mikeontraffic.com/2011/03/top-9-things-to-review-with-a-field-visit.html

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Field Review Top Items

1. Transit stops
2. Verify median openings
3. Traffic signal operations
4. U-turn operations
5. No Turn on Red Restrictions
6. Speed Limits and "real" operating speeds
7. Construction that affects your "normal" traffic counts?
8. Any construction or signs for developments near your site?
9. Excessive grades or slopes?
10. Any objects on corners of intersections that block a clear view of oncoming traffic or pedestrians?

Adapted from "Mike on Traffic"

http://www.mikeontraffic.com/2011/03/top-9-things-to-review-with-a-field-visit.html

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Field Review Operations

1. Do shoulders get used by cars as separate right turn lanes?
2. Do the traffic signals along a corridor seem to be coordinated
3. Take a stop watch along and do a few spot checks of each traffic signal cycle.
4. Are there any queues that back up out of turn lanes into the through lane or do queues extend back from one intersection blocking the upstream intersection?
5. Is it hard to turn onto a major street from a cross street that has a stop sign?

Adapted from "Mike on Traffic"

http://www.mikeontraffic.com/2011/03/top-9-things-to-review-with-a-field-visit.html

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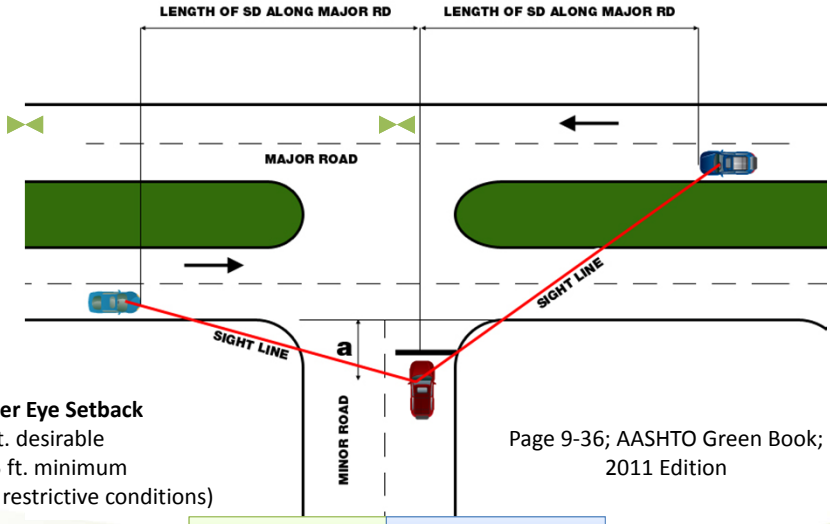
How Sight Distance is Measured



a = Driver Eye Setback
a = 18 ft. desirable
a = 14.5 ft. minimum
(only in restrictive conditions)

Page 9-36; AASHTO Green Book; 2011 Edition

Median Handbook Chapter 3

Driveway Info Guide Chapter 8

122

Sight Distance

Design Speed (mph)	Sight Distance at Intersection (in feet) Passenger Vehicle (P) (feet)	Sight Distance at Intersection (in feet) Single Unit Vehicle (SU) Common Delivery Truck (feet)
35	460	630
40	520	720
45	590	810
50	650	900
55	720	990
60	780	1,080

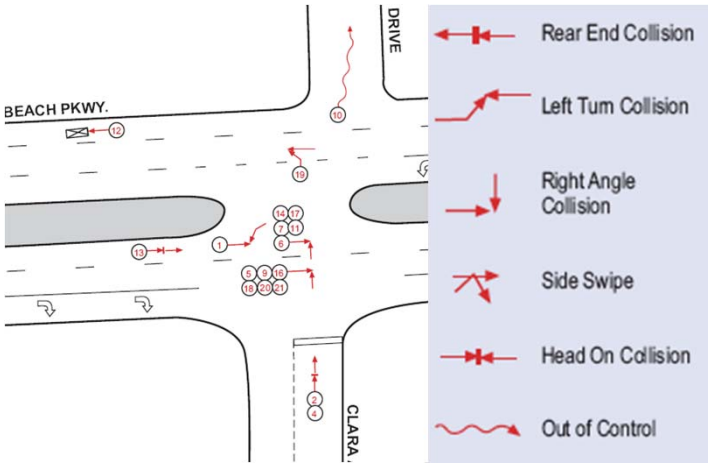
From FDOT Standard Index 546 for 4 Lane with 22 ft. (or Less) Median Width

Median Handbook Chapter 3

Driveway Info Guide Chapter 8

123

Crash Analysis

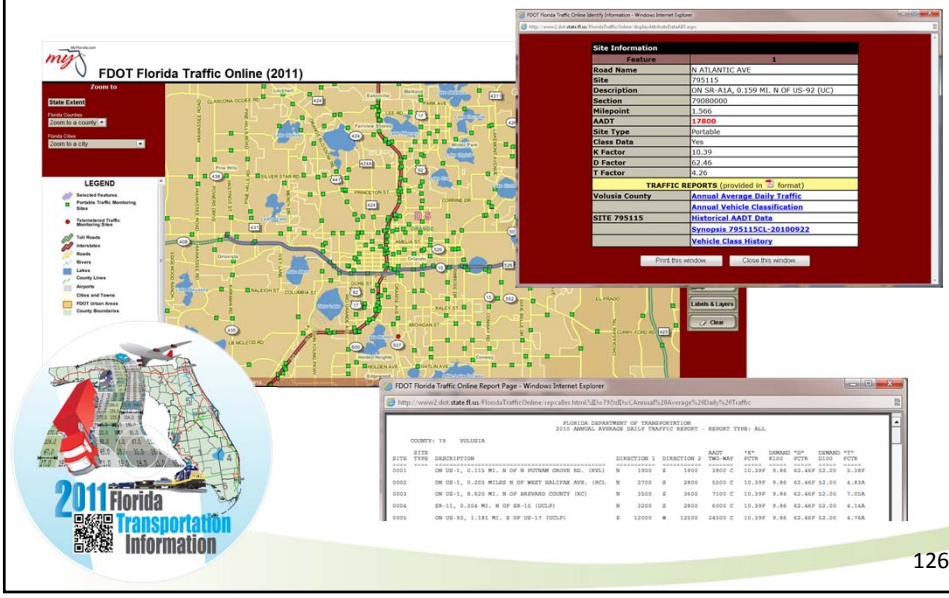


124

Field Collected Traffic Counts

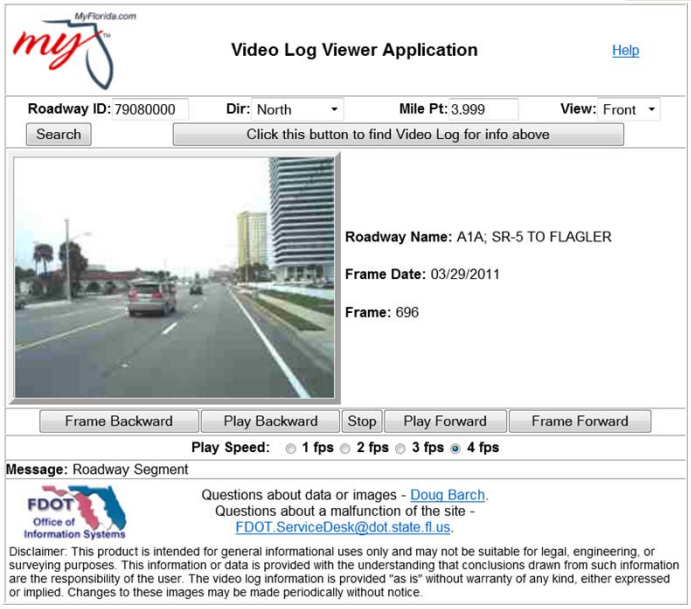
125

FDOT Online Traffic Counts



126

Roadway Inventory



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Access Management Process – Decisions in Context

The key is facing trade-offs!

MOBILITY
- Ideal vs. Realistic
- Safety

MEDIANS
- Control Accessibility
- Attractive Corridor

DRIVEWAYS
- Property Accessibility
- Pedestrian vs. Truck

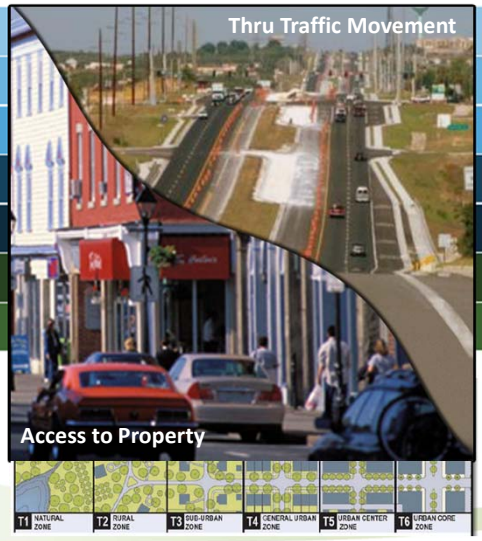
ACCESS
- Property Rights
- Economic Opportunity

All Decisions Made in Context

129

How FDOT Access Standards Fit Into the Picture

Generic Classifications	Specific FDOT Classifications
INTERSTATES	CLASS 1
SIS ARTERIALS	
ARTERIALS	
OTHER	
ARTERIALS	CLASS 7
COLLECTORS	
ACCESS ROADS	
LOCAL ROADS	

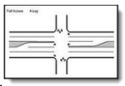
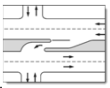
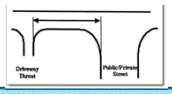


130

Median Handbook pg 15-16

Driveway Info Guide pg 8

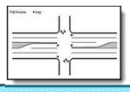
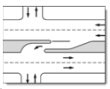
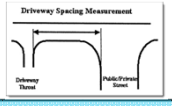
Access Management Spacing Standards from Rule 14-97

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 (More than 45MPH) 1,320 (45MPH or Less)	660	440	245
6	Non-Restrictive			440	245
Least Strict 7	Both	660	330	125	125

131

Access Management Spacing Standards from Rule 14-97

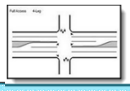
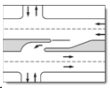
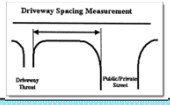
CLASS	MEDIANS	MEDIAN OPENINGS		CONNECTION	
		FULL	DIRECTIONAL	MORE THAN 45MPH	45MPH OR LESS
2	Restrictive w/ Service Roads	2,640	1,320	1,320	660
3	Restrictive	2,640	1,320	660	440
4	Non-Restrictive			660	440
5	Restrictive	2,640 (More than 45MPH) 1,320 (45MPH or Less)	660	440	245
6	Non-Restrictive			440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

Generally Developing or Undeveloped

Generally Developed

132

Access Management Spacing Standards from Rule 14-97

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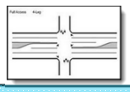
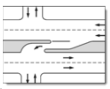
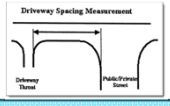
3	Restrictive	2,640	1,320	660	440
4	Non-Restrictive			660	440
5	Restrictive	2,640 (More than 45MPH) 1,320 (45MPH or Less)	Most Common	440	245
6	Non-Restrictive			440	245
7	Both	660	330	125	125

133

Access Management Spacing Standards from Rule 14-97

CLASS	MEDIANS	MEDIAN OPENINGS		CONNECTION	
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4	Non-Restrictive			660	440
5	Restrictive	2,640 (More than 45MPH) 1,320 (45MPH or Less)	660	440	245
6	Non-Restrictive			440	245
7	Both	660	330	125	125

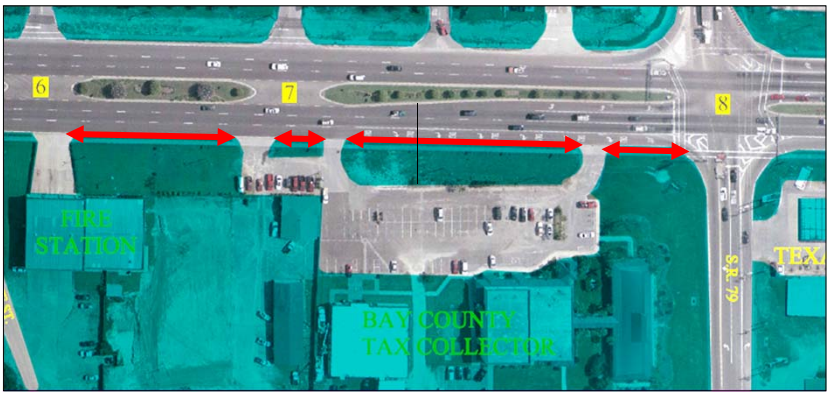
+45mph

45mph and less

134

How to Measure Driveway Spacing

- From edge to edge



Median Handbook pg 15-16

Driveway Info Guide pg 72

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How to Measure Median Opening

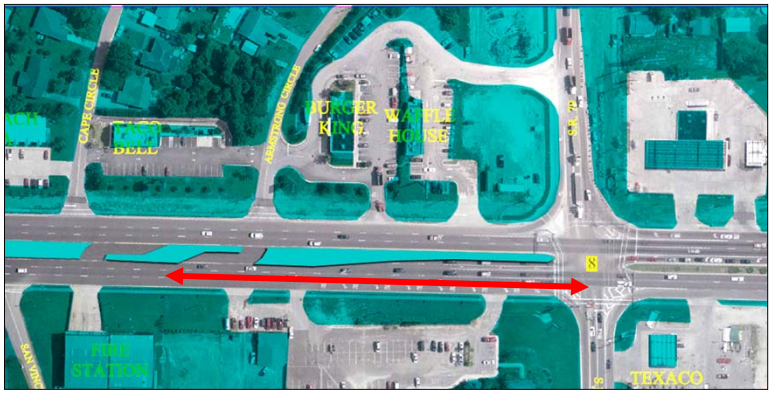
- From intersection – center to center

Median Handbook pg 15-16

136

How to Measure Directional Median Opening Spacing

- Center of two directional openings



Median Handbook pg 15-6

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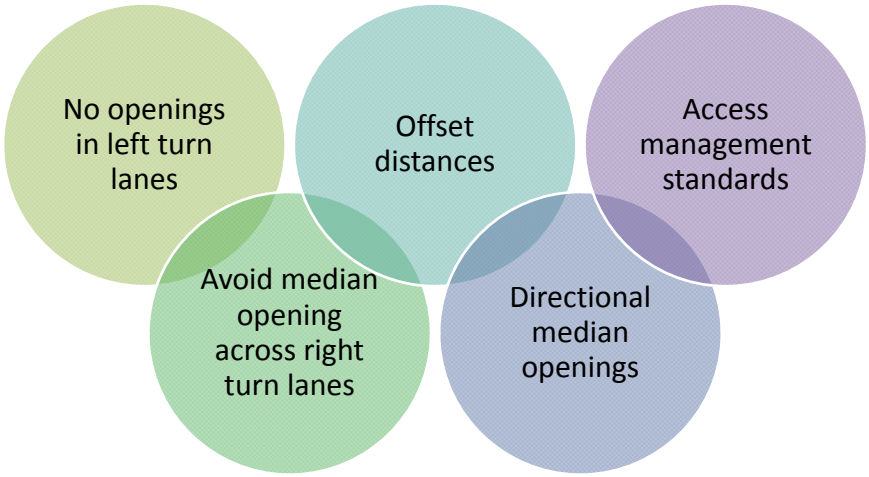
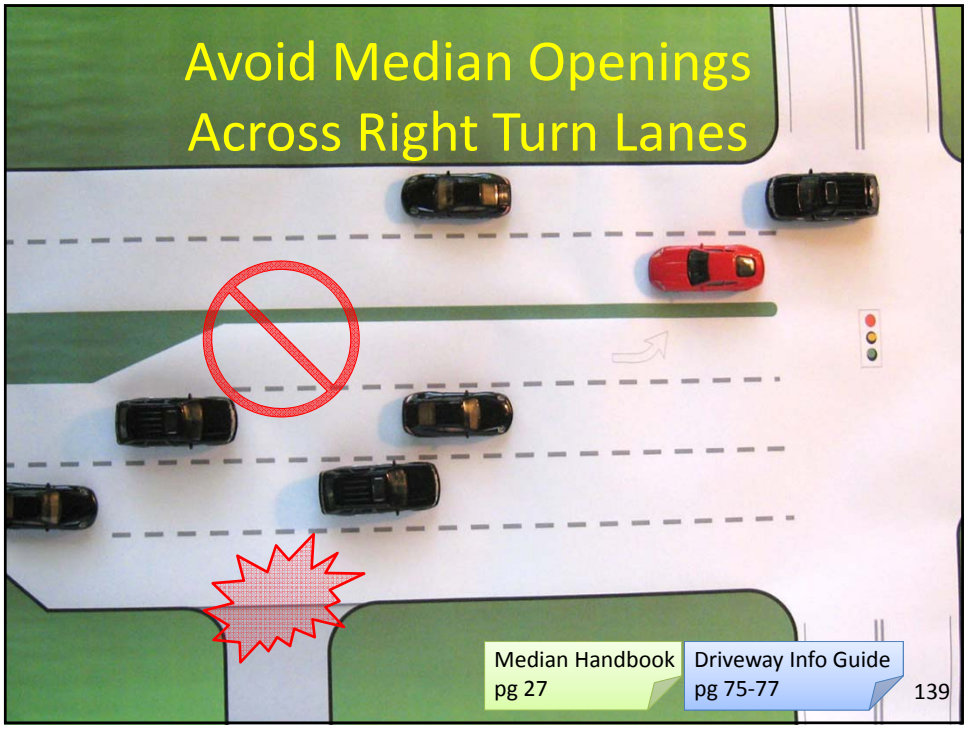
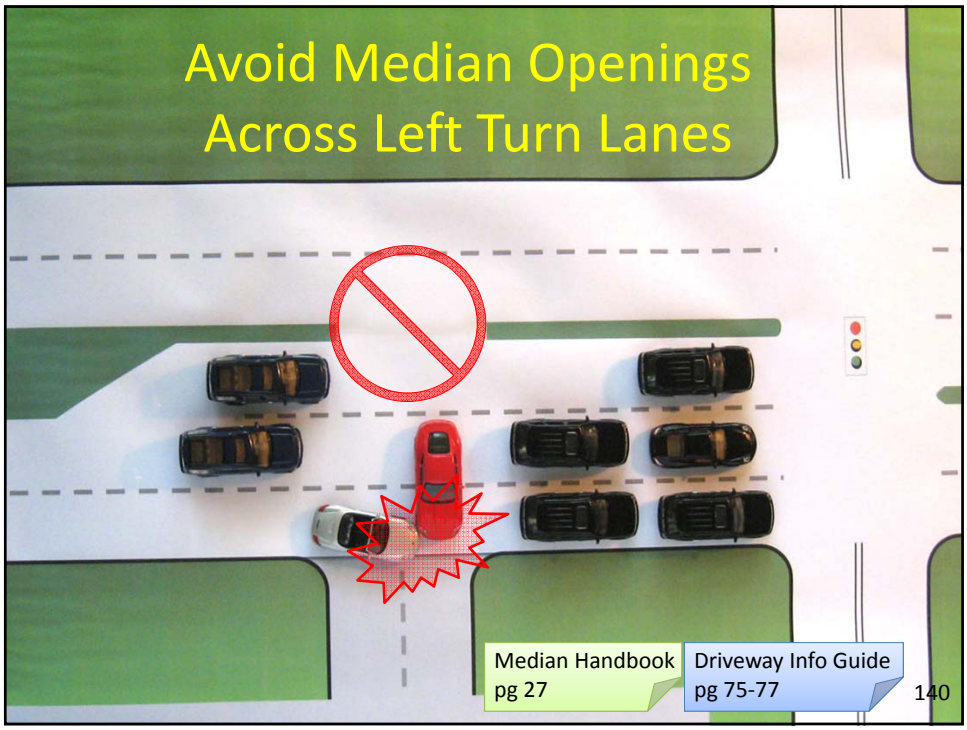
Design Considerations



138


Avoid Median Openings
Across Right Turn Lanes
Median Handbook
pg 27
Driveway Info Guide
pg 75-77
139


Avoid Median Openings
Across Left Turn Lanes
Median Handbook
pg 27
Driveway Info Guide
pg 75-77
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Directional Opening at US 98
Notice the wide median allows for the design of a well defined left turn only lane.
Also, note the overlapping concrete traffic separators discourage wrong way movement.
141

Workshop #3 – SR 50 PD&E

- **Background Information**
  - SR 50 is a major east-west arterial that traverses Orange County in District 5
  - 4 lane, 1.65 mile-long facility
    - TWLTL between Maguire Road and Bluford Avenue
    - Combination of divided and undivided roadway between Bluford Avenue and Vintage Village Lane
  - Posted speed limit of 45 mph
  - Two transit routes with eight stops along corridor
  - Access Class 3

142

Workshop #3 – SR 50 PD&E

- **Land Uses**
  - West Oaks Mall located on the eastern end of the study corridor
  - Health Central Hospital located on the southeast corner of SR 50 and Blackwood Avenue
  - Walmart planned on southwest corner across from hospital (no site plan available)
- **Objective**
  - PD&E level exercise for four lane to six lane widening
  - Review traffic study and proposed access management plan to widen roadway

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Workshop #3 – SR 50 PD&E

- **Task**
  - FDOT conducting PD&E to expand SR 50 from four to six lanes
  - Your task is to provide an acceptable access management plan for SR 50 from Maguire Rd. to Vintage Village Lane

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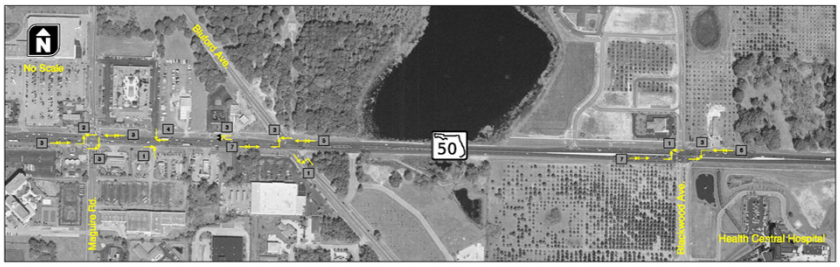
Workshop #3 – SR 50 PD&E

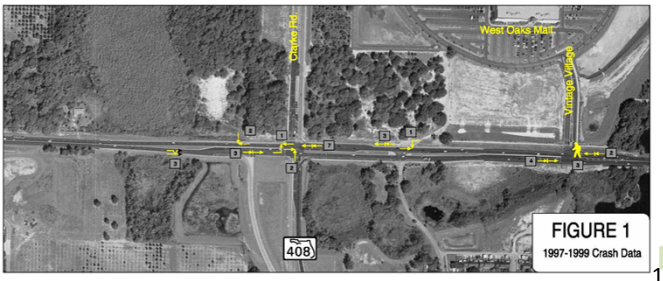
- **Materials**
  - Crash data for the study corridor (Figure 1)
  - Existing (Figures 2a, 2b, and 2c) and proposed typical sections (Figure 3)
  - Turning movement counts at the major intersections during the PM peak hour (Figure 4)
  - 2001 aerial focused on the study corridor and the surrounding land uses (Figure 5)
  - FLU map

145

Workshop #3 – SR 50 PD&E



MATCHLINE



MATCHLINE

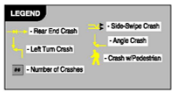
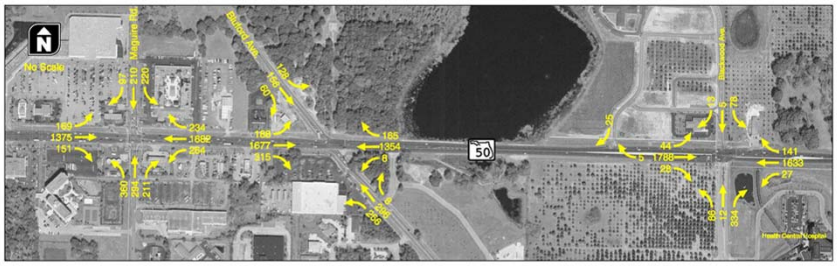


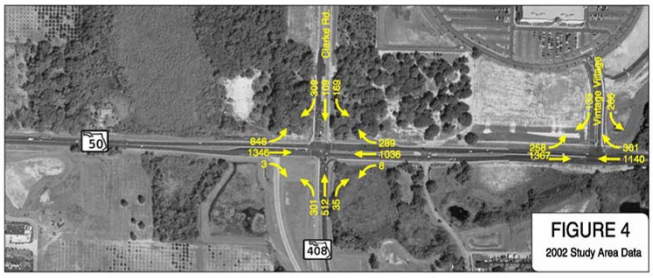
FIGURE 1
1997-1999 Crash Data

146

Workshop #3 – SR 50 PD&E



MATCHLINE

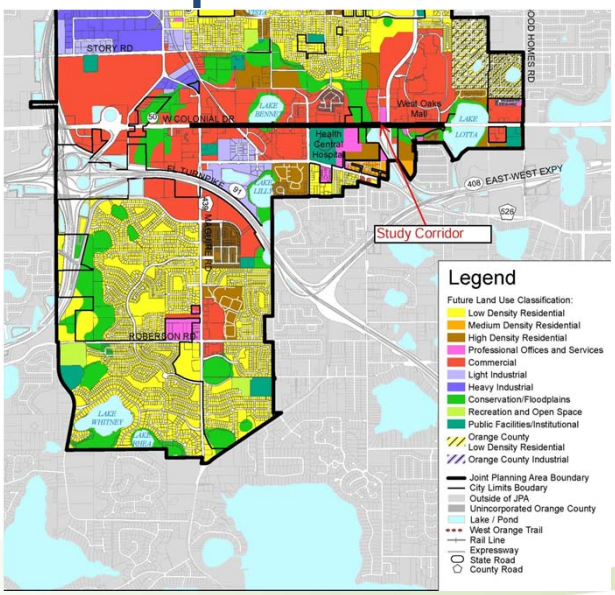


MATCHLINE

FIGURE 4
2002 Study Area Data

147

Workshop #3 – SR 50 PD&E



148

Workshop #3 – SR 50 PD&E

- **Question 1**
  - What are additional data collection needs for the study corridor?
- **Question 2**
  - What are the top 3 access management issues in the corridor?
- **Question 3**
  - Based on the issues you have noted in Q1, what median treatment plan would you develop?

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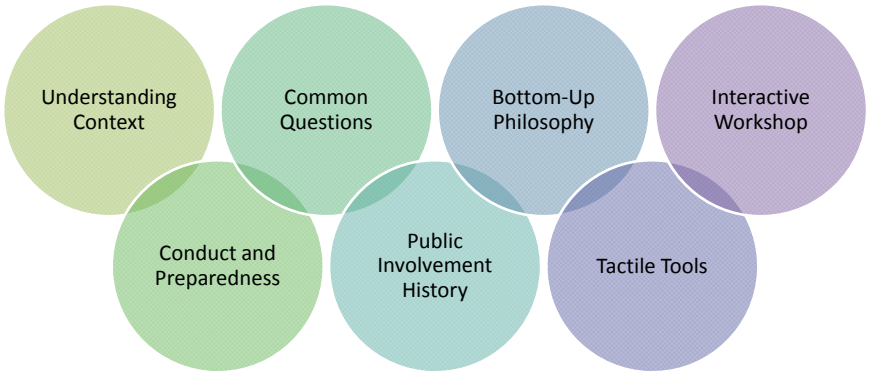
Access Management Process – Public Involvement

Public Involvement Considerations in Access Management



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What is the Context?

CONTEXT

1 Project Type

2 Community Desire

3 Audience

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What Stage of the Process?

Planning	Preliminary Engineering / PD&E	Final Design	Construction	Development Review

Project Type

CONTEXT

1

2 Community Desire

3 Audience

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Understanding the desires of the community

Stakeholders: What are the concerns and Why are they concerns	Listening!	Message
• Impacts to place of living • Impacts to place of business • Impacts to the roadway users	• Actively listen to the public when they speak • Use standard tools for recording public input (forms, websites, recordings)	• Present information that is easily understood and provides value

CONTEXT 1 Project Type 2 Community Desire 3 Audience

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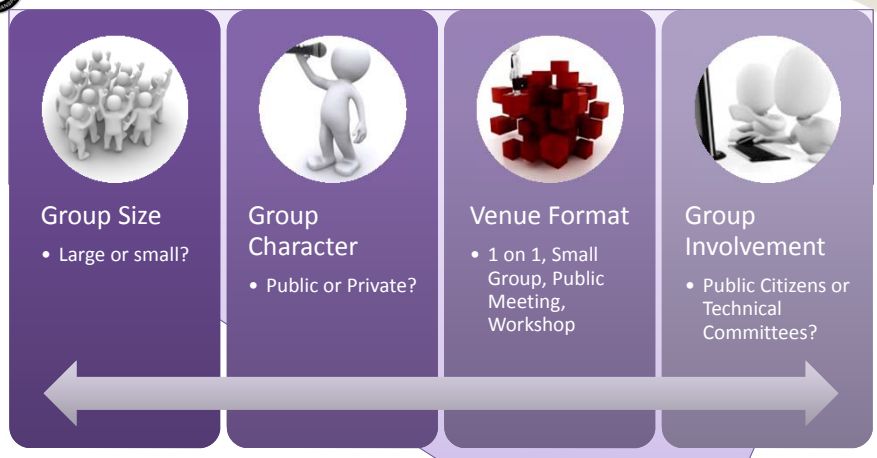

Audience

CONTEXT 1 Project Type 2 Community Desire 3

155

- Always remain professional
- Conduct a thorough/ defendable analysis
- Involve all interested parties
- Bring documentation
- Be able to explain in “Plain English”

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Being Prepared

What is the **objective**?

What do **they** need out of it?

What do **you** need out of it?

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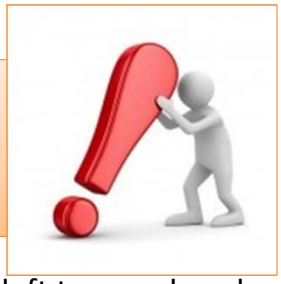
Public Comment #1

The U-turns will cause a safety problem.



- Show graphically the number of left turn and angle crashes
- Show the benefits of U-turn movements and reduction in crashes/conflicts
- Make sure adequate receiving pavement widths exists
- Avoid U-turns and right turn conflicts
- Use local law enforcement to back up your case

Adapted from:
Public Information Meetings For Access Management Projects
David W. Gwynn, Jr., P.E.

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Public Comment #2

You Don't Care What I Have To Say!

- Let people have their "say"
- Reassure person that we need their input
- Listen well, do not interrupt and refer to what they have said
- Do not argue
- Send personalized letter to each person making comments

Adapted from:
Public Information Meetings For Access Management Projects
David W. Gwynn, Jr., P.E.

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Public Comment #3

You are going to put me out of business!

- **People shop for value and price**, even businesses considered "convenience"
- People avoid places where **left turns are risky**
- Share **research** on economic impacts

Adapted from:
Public Information Meetings For Access Management Projects
David W. Gwynn, Jr., P.E.

160

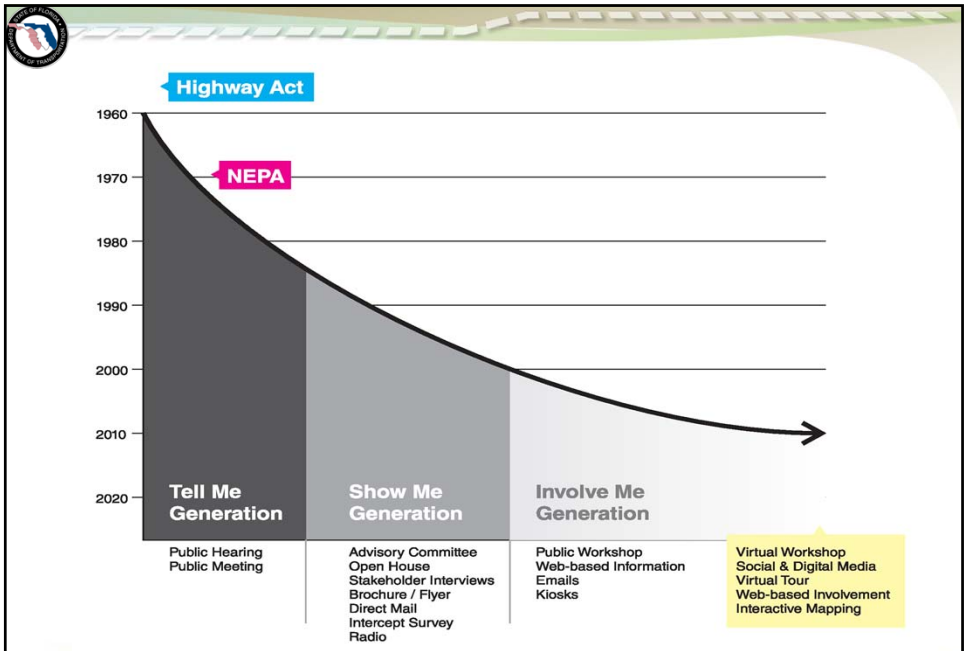
Public Comment #4

Do Access Management Projects Harm Business?

Most businesses see no loss in business due to access management improvements.

Adapted from:
Public Information Meetings For Access Management Projects
David W. Gwynn, Jr., P.E.

161



Public Involvement History

162

Bottom-Up Public Engagement Philosophy

Tell Me, I Forget

Show Me, I Remember

Involve Me, I Understand

Objective:
Informed, Educated, and Actively Engaged Stakeholders

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Key to Active Public Participation

Describe the Process: Storyboarding

Maintain Transparent Process

- "Breadcrumb Test" Compliant

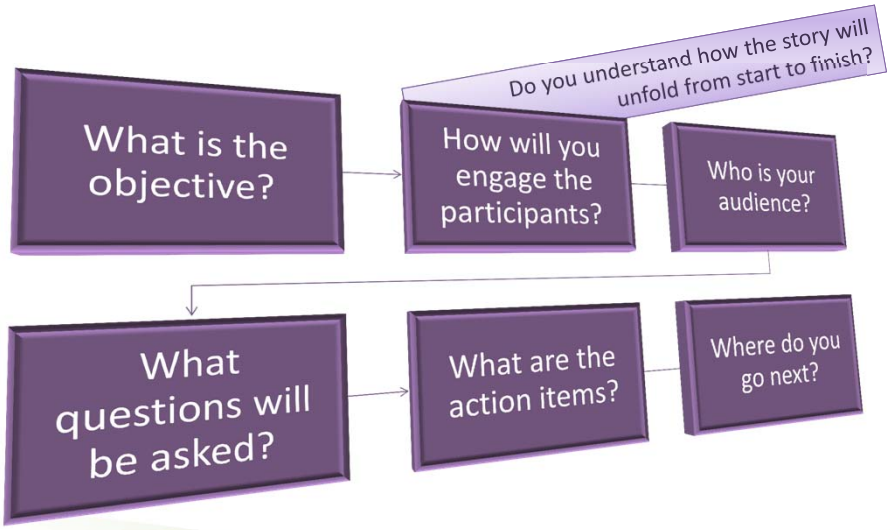
Provide "Hands-on", Tactile Tools to Demonstrate issues and tradeoffs

Allow process to drive the solution.

Don't try to sell your pre-determined solution.

164

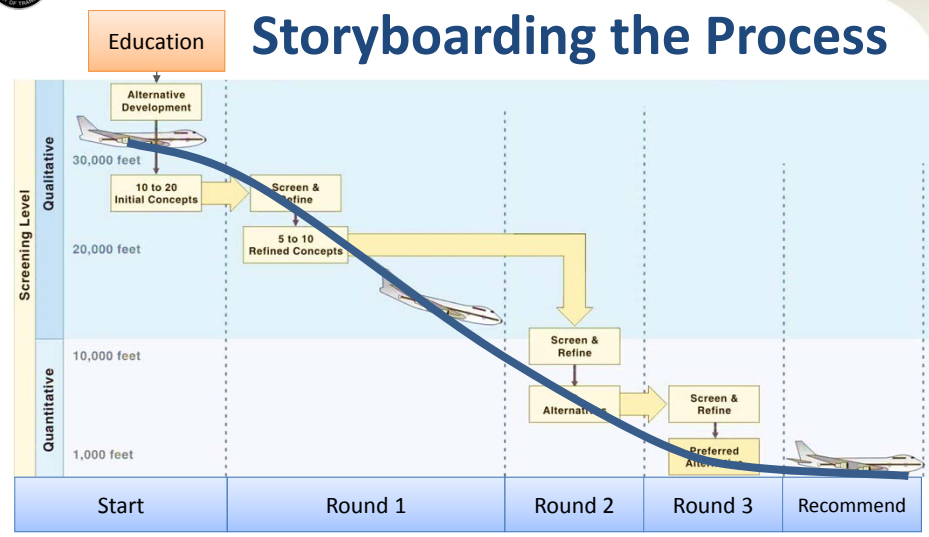
Storyboarding Public Participation



Things to ask yourself about all meetings, workshops, virtual workshops, web interactions, and open houses

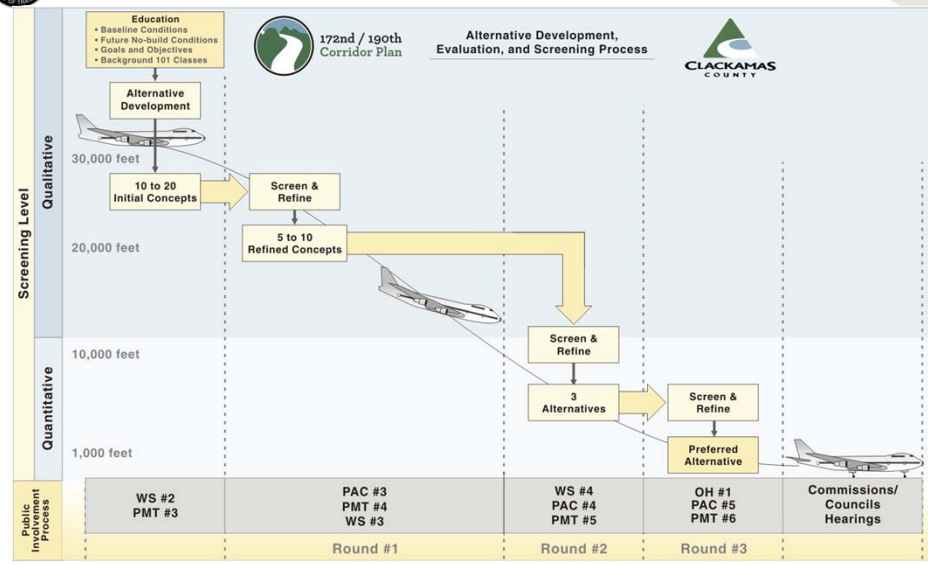
165

Storyboarding the Process



Answering the "Who, What, Why, Where, and How"

166



WS Workshop **PMT** Project Management Team **PAC** Project Advisory Council

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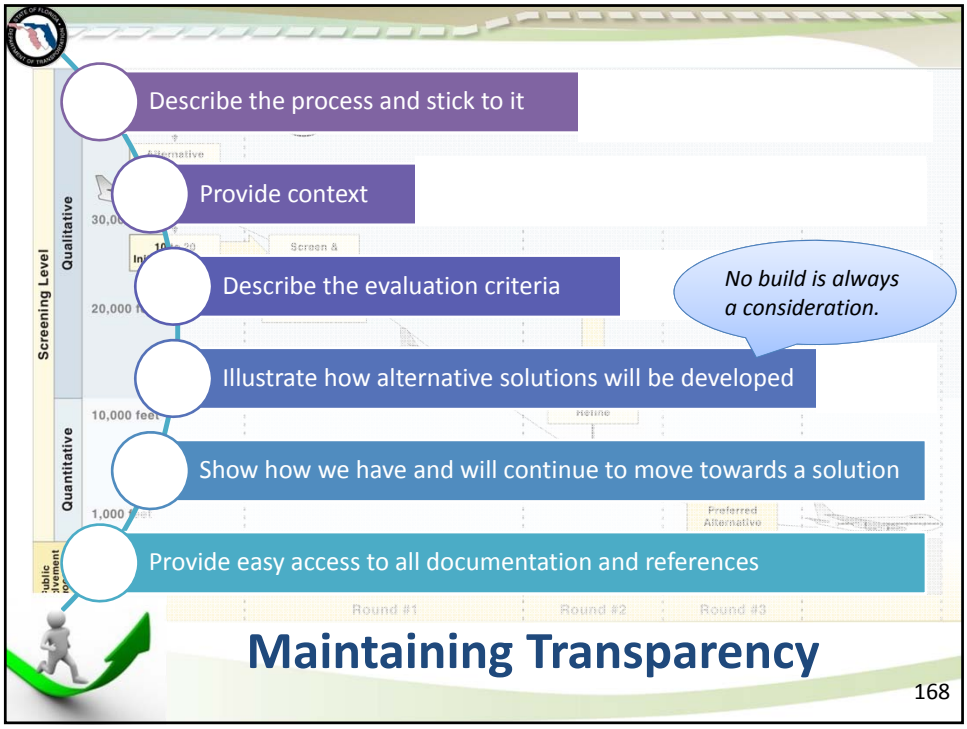
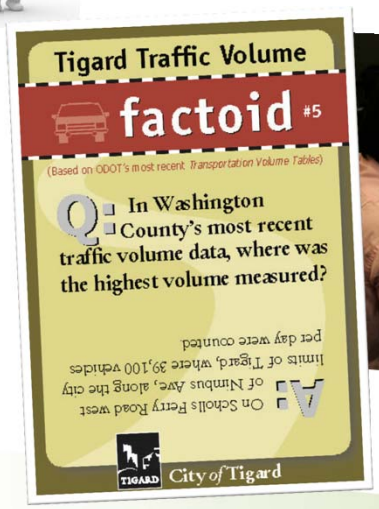

Describe the process and stick to it
Provide context
Describe the evaluation criteria
No build is always a consideration.
Illustrate how alternative solutions will be developed
Show how we have and will continue to move towards a solution
Provide easy access to all documentation and references
Screening Level
Qualitative
Quantitative
Maintaining Transparency
168

Tactile Tools

Tactile Tools #1:

Handouts and Games



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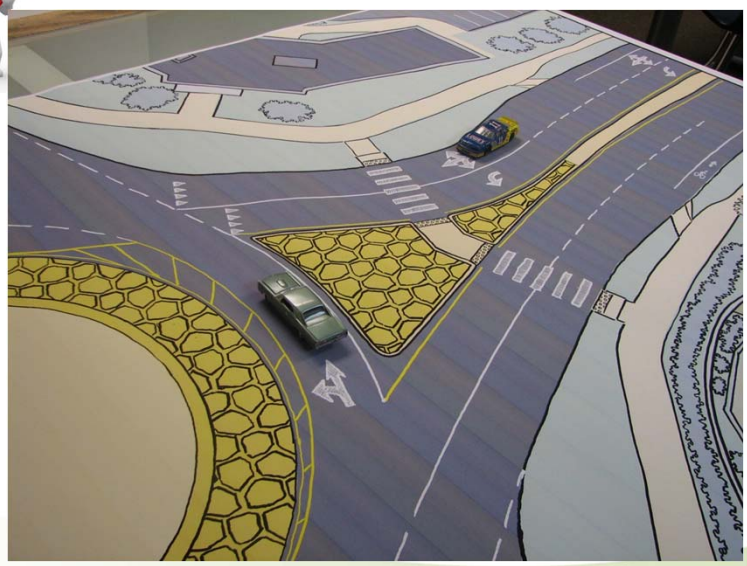
Tactile Tools #2:

Scalable Models



171

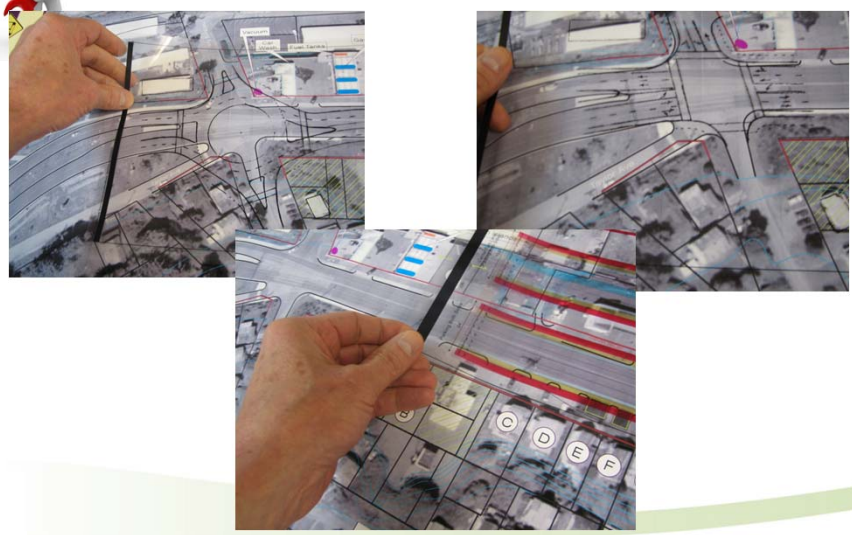
Tactile Tools #3:

Interactive Roadway Modeling System

172

Tactile Tools #4:

Scalable Alternative Development Tools



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Tactile Tools #4:

Scalable Alternative Development Tools

174

How to Use the Tool

175

Tactile Tools #5:

Aerials & Models

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Tactile Tools #6:

Interactive 3-D Models

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Tactile Tools #7:

Workshop Displays

179

Tactile Tools #8:

Interactive Websites

US20: Pioneer Mountain to Eddyville

- http://us20pme.com/

Tigard Trails Public Drawing Tool

- http://prj.kittelson.com/tigardtrails

172nd/190th Corridor Plan Virtual Workshops

- http://voh.172nd.com/
- http://vw3.project.kittelson.com/

Interactive Transportation System Plan

- http://monmouth.project.kittelson.com/

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Additional Tactile Tools

What tactile tools have you used?

What tactile tools could you use for:

- Development Review
- Corridor Planning
- Retrofit Situations

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Interchange Area Management Plan Breadcrumb Test Example

Compliance with "Breadcrumb Test"

Why not this?

(Part 1)	(Part 2)
Why this crossroad location?	Why not this crossroad location?
Why this interchange form?	Why not this interchange form?
Why this local circulation plan?	Why not this local circulation plan?
Why this access management plan?	Why not this access management plan?

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Breadcrumb Approach

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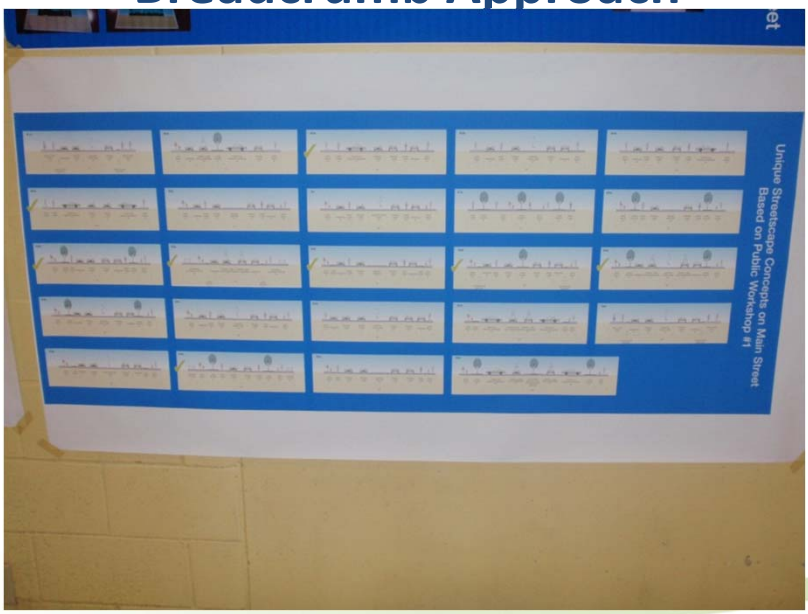
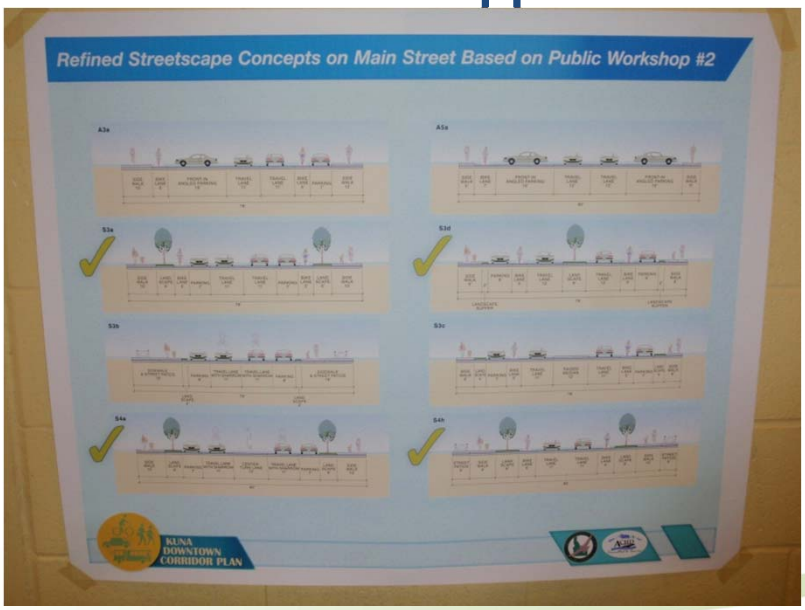
Breadcrumb Approach



184

Breadcrumb Approach



185

Create a Learning Environment to Form Concepts & Opinions

- Transforming the Environment
- Developing a Workbook
- Develop Brick and Mortar **and** Online Venues

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Emerging Trends

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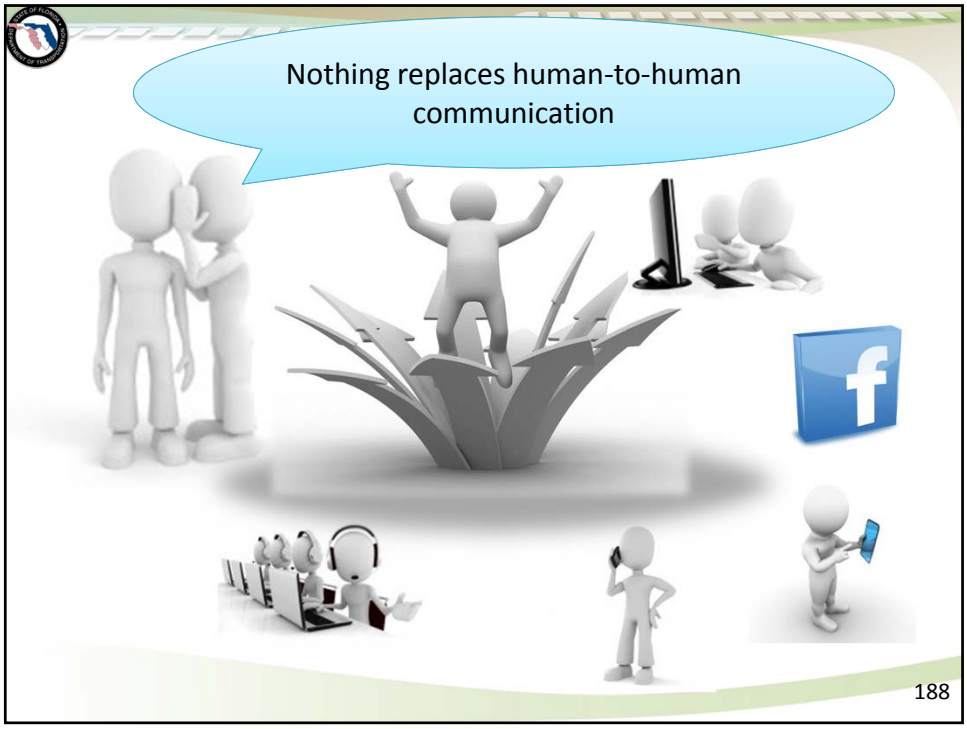
Nothing replaces human-to-human communication
188

Workshop #4 – SR 50 Public Involvement

- **Background Information**
  - Several years later, the PD&E study in Workshop #3 has advanced to final design
  - Many land uses changes along the corridor
- **Objective**
  - Public involvement exercise
  - The corridor has changed and your objective is to update the access management plan to reflect the existing (2011) land uses and present that plan to the public

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Workshop #4 – SR 50 Public Involvement

- **Land Uses**
  - The study corridor has seen added commercial/residential growth over the last several years in these areas:
    - On the north side of SR 50 between Maguire Road and Bluford Avenue
    - On both sides of SR 50 between Bluford Avenue and Blackwood Avenue
    - On the north side of SR 50 between Blackwood Avenue and SR 408/Clarke Road
    - On both sides of SR 50 between Clarke Road and Vintage Village Lane

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Workshop #4 – SR 50 Public Involvement

- **Task**
  - FDOT is updating Workshop #3 PD&E to widen SR 50 from four to six lanes
  - Your Task:
    - The corridor has changed so the 2001 access management plan needs to be updated to account for the existing land uses
    - Create an approach for a public involvement workshop to receive input from surrounding property owners regarding changes in the access management plan.

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Workshop #4 – SR 50 Public Involvement

- **Materials**
  - Updated crash data for the study corridor (Figure 1)
  - Updated turning movement counts at the major intersections during the PM peak hour (Figure 2)
  - 2011 aerial focused on the study corridor and the surrounding land uses (Figure 3)

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Workshop #4 – SR 50 Public Involvement

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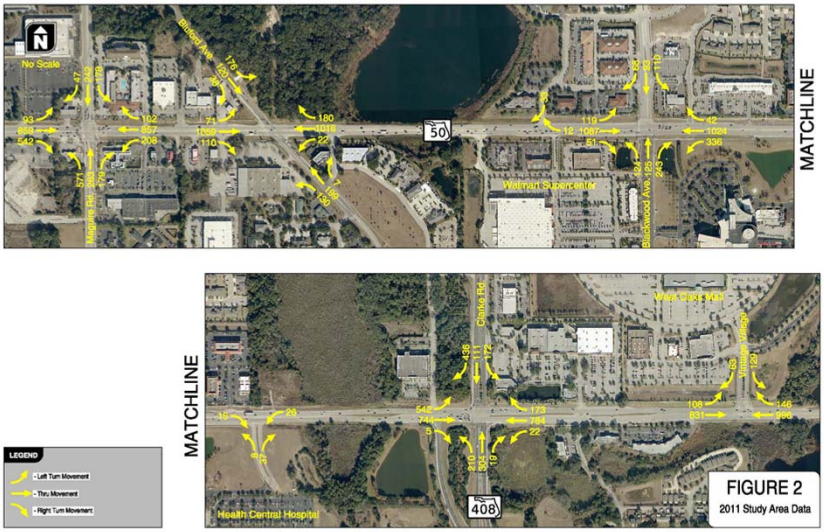
Workshop #4 – SR 50 Public Involvement



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Workshop #4 – SR 50 Public Involvement

- **Question 1**
  - Review the previous access management plan you developed in Workshop #3. What changes would you suggest based on the land use changes that have occurred since 2002?
- **Question 2**
  - Create an approach for a public involvement workshop to receive input from surrounding property owners regarding changes in the access management plan. (Review Slide 123)
  - What tactile tools would you employ?

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Public Involvement Wrap-Up

What are the objectives of the Bottom-Up Philosophy?

What are the four keys to effective Public Engagement?

Why do we Storyboard?

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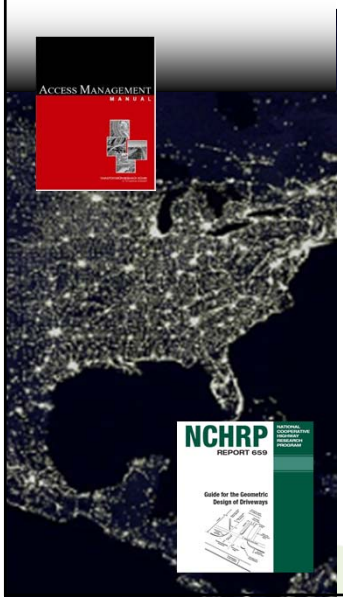
Ongoing National Research and Tools



Available and Soon to be published resources:

- Access Management Manual – 2nd Edition
- Access Management Application Guide (AMAG)
- www.accessmanagement.info
- **Report 659**: Guide for the Geometric Design of Driveways

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Access Management Manual

Contains national background information often cited in legal cases

1st Edition **2003**

NCHRP 15-43 – Schedule for completion in **2013**

2nd Edition under development

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Access Management Application Guide AMAG

Overview of AMAG Modules

A. General Access Management Concepts
A.1. When/Where to Apply Access Management
A.2. Roadway Functional Classification
A.3. Access Management Categories
A.4. Alternative Access Strategies and Applications
B. Policy Related Access Management Program Development and Implementation
B.1. Guidelines versus Standards
B.2. Legal Authority for Access Management
B.3. Establishing Methods or Procedures for Variances and/or Deviations
B.4. Permitting Process and Approaches
B.5. Economic Impacts of Access Management Strategies
C. Local Access Driveway Design
C.1. Driveway Design & Geometrics
C.2. Throat Length Design Guidelines
D. Corridor Design
D.1. Unsignalized Access Spacing
D.2. Signalized Access Spacing
D.3. Roundabout Access Spacing
D.4. Median Applications and Design
D.5. Unsignalized Median Opening Design
D.6. U-turn Lane Requirements (passenger cars & trucks)
D.7. Traffic Conflicts
D.8. Guidance for Implementing Access Management at Crossroads in the Vicinity of Interchanges
E. Site Design
E.1. Internal and Inter-Parcel Circulation

Draft

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Access Management Application Guide

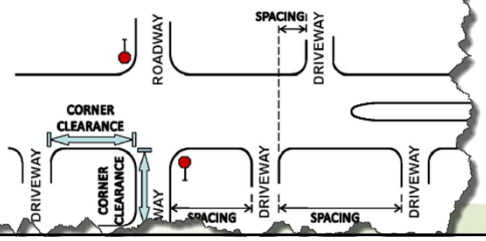
D. 1. Unsignalized Access Spacing

Definition

Unsignalized access spacing is the distance along a roadway between two successive unsignalized connections, e.g., intersecting driveways. The following considerations lea variations in the definition of unsignalized access spacing.

- When establishing the distance between successive driveways, should the measure be made between the near edges or between the centerlines?
- Does spacing apply only to the distance between driveway connections, or also to t distance between a driveway and a roadway?
- Do spacing criteria apply only to connections on the same side of the road, or also to connections on the opposite side of the road?

The term **corner clearance** is sometimes used, denoting the "distance from an intersec of a public or private road to the nearest access connection, measured from the closes of the pavement of the intersecting road to the closest edge of the pavement of the connection along the traveled way" (*TRB, 2003*). Figure D.1.1 displays various unsignali access spacing dimensions.



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Access Management Application Guide

D. 1. Unsignalized Access Spacing

Definition

D. 1. Unsignalized Access Spacing

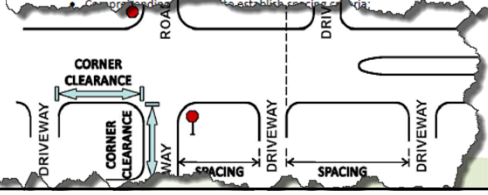
Purpose

Greater distances between successive connections afford drivers more time to react to upcoming traffic situations and to maneuver appropriately as needed. Conversely, inadequate spacing between successive connections can create situations in which the number of decisions and reactions that drivers have to make in such a short space and time leads to mental-workload overload. Adequate spacing between unsignalized access connections helps improve both the quality of traffic flow and safety.

This summary discusses the underlying reasons for mandating minimum unsignalized access spacing and considerations in the application of spacing requirements.

Guidance for Users: Needs and Issues to Consider

Before applying unsignalized access spacing criteria to create guidelines and standards, one must consider and address the following issues:



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Access Management Application Guide

D. 1. Unsignalized Access Spacing

Definition

D. 1. Unsignalized Access Spacing

Purpose

Vehicle Perspective

Safety

A number of research studies dating back to the mid-1900s have found that in many environments, as the frequency of access connections increases, the frequency of crashes increases. A review of literature identified safety studies that were based on data from the following locales.

Arkansas	Colorado	Connecticut	Delaware
Florida	Illinois	Indiana	Louisiana
Michigan	Minnesota	Nebraska	New Jersey
North Carolina	Ohio	Oklahoma	Oregon
Tennessee	Texas	Virginia	Wisconsin
Australia			

These studies focused on a variety of situations and locations such as both urban and rural environments, two-lane and multilane roadways, and roadways with and without restrictive

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Access Management Application Guide

Other User Perspectives

Pedestrians: Access roads and driveways create conflict points between pedestrians on the sidewalk and vehicles using the access facility. The more closely spaced these access points, the greater the number of potential conflict points and the lower the quality of service for pedestrians. In most states, pedestrians have priority at all unsignalized intersections, whether a crosswalk is painted or not. However, few pedestrians and even fewer motorists are aware of and comply with this rule. Design features can improve the visibility and driver awareness of crosswalks and pedestrian priority and should be considered at all access locations with pedestrian demand.

Bicycles: As with pedestrians, access driveways for autos create potential conflict locations for bicycles, and closely spaced access points increase cyclists' exposure to conflict. Bicyclists typically ride on the right edge of a roadway (whether a lane is provided there or not) placing them in the path of both left- and right-turning vehicles using an access driveway. Both ingress and egress turning vehicles are required to yield to bicycles traveling straight through the intersection, but many motorists are not accustomed to scanning for conflicts where bicycles are found. Closely spaced intersections add further complexity to this situation and additional bicycle provisions may be necessary to preserve roadway safety.

Buses: Transit vehicles generally have the same requirements as autos with respect to access spacing. Closely-spaced access connections, unless they have low volumes, can affect public transit operations, [illegible] weight [illegible]eries. The slowdowns that occur in response to vehicles [illegible]

These studies focused on a variety of situations and locations such as both urban and rural environments, two-lane and multilane roadways, and roadways with and without restrictive

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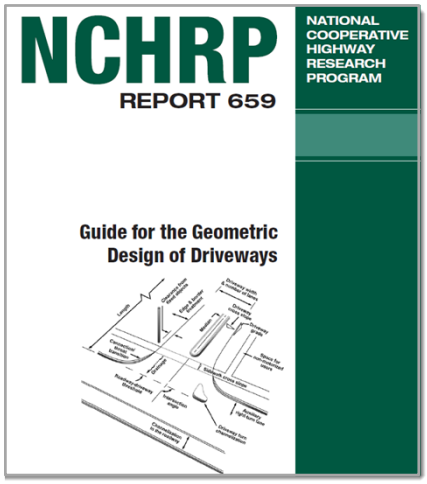

New Guidance on Driveway Design

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

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www.accessmanagement.info

- Resource Materials
  - Presentations
  - Videos
  - Brochures
- Upcoming Conferences

Transportation Research Board (TRB) Committee Information

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Other Online Tools

FHWA Video – *Safe Access is Good for Business*

- http://www.youtube.com/watch?v=j58siSPT6S8

Animated Access Management Principles

- http://www.accessmanagement.info/10principles.html

FDOT Access Management Brochure

- http://www.accessmanagement.info/pdf/Q&A%20FL.pdf

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Access Management is changing!

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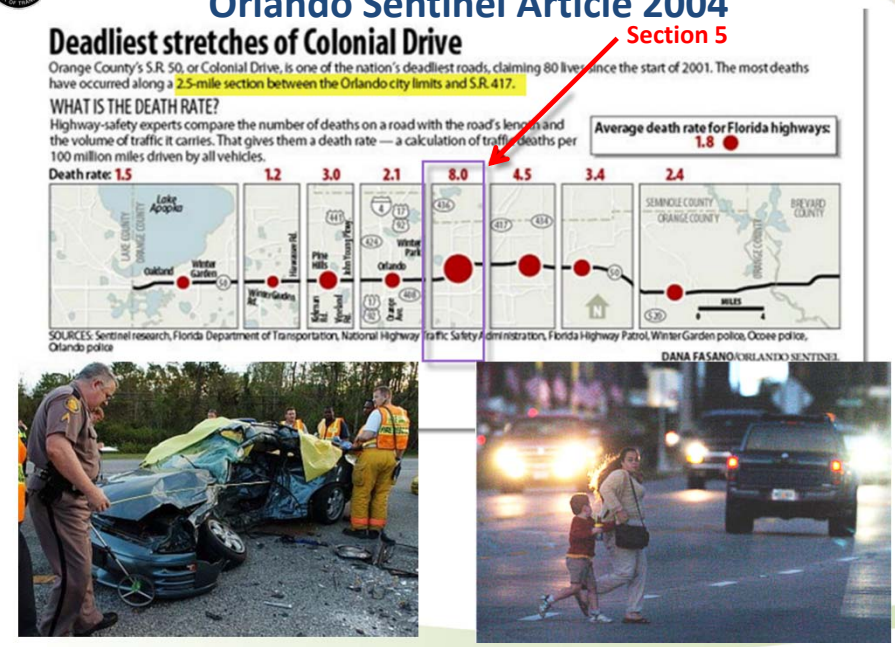
Orlando Sentinel Article 2004



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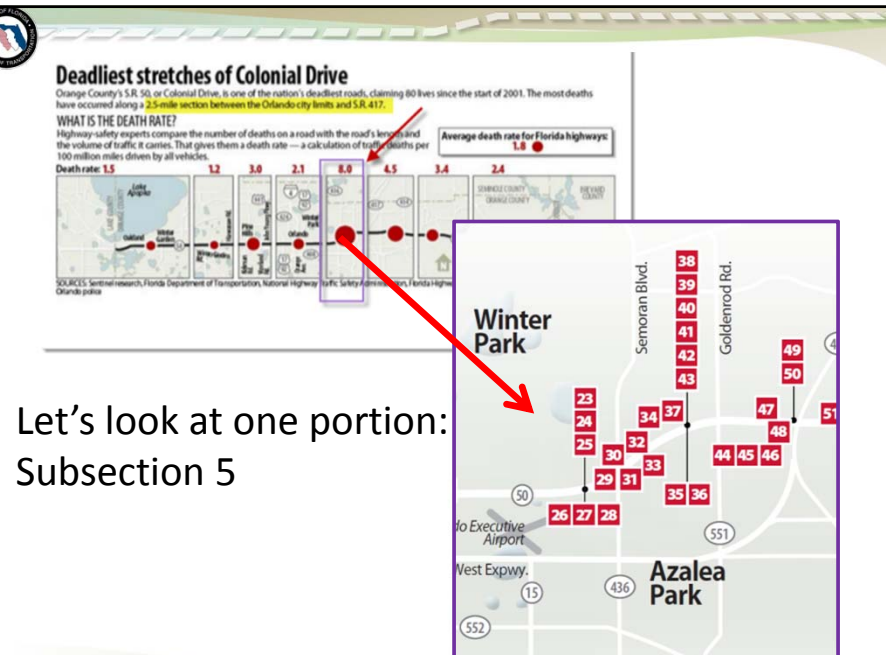

Let's look at one portion:
Subsection 5

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Section 5

FDOT Systems Planning Office has now begun a comprehensive Before and After study of many corridors around the state. The study is being conducted by Florida International University and should be complete by November 2012.

Medians Might Have helped Prevent Some of These Deaths by Protecting left turns and Pedestrians.

30. Charles Alexander
31. Byron J. Williams
32. Charles F. Woods
33. Mary G. Cudd
34. Arthur Zamorano
35. Jayson Lee Echevarria
36. Yull Alejandro Toro
37. Ronald Lee Alford
38. William Ehart
39. Richard L. Williams
40. Michael Duane Larson
41. Bernice Falk
42. Unidentified
43. Paul Frank Wadman
44. Dany Toribio
45. Marissa Irene Herzer
46. Robert John Vale
47. Christopher D. Brown
48. Cathy A. Selje
49. Cathy Elaine Sproule
50. Roxane Whitemore

Subsection 5 Activity Leading to Death

Age	Crash date	Accident description
60	10/16/01	Driving east, tried to turn left, struck by westbound car.
21	1/20/03	Driving west, struck eastbound car that tried to turn left.
3	1/20/03	Passenger in eastbound car that tried to turn left, struck by westbound car.
30	1/20/03	Passenger in westbound car that struck eastbound car that tried to turn left.
15	1/20/03	Passenger in eastbound car that tried to turn left, struck by westbound car.
22	1/20/03	Passenger in eastbound car that tried to turn left, struck by westbound car.
37	7/24/02	Driving east, tried to turn right, left roadway, struck a tree.
15	10/1/02	Struck by car while walking across to south side.
24	10/19/03	Driving west, struck by eastbound truck that tried to turn left.
59	8/11/01	Struck by car while walking across to south side.
73	5/2/03	Driving east, struck by westbound car forced across median by truck turning left.
31	10/26/02	Driving motorcycle west, struck by southbound truck.
23	6/30/04	Driving motorcycle west, struck car that tried to turn left.
28	6/30/04	Driving motorcycle west, struck car that tried to turn left.
36	12/16/02	Struck by car while walking across to north side.
35	3/11/03	Struck by car while walking across to south side.
27	12/1/02	Struck by car while walking across to south side.
37	10/9/01	Struck by car while walking across to south side.
90	11/7/03	Struck by car while walking across to south side.
na	4/18/01	Struck by car while walking across to south side.
55	8/17/01	Struck by unknown vehicle while walking across to north side.
23	12/2/02	Stopped eastbound for red light, struck from behind by eastbound car.
21	1/25/03	Waiting for southbound red light, struck by eastbound car that left roadway.
21	1/25/03	Passenger at southbound red light, struck by eastbound car that left roadway.
21	6/16/02	Passenger on eastbound motorcycle, struck by westbound truck making U-turn.
45	10/23/02	Struck by car while walking across to north side.
21	4/28/01	Driving east, struck by westbound car that crossed median.
15	11/3/04	Passenger in eastbound car that turned left, struck by westbound car.

tried to turn left

walking across