

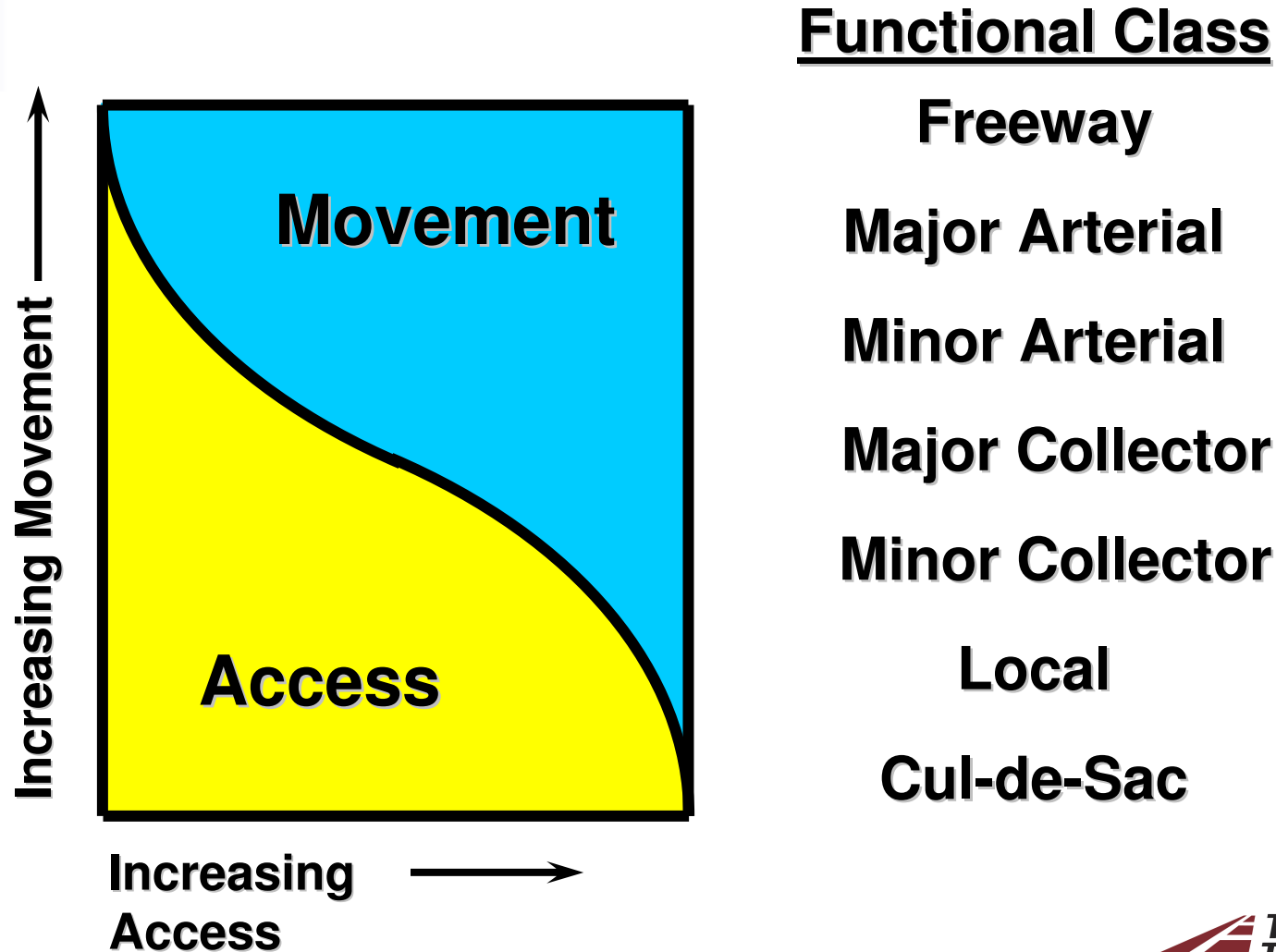
# Mobility Impacts: Presentation Overview



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- Access Management Mobility Improvements
- Studies

# Hierarchy of Roadways in a Functionally Designed System



# Hierarchy of Roadways in a Functionally Designed System





# What Is Important When Driving?

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- Safety
- Arriving On time (mobility)
- Getting your (tax) dollars' worth



# Guiding Principles for Texas

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- Safety and Mobility
- Access Management can Provide Reasonable Access to Developments
- Promote Local Government Partnerships



# Access Management Guiding Principles for Texas

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- “Safety and Mobility”
  - Safety
    - Reducing conflict points reduces crash potential
    - ~ 50% of all crashes are intersection-related
      - Driveways are intersections, too!
    - More than 3,500 people die in Texas crashes each year
    - Increase driver expectancy

# Access Management Guiding Principles for Texas

- “Safety and Mobility”

- Mobility

- Allow through traffic to move more efficiently (less “stop and go” traffic)
    - Preserve roadway capacity (reduced delay)
    - Separate speed differentials
    - Less braking and hard acceleration
    - Reduce fuel consumption/emissions





# Access Points and Free-flow Speed

<b>Access Points and Free-flow Speed</b>	
Access points per mile	Reduction in free-flow speed, mph
0	0.0
10	2.5
20	5.0
30	7.5
40 or more	10



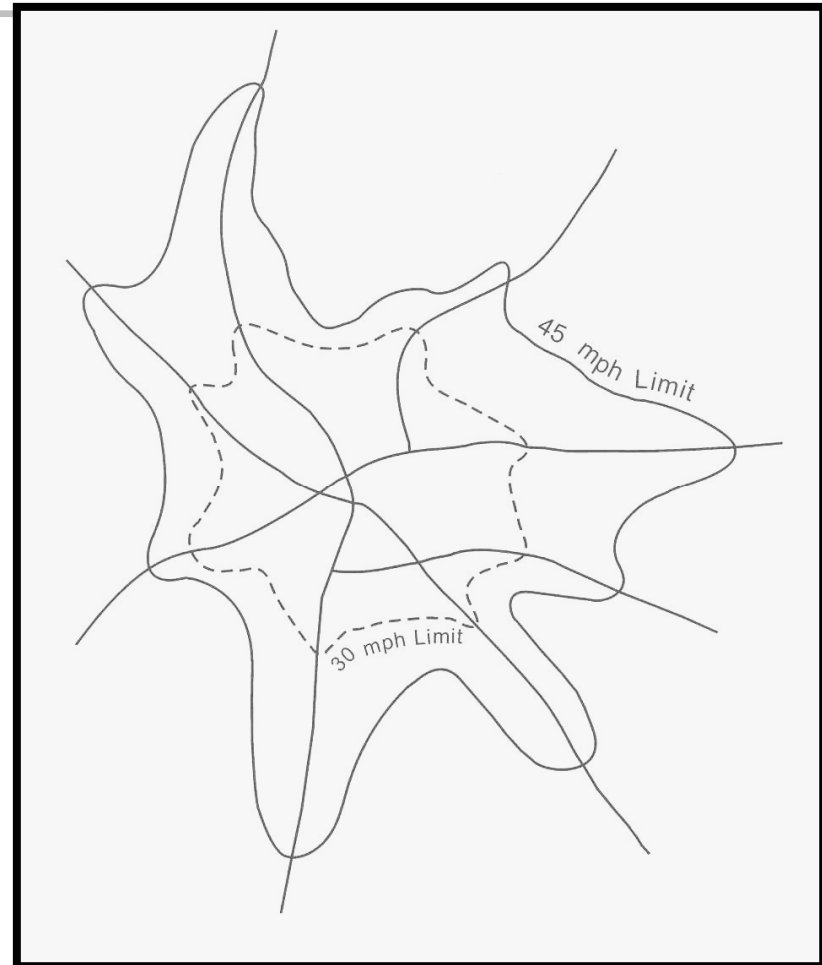


# Travel Time and Signal Density

<b>Percentage Increase in Travel Times as Signal Density Increases</b>	
<b>Signals per Mile</b>	<b>Percent Increase in Travel Times (compared with 2 signals per mile)</b>
2.0	0
3.0	9
4.0	16
5.0	23
6.0	29
7.0	34
8.0	39

# Mobility Provides Economic Impacts

- Market area is important to business success
  - Reduction of travel speeds means smaller market areas



Graphic from ITE, *Transportation and Land Development*



# Considerations by Treatment

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- Unsignalized Spacing
- Signalized Spacing
- Raised Medians
- Acceleration / Deceleration Lanes



# Unsignalized Access Spacing

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- Engineering considerations:
  - Functional intersection area
  - AASHTO guidance
  - Stopping sight distance
  - Intersection sight distance
  - Case-by-case
    - No cookbooks allowed!



# Signalized Intersection Spacing

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- Consider within the functional design
- Consider future signal locations when laying out streets
- Optimal and uniform signal spacing is essential if efficient progression and appropriate speeds for arterial streets are to be achieved



# Signalization Variables

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- Roadway Speed and Traffic Volumes
- Cycle Length and Offset
- Signal Spacing
- Efficiency of Progression
- Texas Manual on Uniform Traffic Control Devices



# Why Consider a Raised Median

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- Play critical role of operations and safety of roadway
- Roadways where aesthetic considerations are a high priority
- Multilane roadways with a high level of pedestrian activity



# When to Consider a Raised Median

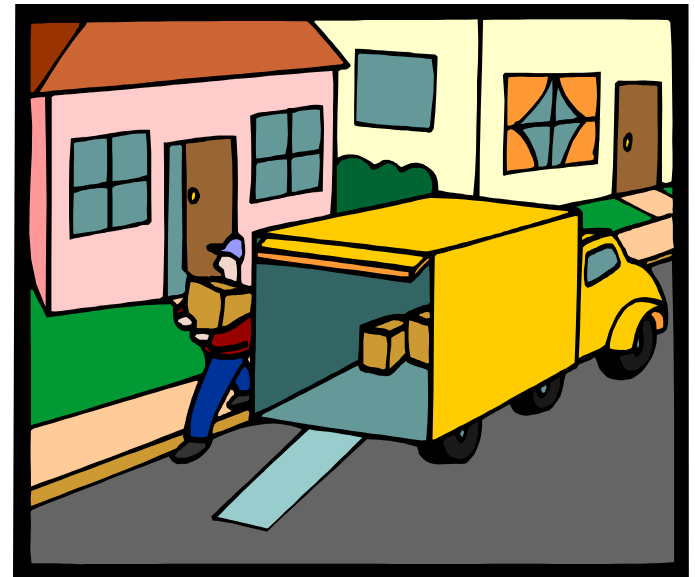
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- High crash locations or where it is desirable to limit left turns to improve safety
  - Clear safety benefit
  - Studies shown later
- When ADTs exceed 20,000 vpd



# Keep in Mind.... Delivery Mobility

- Need adequate locations and width to handle U-turns
  - Can flare intersections or use loons
  - Jughandles/MI U-turn
- Alternate routes to handle delivery truck traffic





# Acceleration / Deceleration Lanes

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- For left and right turns
- Include taper, storage lengths and accel/decel lengths
- Auxiliary lane thresholds in the TxDOT *Access Management Manual*
- TxDOT *Roadway Design Manual* should be used for designing accel/decel lane lengths



# Texas Studies

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# Micro-simulation Operational Analysis

- Investigate the impacts of raised median installation and driveway density by traffic volume
  - 3 case studies
  - 3 theoretical corridors
- Selecting a micro-simulation tool for access management alternatives analysis
  - Input and output characteristics



# Methodology

- 3 case studies and 3 theoretical corridors
- Three simulation runs of each traffic volume
  - Each run provides a random estimate of the measure
  - Analyzed peak hour



# Methodology

- Reduction in conflict points, travel time, speed and delay were analyzed
  - Travel time and speed of vehicles traversing the corridor
  - System delay
- Used VISSIM model



# Three Case Studies (Characteristics)

<b>Location</b>	<b>Corridor Length (miles)</b>	<b>Signals per Mile / Access Points per Mile</b>	<b>Median Opening Spacing (feet)</b>	<b>Number of Lanes Each Direction</b>
Bryan, Texas	0.66	3.0 / 91	690 to 1,320	2
Temple, Texas	0.71	5.6 / 66	350 to 850	2
Tyler, Texas	1.47	4.1 / 46	500 to 1,500	3

# Texas Case Studies (Results)

Location	Percent Difference in Conflict Points	Estimated Existing ADT	Estimated Future ADT	Future Percent Difference in Travel Time	Future Actual Difference in Speed (mph)
Bryan, Texas	-60				
Temple, Texas	-56				
Tyler, Texas	-60				

- Large reduction in conflict points with raised median installation



# Texas Case Studies (Results)

Location	Percent Difference in Conflict Points	Estimated Existing ADT	Estimated Future ADT	Future Percent Difference in Travel Time	Future Actual Difference in Speed (mph)
Bryan, Texas	-60	18,200	21,800		
			48,000		
Temple, Texas	-56	13,300	16,000		
Tyler, Texas	-60	24,400	29,300		
			48,000		

- Lower ADT is “existing +20%”
- Higher volume selected for further analysis

# Texas Case Studies (Results)

<b>Location</b>	<b>Percent Difference in Conflict Points</b>	<b>Estimated Existing ADT</b>	<b>Estimated Future ADT</b>	<b>Future Percent Difference in Travel Time</b>	<b>Future Actual Difference in Speed (mph)</b>
Bryan, Texas	-60	18,200	21,800	-11	2 (increase)
			48,000	-38	7 (increase)
Temple, Texas	-56	13,300	16,000	3	1 (decrease)
Tyler, Texas	-60	24,400	29,300	2	<1 (decrease)
			48,000	57	6 (decrease)

- Case-specific results
- Function of traffic patterns, median opening locations, etc.

# Theoretical Scenarios (Characteristics)

Theoretical Corridor	Median Treatment	Number of Lanes in Each Direction	Number of Driveways	Driveway Spacing (feet)	Raised Median Opening Spacing (feet)
Scenario 1	TWLTL & Raised	2	18	660	660
Scenario 2	TWLTL	2	42	330	660
	Raised				
Scenario 2	TWLTL	3	42	330	660
	Raised				
Scenario 3	TWLTL	3	84	165	660
	Raised				

- ITE trip generation used, and driveways across from each other

# Theoretical Scenarios (Characteristics)

Theoretical Corridor	Estimated Future ADT	Future Percent Difference in Travel Time	Future Actual Difference in Speed (mph)
Scenario 1	18,000 - 28,000		
Scenario 2 (2 lanes)	18,000		
	23,000		
	28,000		
Scenario 2 (3 lanes)	18,000		
	23,000		
	28,000		
	48,000		
Scenario 3 (3 lanes and higher driveway density)	18,000		
	23,000		
	28,000		
	33,000		
	38,000		
	48,000		

# Theoretical Scenarios (Characteristics)

Theoretical Corridor	Estimated Future ADT	Future Percent Difference in Travel Time	Future Actual Difference in Speed (mph)
Scenario 1	18,000 - 28,000	Not Applicable	Not Applicable
Scenario 2 (2 lanes)	18,000	2	<1 (decrease)
	23,000	6	2 (decrease)
	28,000	31	8 (decrease)
Scenario 2 (3 lanes)	18,000	8	2 (decrease)
	23,000	8	2 (decrease)
	28,000	11	3 (decrease)
	48,000	44	9 (decrease)
Scenario 3 (3 lanes and higher driveway density)	18,000	6	2 (decrease)
	23,000	1	<1 (decrease)
	28,000	2	<1 (decrease)
	33,000	7	2 (decrease)
	38,000	22	6 (decrease)
	48,000	10	3 (decrease)

# Concluding Thoughts

- Results from raised median installation are case-specific
- Caution should be used when generalizing access management impacts across corridors
- Function of: traffic volumes, driveway density, weaving (o-d patterns), median opening location and density, decel lane length, signal coordination, speed distribution, driver behavior, etc.
- Micro-simulation allows detailed corridor analysis



# Micro-simulation Concluding Thoughts

- Where observed, relatively small increases in travel time are likely offset by the well-documented increase in safety
  - Texas (4221-2 research report)
  - NCHRP 395, NCHRP 420
- Must coordinate access management analysis needs with micro-simulation tool selection