

Access Control A local and Global Perspective



Transportation Planning
Symposium, Spokane
November 15, 2007

Philip Demosthenes
Parametrix Inc.

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Problem Identification

- Traffic volumes continue to increase
- Congestion and travel delays
- Unacceptable crash rates & loss of life
- Roadway construction costs
- Social, economic, environmental impacts
- Maintenance costs
- Decreasing buying power

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What is Access Management

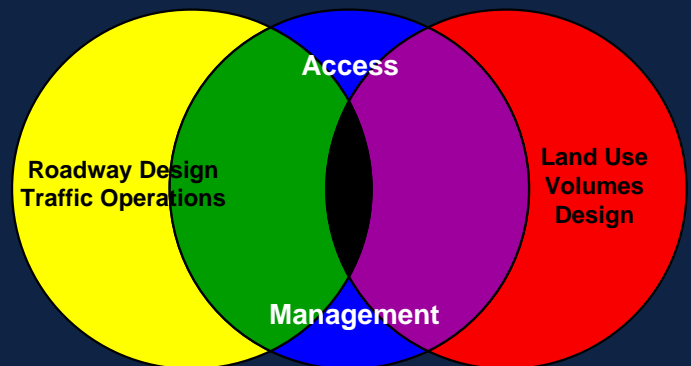
- Managing each point of access.
- Driveways and intersections
- Goal – improved performance



Smoother traffic flow
Better travel times
Less delays at traffic signals
Less stressful drive
Fewer accidents

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Building a bridge between different agencies and different professions



Source: Chris Huffman, KDOT

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Access Management Strategies Support:

- Congestion Management
 - Improves roadway performance
- Asset Management
 - Preserves functional integrity of existing roadway, reducing reconstruction needs
- Safety Management
 - Reduces crash rates significantly
- Mobility Goals
- Saves energy



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Managing Congestion, Capacity and Mobility includes:

- Managing location and design of access to land development
- Uniform intersection spacing
- PARTNERSHIPS with land use authorities – is a TOP priority
- Ounce of prevention saves a pound of cure.

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What is the one thing the Washington DOT does every day that increases crash potential and congestion?

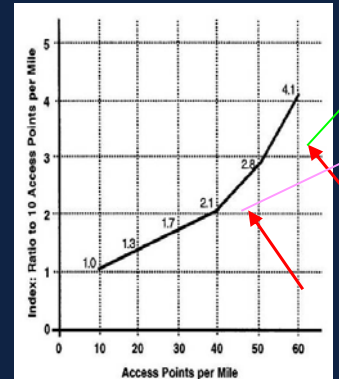
It issues access permits.
It allows new traffic signals.

There is no such thing as a safe access.

As the number of access points per mile increase, so does the frequency of total highway collisions.

And the rate also increases

Each access = 4%



Source: Estimated from Various Sources
Figure 15. Composite accident rate indices.

Roadways are the Most Dangerous Public Facilities on the Face of the Earth

- In the US, over 830 people were killed each **week** in 2005
- 17,500 Crashes each **day**
- 7,400 Injuries each **day**
- Over \$630 million dollars in losses daily
- The leading cause of death of a child, 4-15 (45 per week)



If 107 jumbo jets crashed annually
Something would be done about it.



From AllState Insurance

Washington totals

- Total fatalities, all roads
 - 2004 567
 - 2005 647, an increase of 14%
- Crashes on State Highways
 - 2004 47,634 130 per day
 - 2005 51,901 142 per day
- Injuries on state highways
 - 2005 28,307, about 77 per day.

YOU can prevent accidents

- Planning with safety in mind,
- Design with safety in mind,
- Can prevent more accidents than law enforcement can.
- You have a role in accident prevention.

Intersection Crash Statistics (nationally)

- 27.3 % of all reported crashes (in intersection)
- Almost 25% of all traffic fatalities
- Almost 50% of all traffic injuries



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Access Related crashes, occurring at driveways and intersections represent over **55** percent of all traffic crashes.

Over 40% in rural; 65% in urban areas



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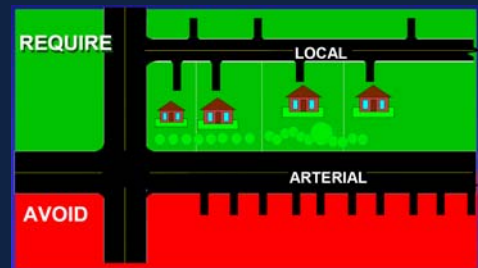
Every Access Point Creates Conflicts and is Fundamentally a Safety Problem

- Issuing a permit is a decision to diminish public safety and roadway function.
- It is one of the few daily agency decisions that is counter to the values, goals and objectives of a public agency.

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Goals of Access Management

- Keep private access off state highways

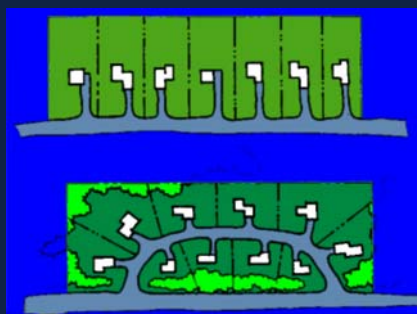


Source: Florida DOT

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Goals of Access Management

- Safer residential access

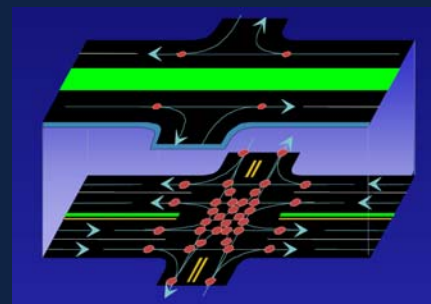


Source: Florida DOT

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Goals of Access Management

- Limit access conflicts

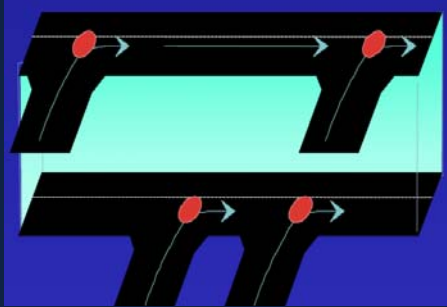


Source: Florida DOT

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Goals of Access Management

- Separate conflict points

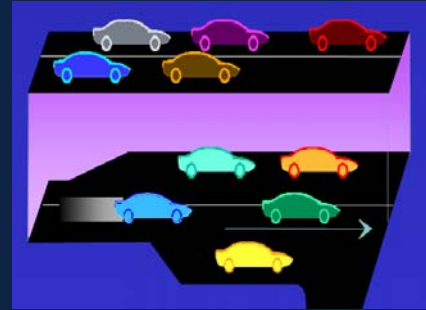


Source: Florida DOT

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Goals of Access Management

- Separate Turning Vehicles from through traffic



Source: Florida DOT

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When access principles are applied to a specific Corridor

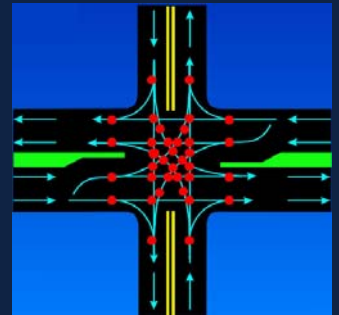
- Crashes reduced by 30 to 60 percent
- Capacity increased by 20 to 40 percent



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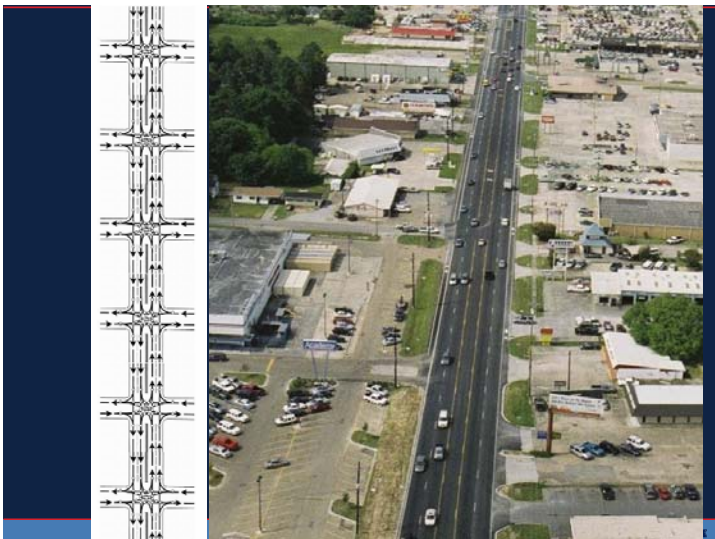
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36 conflict points exist at a 4 leg intersection

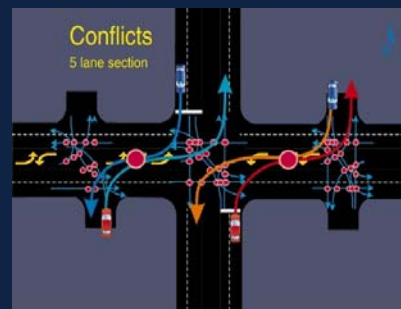


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Access management is – Conflict Management



- Reducing the Rate at which a motorist encounters conflicts, reduces the Rate of crashes.

Florida DOT

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This new shopping center has created many new conflict points on the supporting street system

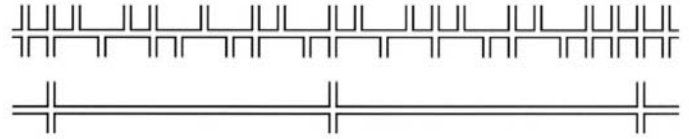
Convenience for shoppers becomes conflict and delay for passerby's.

Where is the Proof of Necessity that this level of hazard is necessary for access service?



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The Frequency of Access Determines a Long Term or Permanent Crash Rate



For a Typical 3 Mile Section of 4 Lanes at 37,000 daily traffic	Top Highway	Bottom Highway
Number of Conflict points	1,641	324
Number of Crashes Expected in 5 years	2,435	680
Cost of Crashes in 5 years	\$ 26.5 M	\$ 7.5 M
Average Speed	25 MPH	44 MPH

3.5 vs 12.5 mvm

Widening this highway from 5 to 6 lanes, caused an increased in access related crashes.



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Loading up an intersection the high generators can increase crashes 200 to 600% at this location. In this 1971 photo, LA Co was installing medians to restrict left turns.



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A shopping center with limited direct access and good on-site circulation is convenient and successful without numerous driveways



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Reducing Access Demands Onto State Highways is all about local street networks

- Having a hierarchy,
 - major to local for circulation.
- Avoiding Strip commercial and residential frontage with direct state highway driveways.

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This road lacks a supporting local network, therefore requiring direct access



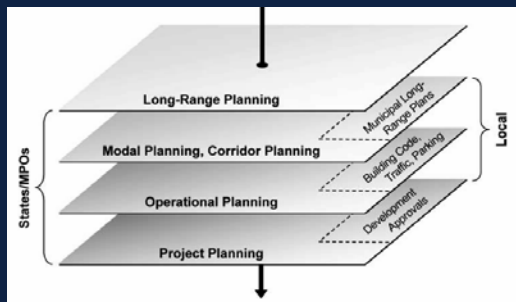
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Land-use and Transportation Planning plays a strong role in determining long term community crash rates

- Local street layouts, local network
- Subdivision design
- Shopping center design and connections
- All determine state highway conflict frequency

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Ideally, AM starts with long range planning



A Guidebook for Including Access Management In Transportation Planning. NCHRP 548

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Safety and Long Range Planning

- An access program with teeth.
- Fund and implement a program
- Program that achieves municipal buy-in
- Accountability and performance audits
- Hot spots – access related
- Standards that address Safety, not just LOS and AASHTO minimums.
- Fund projects with Access plans to protect the public investment

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No National Standards

- There are no national standards for most driveway design elements
- No warrants for right turn lanes
- No warrants for left turn lanes
- No standards for driveway width
- States & Municipalities use various standards and warrants based on old guides, old research and a lot of “judgement”.

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Signalized Intersection Spacing

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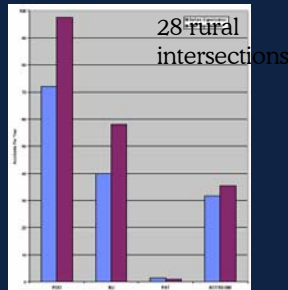
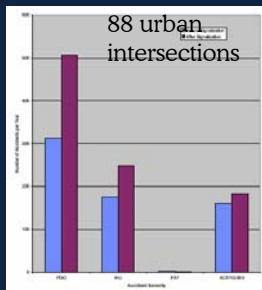


Traffic signals produce and greatest amount of conflict, delay and workload

Relative crash frequency

- 0.7 per year at rural unsignalized intersections
- 1.4 per year at urban unsignalized intersections
- 4.8 per year for rural signalized intersections
- 6.2 per year at urban signalized intersections

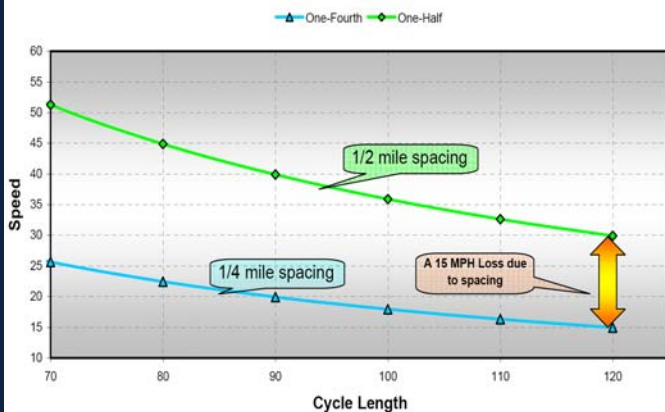
Signals Increase Accidents



Why Signal Spacing is Important

- Short spacing reduces ability to maintain speed and capacity
- More signals per mile means more collisions per mile
- Short spacing may result in adjacent signal queues impacting each other

Cycle Length and Progression Speed



1/2 or 1/4 mile signals ??

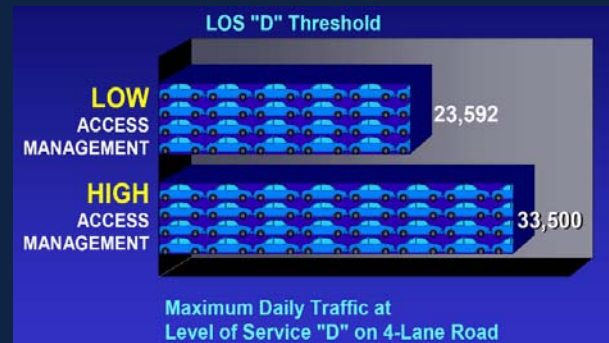


Estimated Savings in Travel time & Delay - 1/2 Vs. 1/4 Signals + Side Friction in 5 Miles

	Travel Speed MPH	Total Travel Time Veh-H/H	Total Delay Time Veh-H/H
Access Controlled Segment	22	542	275
Unrestricted Segment	13	942	675
Percent Change		- 42%	- 59%

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Capacity Benefits



Source: Florida DOT

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Have a Traffic Signal Plan

- Signals reduce capacity, mobility and increase crashes
- Yet, are a necessity
- Have a plan then minimizes their need and achieves good spacing
- At state level – adopt signal spacing standards

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Is Access Management Bad for Business?

- **NO**
- Access Management
 - Improves local and regional mobility
 - Preserves travel time, reliability
 - Preserves capacity, LOS

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Business Interests Include

- Industry
 - Materials, labor, distribution
 - Agriculture, materials, farm to market
- Corporate.
 - Labor, services, travel, efficiency
- Services
 - Travel to clients, or clients to offices
- Freight, Distribution
- Agricultural (farm to market)

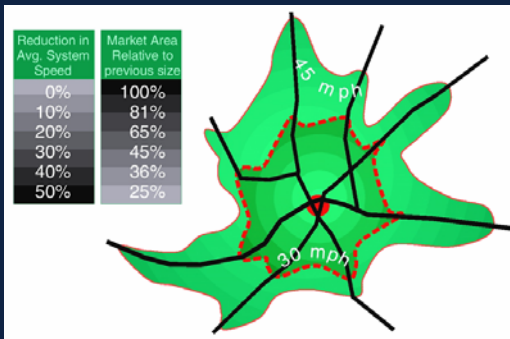
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Retail – access demands are complex

- Retail needs fat wallets - not driveways.
- Customer base (households and income level in market area)
- **Retail should demand access management**
- Travel time determines customer base

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Business Market Area Shrinks as Highway Speed is reduced by congestion and more traffic signals.



Dropping from 45 mph to 30 means over 45% reduction

Source: Florida DOT

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

- Kansas; Except in extreme cases, no impact to businesses were noted
- Texas
 - Business owners reported no change in pass-by traffic
 - Most negative impacts were during construction
 - Perceptions before installation were more pessimistic than after
 - 93% of business owners saw no loss of customers
 - Property values stayed the same or increased

Kristine Williams, AICP, *Economic Impacts of Access Management*, 2000

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Regional Economy and Growth is

- Good jobs, good paychecks
- Local industries that export
- Freight mobility and reliability
- Labor mobility (access to jobs)

- Retail sales are a product of employment not driveways

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FHWA, Office of Operations, Washington, DC
www.ops.fhwa.dot.gov/v/access_management
 8/2006 FHWA-HOP-06-107 EDL 14294



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US Supreme Court Decision on Access



- In 1907 the US Supreme court deemed access control was a property rights issue controlled by the sovereign power of the states not the federal government.
 - *Sauer v. City of New York* 206 US 536 (1907)

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Speed differential is a conflict



Vehicles turning across sidewalks must wait for pedestrians. A right turn decel lane would have improved safety and eliminated delay for vehicles following.



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Left turns create high speed differential and avoidance behavior, significantly increasing crash potential.



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Relative Accident Potential on At-Grade State Highways

- **Speed Differential** -10 -20 -30 -35
- **Relative Accident**
- **Potential** 1 3.3 23 90
 - A vehicle traveling 35 mph slower than other traffic is 90 times more likely to become involved in an accident than a vehicle traveling only 10 mph slower
 - V.G Stover and F. J Koepke, Transportation and Land Development, ITE 1987

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Short lanes are better than a poke in the eye.



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Suggested turning volume warrants for turn lanes

Access Category	Left-turn Decel		Right-turn Decel Lane	
	At/Above 45 MPH	Below 45 MPH	At/Above 45 MPH	Below 45 MPH
MR	10 AADT	10 AADT	5 VPH	10 VPH
UA	10 VPH	10 VPH	10 VPH	10 VPH
UB	10 VPH	15 VPH	15 VPH	15 VPH
UC	10 VPH	25 VPH	15 VPH	25 VPH
RA	10 VPH	10 VPH	10 VPH	10 VPH
RB	10 VPH	15 VPH	10 VPH	15 VPH
SF	10 VPH	25 VPH	15 VPH	25 VPH

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Turn lanes also need sufficient length to reduce departure speed differential on the mainline.



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Options for Deceleration Lane Length, includes taper

Speed in MPH	35	45	55	65
Deceleration Length, Ft.	215	345	510	710

10 mph speed differential
For normal state highway

Speed in MPH	35	45	55	65
Deceleration Length, Ft.	350	630	810	1060

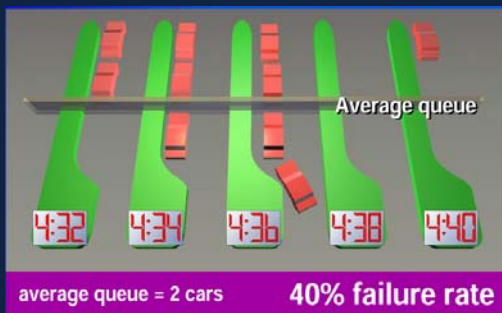
Zero mph speed differential
For major state highway, expressway

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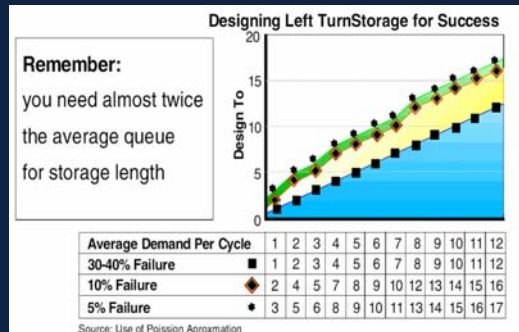
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Why Designing for Average Queue will cause some failures



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What a difference more storage can make

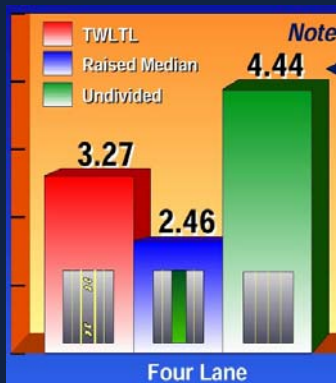


Florida DOT

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Decreasing crash rates by adding medians

Florida DOT



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TWLTL has volume limits



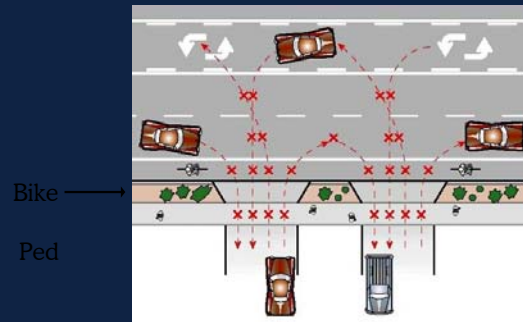
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Frequent driveways result in poor use of median lanes



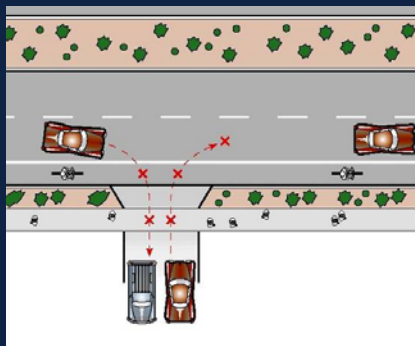
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Full movement driveways increase bike and ped hazards



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Medians reduce bike and ped conflicts



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Using More Sight Distance For Safety

- Not using emergency stopping for each problem.
- Allowing for work load, decisions, maneuvering, in order to have smoother flow, better decision making.

From AASHTO 2004 tables	35 MPH (design speed)	55 MPH (design speed)
Minimum Stopping Sight Distance	250	495
Decision SD to Stop, Urban	590	1030
Decision SD to Maneuver Urban	720	1135
Decision SD to Maneuver Rural	525	865

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TRB Access Management Committee Web Site

- Best online resource for everything in access management:
- www.accessmanagement.info
 - A TRB resources website
 - Reports, conference papers, research, movies, information.

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Memorial Drive, Atlanta



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Post Project – Memorial Drive

- **37 % drop in Total Accident Rate**
- 48 % drop in Injury Rate
- 59 % drop in Mid-block Injury Rate
- 40 % drop in Intersection Injury Rate
- Project has saved at least 15 lives and has prevented thousands of accidents since completion.

Crash reductions - Golden Colorado (3 years before & after)



- Was commercial strip, 4 signals and TWLTL
- 4 RBTs and raised median
- 60 % drop in Crashes (mvm)
- 94 % drop in injuries
 - Only 1 vehicular injury crash in 3 years (previous 3 years were 31)
- No Pedestrian crashes



Lacking local circulation network, how would this corridor look and work with solid median and roundabout intersections to handle u-turns?

Access Management Program and Policy

- Have a permitting program
- Have standards that implement the key principals effectively
- Have the standards FIT the roadside land use
- Education, training, agency cooperation.
- Multi-discipline expertise.

Most Access Programs have Two major elements:

- Access Standards
- and Access Categories.

The true heart of an access management program is the access category system

Arizona State Highway (Draft) Access Management Categories

FW (freeway)	
MR (major regional)	
RA (rural principal)	UA (urban principal)
RB (rural secondary)	UB (urban mixed)
	UC (urban secondary)
SF (service and frontage roads)	

Access Classification System

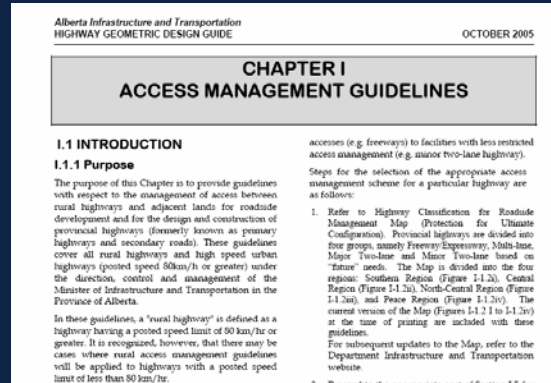
- Establishes an access decision hierarchy that is aligned with the adopted transportation plan.
- Ensure that each access decision is consistent with meeting the functional purpose of the roadway.
- Access category is the functional guidance on day to day access decisions impacting the performance of the roadway.



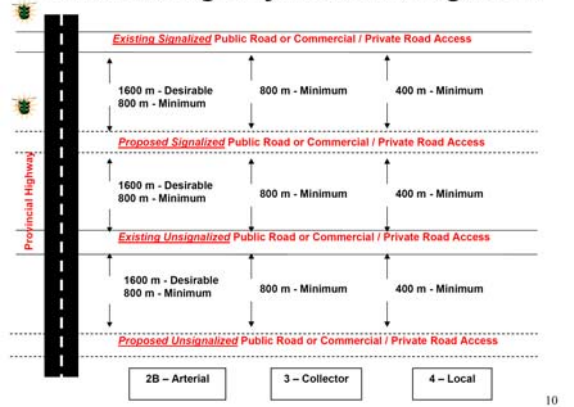
Access Category Assignments

- Made at the highest level.
- Adopted as regulation
- Developed in cooperation with local government and regional planning agencies

Alberta



Key Standards – Highway Intersection Spacing Provincial Highway Access Management



Highway Access Management Guideline

Final Draft - November 2006

Corridor Management and Property Section
Operations Office
Contract Management and Operations Branch
Provincial Highways Management Division



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Demolition

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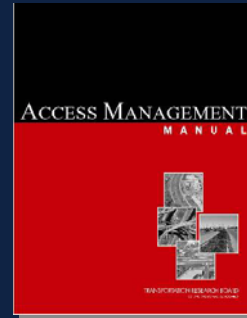
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TRB National Access Management Conference

- Next Bi-annual conference
- Baltimore Harbor, July 13-16, 2008
- Best online resource for everything in access management:
- www.accessmanagement.info
 - A TRB resources website
 - Reports, conference papers, research, movies, information.

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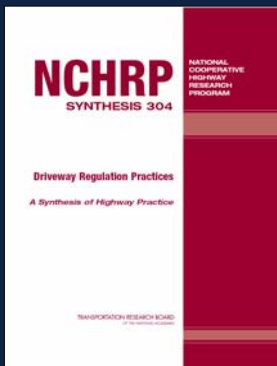
TRB Access Management Manual



- State of the art
- Supplemented by subsequent state and national studies

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NCHRP Synthesis 304



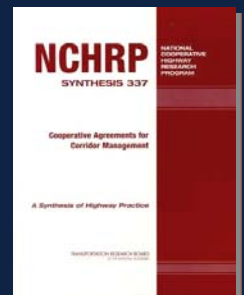
- How can we accomplish access spacing in the “real world”?
- Access permitting best practices
- Variance procedures
- Fee structures

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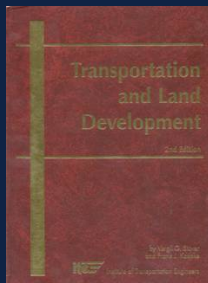
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NCHRP Synthesis 337 Cooperative Agreements for Corridor Management

- **Integrate plan** into policies, practices and regulations
 - Joint administration
- Provide for **future updates** to the plan
- Create frequent opportunities for **educating partners**

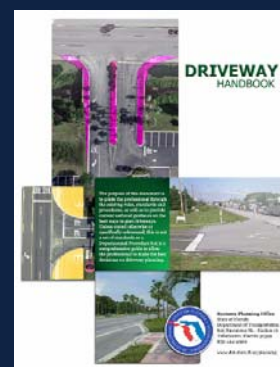


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**Stover, V.G. and Koepke, F. J.,
Transportation and Land Development, 2nd
Edition, Institute of Transportation
Engineers, Washington, DC, U.S.A., 2002**

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**Florida DOT
Driveway
Handbook
2005**

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