Applying Access Management to Roadway Projects

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Why Access Management is Important

What is Access Management

- Managing each point of access to a road.
- Driveways and intersections
- Interchanges and interchange crossroads

- Goals: Smoother traffic flow
- Better travel times
- Less stressful drive
- Fewer accidents

3

Why managing access is a key element in investing in construction and design

- Improves capacity in addition to adding lanes
- Helps preserve capacity as originally intended
- Reduces crash rate and frequency significantly over the life of the investment
- Extends functional life of the project - supports sustainability

4

SAFETY is a big component of Access Management

5

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

- In the US, about 650 people are killed each **week**
- Over 15,000 Crashes each **day**
- Over 6,000 Injuries each **day**

•The leading cause of death of a child, age 3 to 14 is a traffic crash.

6

At the current U.S. crash rate, one person of every 90 born today will die violently in a motor vehicle crash. 70 out of every 100 will be injured at some point in their lives.

AASHTO Strategic Highway Safety Plan, December 2004

Relationship Between Access and Crashes

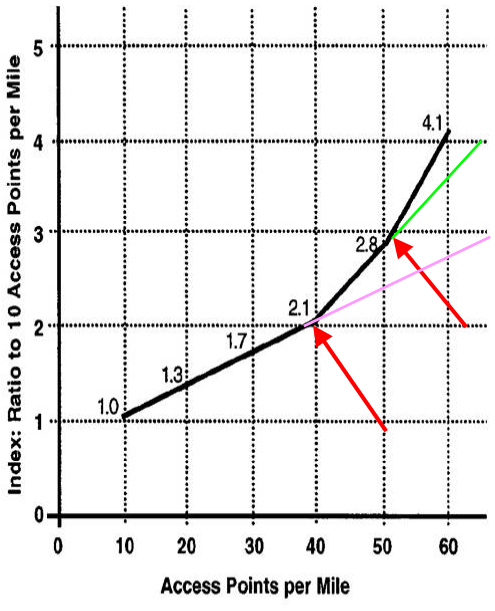
- Access Related crashes at driveways and intersections represent over **55** percent of all traffic crashes. 65% to 75% in urban areas
- More than 3 million access related crashes annually.
- Over 3,000 access related injuries each day.

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.

The crash rate also increases.
Each access = 4%

NCHRP 420



Source: Estimated from Various Sources

Figure 15. Composite accident rate indices.

Every Access Point is Fundamentally a Safety Problem

- Issuing an access permit is a decision to diminish public safety and roadway function.

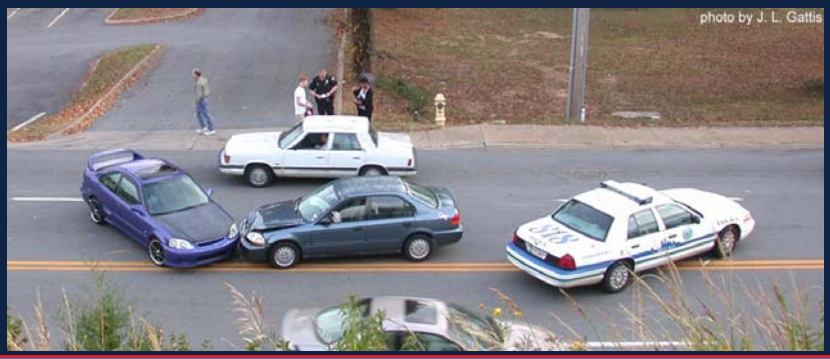


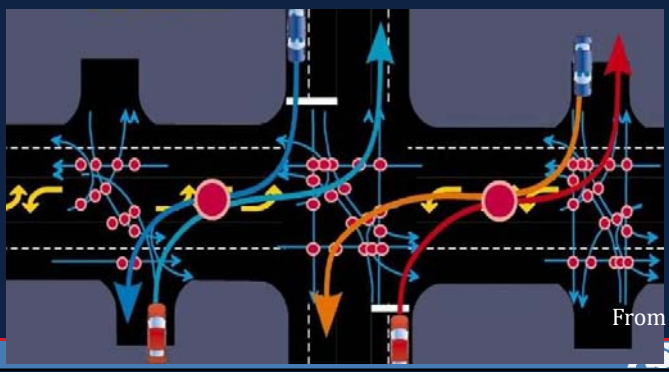
Photo by Dr. J.L. Gattis

When access principles are applied to a specific Corridor

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

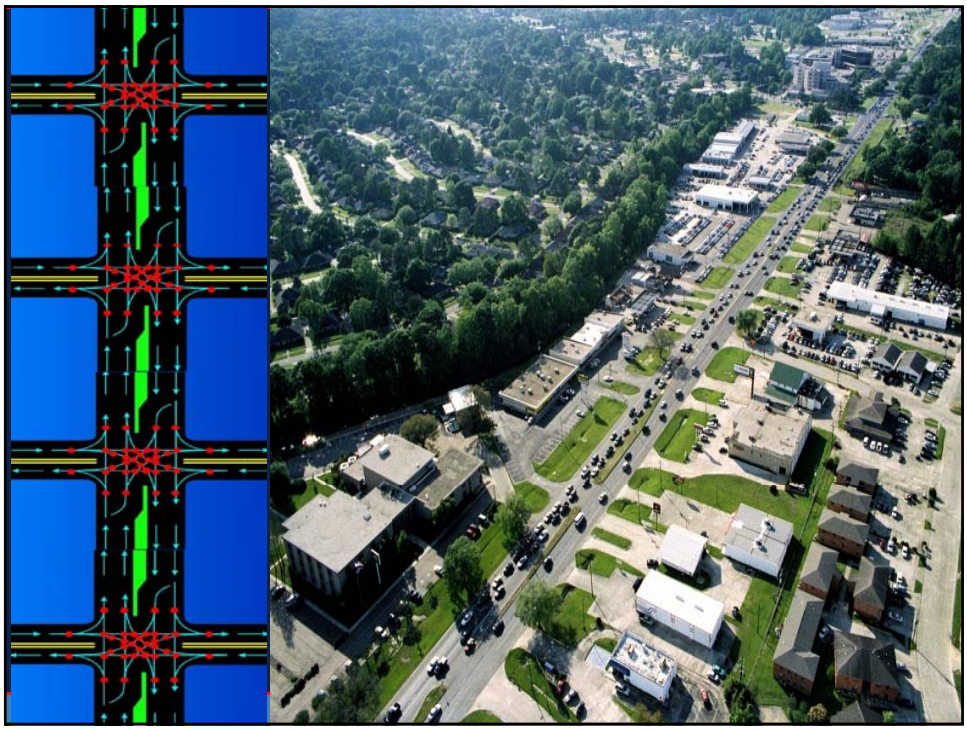
In its simplest form, Access Management is Conflict Management

- If you reduce the rate and severity of conflicts the motorist encounters, you will reduce the crash rate, the injury rate and increase the smooth flow of traffic.



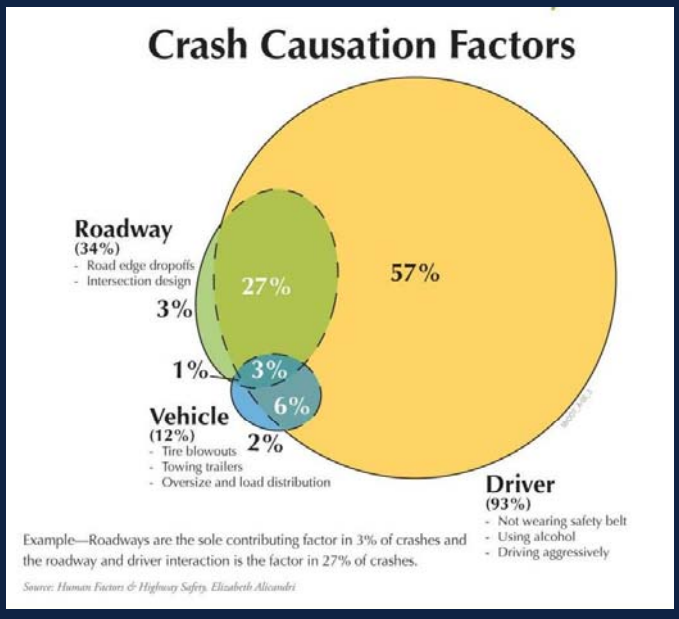
From Florida DOT

13



Managing road design

- Do we design for the vehicle?
  - Design vehicle, basic stopping distance criteria, sight distance
- Or increase design for the driver?
  - Varying reaction times
  - Exceeding design speed
  - Inattentiveness, aggressiveness
  - Increase the allowances for P.I.E.V.
    - (Perception, Intellection, Emotion, Volition)



Adopted from Elizabeth Alicandri and the Minnesota DOT

Design Allowance for Human Errors

- If no human errors, there should only be about 7% of the current crash history
- Should we increase our design considerations for human error?
- Conflict management addresses driver error and has capacity and safety benefits.

Driver Work-Load is a Rate

- Speed = increases work load rate
- Conflict frequency = increases work load rate
- High work load = higher crash rate

AM Strategy: Driver Work-Load can be modified by good planning and design

Design and location principles in access management

Goals of Access Management

- Separate Turing Vehicles from through traffic
  - Provide left and right turn lanes

Goals of Access Management

- Separate conflict points
- Fewer per mile

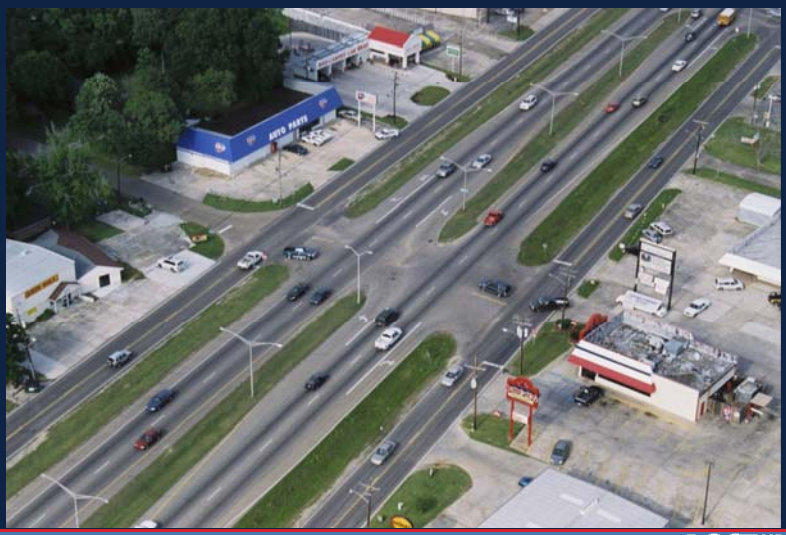
Goals of Access Management

- Keep private access off arterials

Goals of Access Management

- Keep private access off arterials

Modern Access Management does not recommend frontage road systems

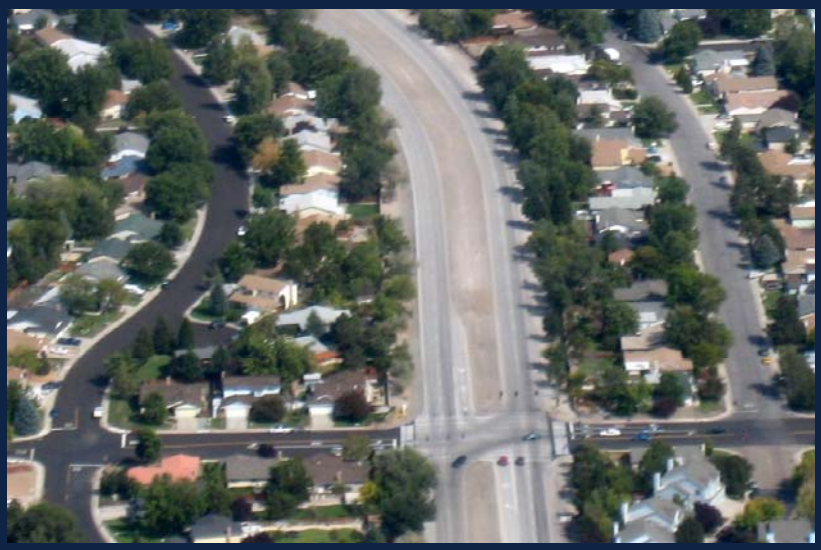


Internal Circulation w/ Limited Access

Hierarchical Network is an Access Management Strategy

Remove Driveways from Arterial Roadway Speed Reduces Driveway Safety

Backage Roads, Local Internal Streets



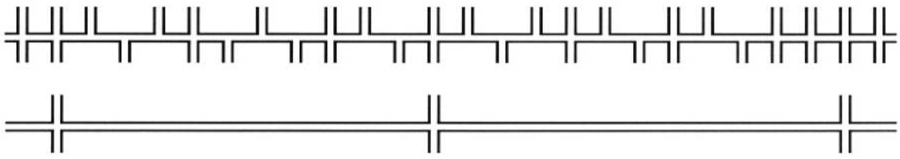
Land use planning and project design decisions do establish long term crash rates

- Planning and Engineering decisions determine – Access need, location, frequency, type and traffic volume - thereby establishing roadway conflict rates.

As arterials are widened, volumes and speeds increase and most frequently crash rates and severity also increase.

Land use, site plan approvals, can produce high conflict rates

If a roadway program or project can reduce the crash rate from 12.5 to 3.5 per MVM



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

Implementation of access management at the planning level

Access Decisions begins with long range planning

- Long range planning
  - Policies, staff budgets, Regional plans
- Modal Planning, Corridor Planning
  - Functional levels, network density, width
- Operational Planning
  - Building, traffic, site design codes, standards
- Project Planning
  - Access Plans, Site Plan approvals, subdivisions

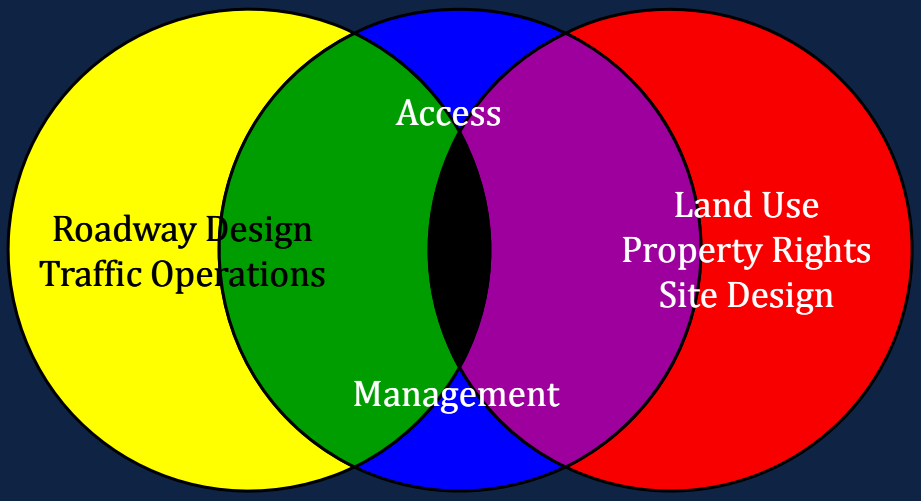
A Guidebook for Including Access Management
In Transportation Planning. NCHRP 548: Transportation Research Board

Why is Access Management Difficult to Execute

- Legal considerations – Property rights
- Crosses professional and agency organizational lines
- Reluctance of highway agencies to deal with land side issues
- Failure of elected officials to put into practice what is necessary for safety

36

Building a bridge between different agencies and different professions



Source: Adopted from Chris Huffman,

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Decision Logic, Process, Framework, for Access Permitting

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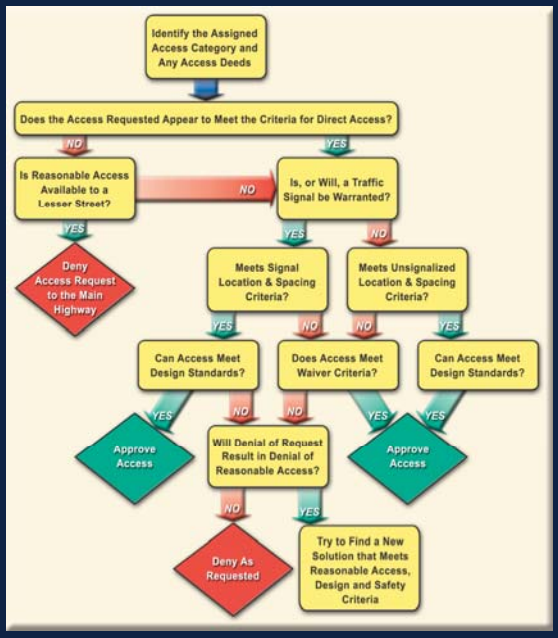
System Wide Access Classification System

- Sets the system hierarchy
- Based on functional level designations
- The access classification determines the answer to the question:
- May I have access to the roadway?
- It's the heart of any access program.

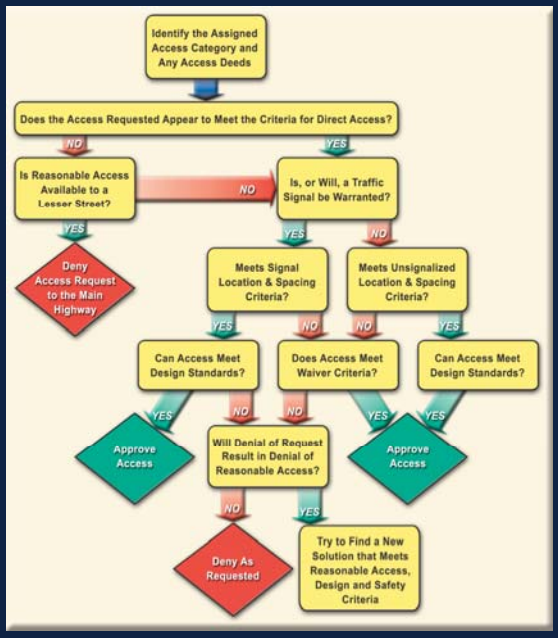


Decision Flow Chart For Permit Decision:

1. Qualify?
2. Location
3. Mitigate

Access Categories to Manage by Function

Access Management Categories	
FW (freeway)	
MR (major regional)	
R1 (rural principal)	U1 (urban principal)
R2 (rural secondary)	U2 (urban mixed)
	U3 (urban secondary)
SF (service and frontage roads)	



Decision Flow Chart For Permit Decision:

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Location Determination Example

- First – Decision Sight Distance (AASHTO)

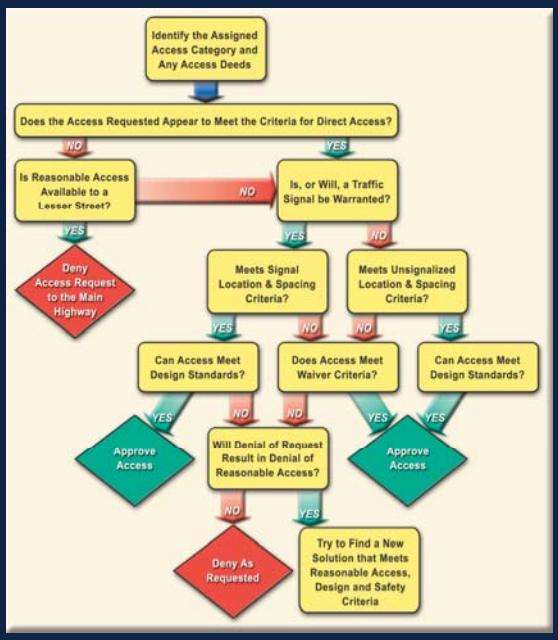
Posted speed in MPH	25	30	35	40	45	50	55	60	65	70
Distance in feet	625	715	800	890	980	1125	1220	1275	1365	1455

- Second – Spacing from other accesses

Posted speed in MPH	25	30	35	40	45	50	55	60	65	70
Approach Spacing	200	250	360	425	495	570	645	730	820	910

- Bottom line – stopping sight distance (adj for design speed)

Posted speed in MPH	25	30	35	40	45	50	55	60	65	70
Sight distance (in ft.)	160	210	265	320	385	455	530	610	695	785



Decision Flow Chart For Permit Decision:

1. Qualify
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Sample Turn Lane Warrants

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
U1	10 VPH	10 VPH	10 VPH	10 VPH
U2	10 VPH	15 VPH	15 VPH	15 VPH
U3	10 VPH	25 VPH	15 VPH	25 VPH
R1	10 VPH	10 VPH	10 VPH	10 VPH
R2	10 VPH	15 VPH	10 VPH	15 VPH
SF	10 VPH	25 VPH	15 VPH	25 VPH

Deceleration Lane Length Options

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

10 mph speed differential for normal arterial

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

Zero mph speed differential For major arterial, expressway

Matching Deceleration turn-lane length to functional level of the roadway

Posted Speed Limit	25	30	35	40	45	50	55	60	65	70	75
MR	210	280	350	490	630	700	810	930	1060	1100	1350
R1 or U1,	110	160	215	275	345	425	510	605	710	820	950
R2, U2, U3, & SF	105	145	190	245	300	365	435	510	590	680	800
Transition Taper length	50	50	50	50	75	75	75	75	75	100	100

- Values above are taper and decel length combined
- Storage length is added to above values

Minimum Design

- Minimum design means
  - minimum capacity
  - minimum safety
  - minimum costs.
- Permits should act to minimize the impacts of the new access
- Functional operation and project life fails sooner with minimum designs.

Minimum Turn lane lengths Impact Peak Hour Mobility, Capacity

Fitting Access Management into Urban and Context Sensitive Locations

- Create access criteria for CS location
- Have realistic standards for sensitive areas linked to a performance level
- Assign the CS category where needed
- A rational regional transportation plan

Legal Issues in Access Management

- Property rights do not include the right to create safety problems on public facilities

- There is no right to a left turn
- Customer convenience is not a right.

51 Photo by J. Gattis

Access is a Potential Public Hazard

- All research clearly shows that access to the roadway is always a hazard to some degree.
- On arterials, the hazard can result in injury or death.

52

Legal Issues in Access Management

- Owners must be able to access their property in a reasonable manner.
- They have a right to use, to develop, their property
- Changes in access may impair convenience to existing, but not rise to the level of substantial impairment
- Remaining access needs to be operationally sufficient.

*You can manage access without compensation and value loss claims if:

- Acting for the public good
- Not denying a reasonable level of access
- Not rising to the level of substantial impairment of property use
- Access modification based on standard practices, plans, policy to protect the public

*seek the advice of your agency legal counsel

Legal Issues in Access Management

- Less of a problem if you have a prepared program with clearly defined and reasonable standards.
- Reference to a set of adopted access standards helps the courts determine correct application.

New Jersey Department of Transportation
State Highway Access Management Code

Chapter 468-51 WAC
Highway access management access permits — administrative process

STATE OF COLORADO
State Highway Access Code
Volume 2, Code of Colorado Regulations 601-1

Georgia Department of Transportation
REGULATIONS FOR
DRIVEWAY AND ENCROACHMENT CONTROL

FLORIDA STATUTE 335.18 ACCESS MANAGEMENT ACT

Major US Supreme Court Decision

- Access law varies between States*
- 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

*Consult your attorney

Thanks to Ross Netherton, TRB

Access Control by Deed

- Controlled-access highway usually refer to freeways and other fully controlled facilities.
- All access rights to and from abutting property are acquired by government either by real-estate transaction or statute.
- Each state has laws defining these special facilities.

Access Control by Permit

- If not "fully controlled", then access rights are managed by agency police powers
- All access should be controlled by permit
- Granting of a permit is a use license
- An encroachment on public R/W
- Owner rights under a license are different than property rights
- Granting of "access right" is a misnomer.

Individual property issues within a reconstruction project

Do your homework for each Parcel

- Any existing promises, permits?
- Operationally, do they really need what they have?
- Volume and vehicle types and frequency
- Apply the proof of necessity – the least access the land use can work with?
- Convenience does not equate to necessity

Meet with the Owner, Lessee

- What is their opinion
- What are traffic and parking issues you may not be aware of
- On-site flow adjustments necessary?
  - Parking circulation, gas pumps, car wash.

Site Access Considerations

- Analyze access opportunities on mainline
- Identify all opportunities for access points
- Identify potential shared access opportunities
- Evaluate access impacts to all modes
- Evaluate approach grades

Site Access

- Evaluate Transition To Internal Site Circulation
- Access design
- Vehicle stacking
- Curb returns, turning radius
- Delivery requirements (max daily design vehicle)
- Select Safe and Reasonable Access

Modifying the Access

Getting the Modification Done

- Are there agency procedures?
- Is there a legal permit, or is it "grandfathered"
- There is no property right to the driveway unless there is something in the history
- Temporary Construction Easement?
- All work in right of way?

Listen to

- Members of the Public Who Feel Victimized
- Their input is valuable
- Listen very carefully

Balance Public Safety and Access Needs

- Be as fair and reasonable as you can
- Know the project impact of being flexible

Decision Paperwork, pit falls

- Do not include access issues in property agreements
- Driveways are licenses, police power.
- Don't make it a property right
- Don't 'permit' left turns
- Be consistent between owners even if some can pull big strings

Rights of Appeal, Due process

- Property owners have a right to either administrative hearing or full court depending on agency process
- If R/W is involved, access change should be folded into R/W acquisition.
- If damage claims, also full court.
- Access issues should be settled in limine hearing (is access compensable?)

Access Management Decisions Should be Identified Early in Planning Documents

Helps lower risks of claims

Resolution of issues more likely

Access Management Planning

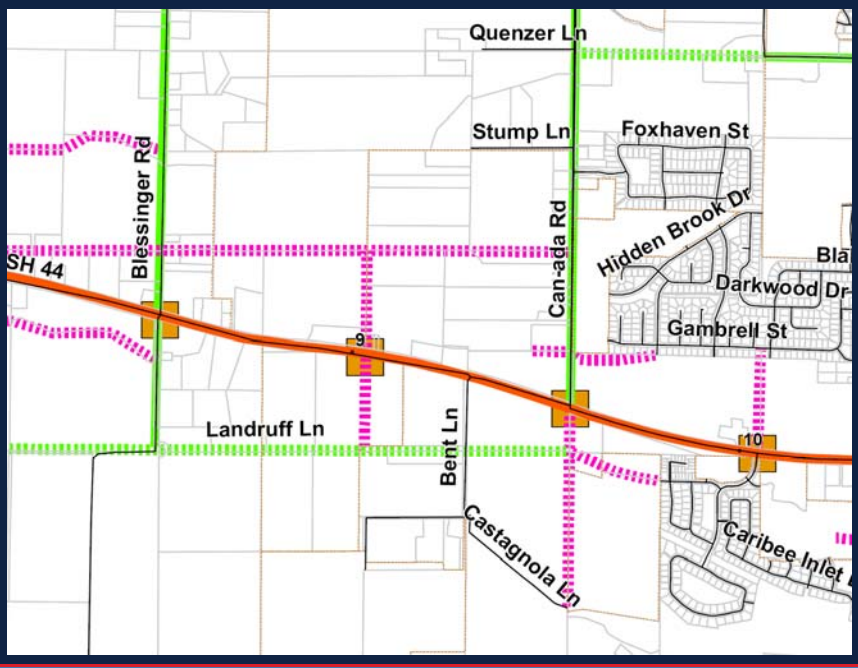
- A plan for a specific segment
- Joint effort to set function and purpose
- Determine performance measures
  - Safety, capacity, efficiency
- Level of allowable private access
- Locations of public intersections
- Final joint agreement for all access permitting.

Build Consensus

- Project performance buy-in at project description, regional planning levels
- Link access control to performance
- Link to community safety, regional health and safety
- AM is good for business because mobility, travel efficiency, is good for business.

Build Consensus

- Don't do it alone
- Get ahead on determining solutions to all concerns – such as U-Turns due to raised median
- AM is not a new strategy, it is proven.



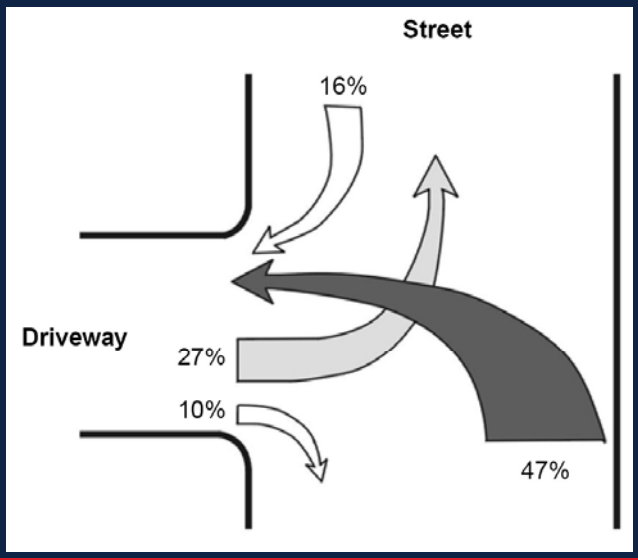
From Parametrix Inc. and ITD

Medians, a very cost effective and useful design element

Using Medians to Improve Operation and Safety

- #1 design element in AM
- Does not touch driveways
- Can be controversial
- Not compensable – no right to a left
- Requires consideration of new circulation patterns

Left Turns Dominate Crash History



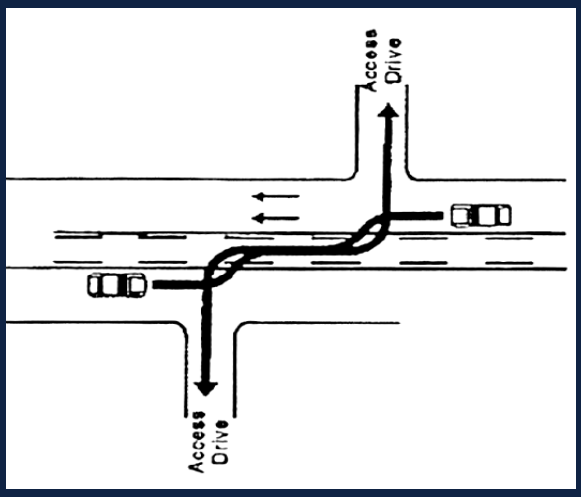
TWLTL has limits

Painted Median?

- Generally, >25,000 daily means higher collision rate if TWLTL
- Speed differential can be high in lane
- Not recommend for > 35 mph
- Not recommended for >4 lanes
- Painted medians are cheaper
- Paint does not control left turns
- Painted medians do not allow signs

- Painted medians often need 'short' medians (for left turn bays)

Overlapping Left-Turn Movements on TWLTL



Mixed Median use in Phoenix

Controlling Driveway Related Conflict Points Using Medians

Driveways With and Without Median

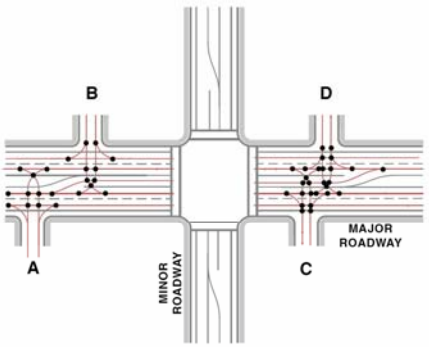


Figure 2: Typical Access Scenario at the Intersection of Two Public Roadways

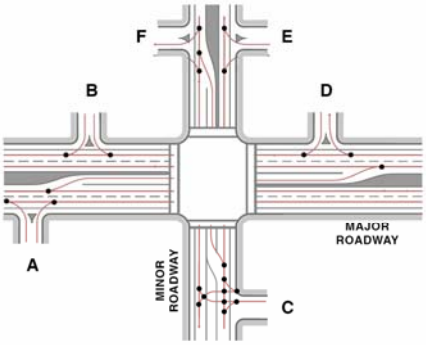


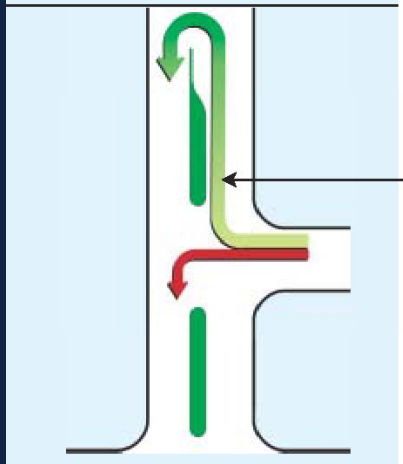
Figure 3: Desirable Access Scenario at the Intersection of Two Public Roadways

Access Management in the Vicinity of Intersections, FHWA Office of Safety

85

U-turns are safer

A study in Orlando shows most customers do not find U-turns an inconvenience



18% total crash rate reduction

27% injury fatality crash rate reduction

John Lu, Ph.D., P.E. University of South Florida 2001

U-turns are often much safer than direct left turns, especially on high volume, high speed, or congested roadways.

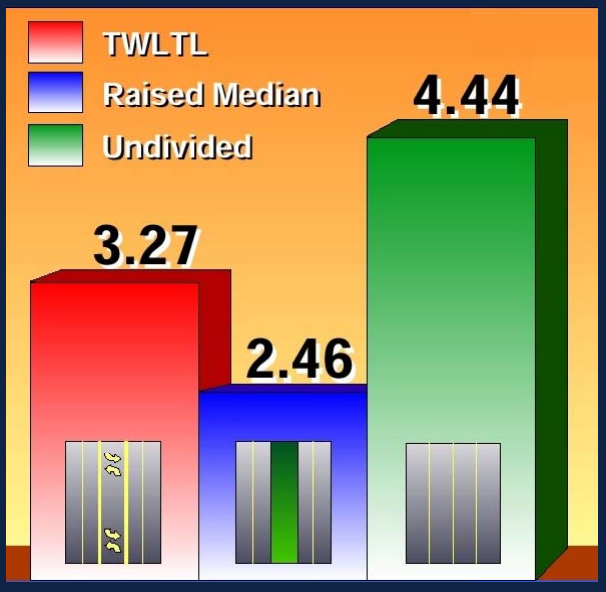
86

Source: Florida DOT

Frequent Access on Bike Routes & Sidewalks, Increase bike and ped hazards

Decreasing crash rates by adding medians

Florida DOT research



4 lane, rate per MVM

Source: Florida DOT

Memorial Drive, Atlanta; TWLTL to Raised Median

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.

Roundabouts Provide for U-turns

La Jolla before

Context Sensitive – Rebuilt 2006-08 using 5 Roundabouts (≈21k ADT)

93

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94

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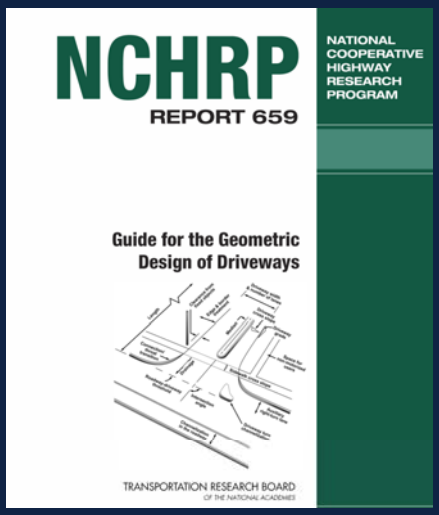
Interchange Access Plans

- Similar process to any corridor plan.
- Emphasis is protecting the performance of the interchange.
- Protect the functional zone (varies)
- Tight control for about 1,000 feet on the crossroad.
- Single point, diamond, roundabout, free right ramps.

No Plan, No Vision, No Control, Low growth capacity, higher reconstruction costs

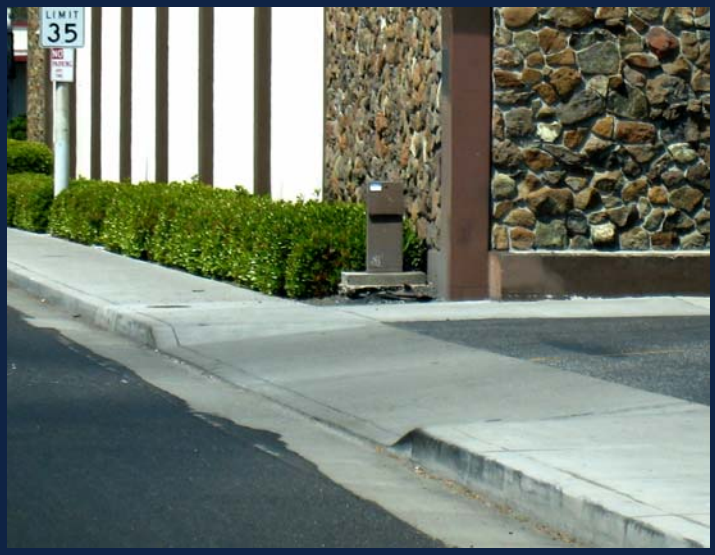
Driveway Design Elements of Concern

New



NCHRP REPORT 659
Guide for the Geometric Design of Driveways
2010

No radius, Not ADA, too narrow

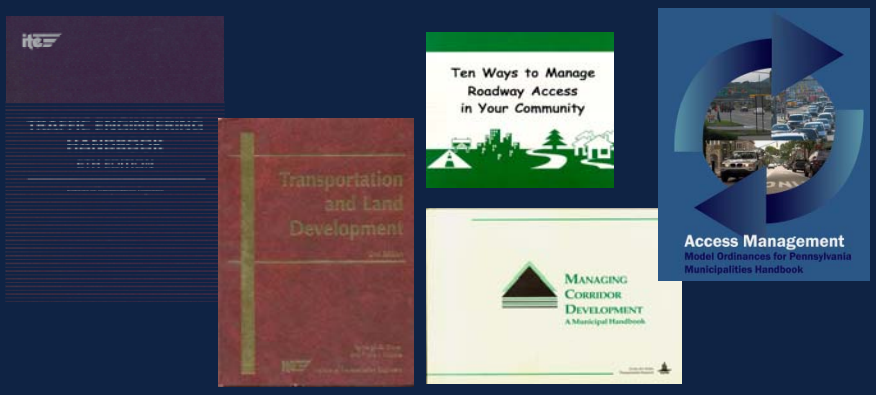


Short Curb Cuts have no radius

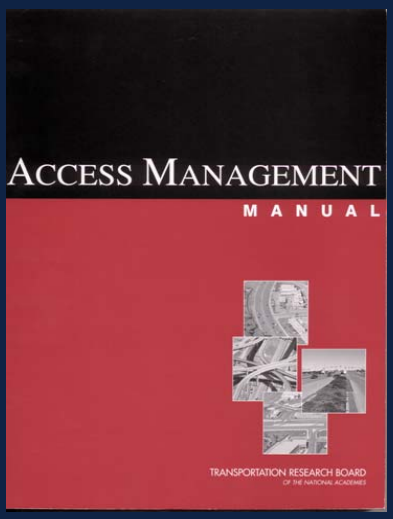
Flared driveway for effective radius

Curb Returns & Flairs for Private Access?

Resources

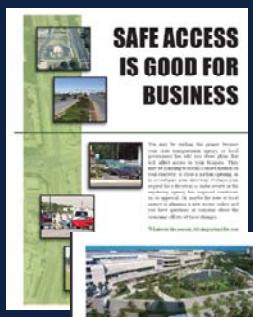


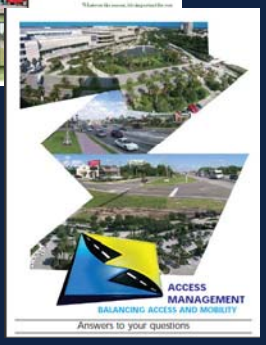
Check out the Resources on
www.accessmanagement.info



Access Management Manual.
Transportation Research Board of the National Academies
Washington, D.C., 2003.

Prepare Handouts and Audiovisual Aids



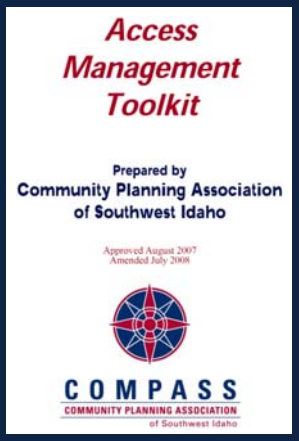


Brochure, CD and video are available.
FHWA Office of Operations:
Neil.Spiller@dot.gov

FDOT brochure and other resources available at www.accessmanagement.info

Access Management Guidebook for Communities, Michigan DOT (2001)

COMPASS is the MPO for the Boise/Nampa urbanized area – Idaho (2008)



New Material From FHWA Office of Safety

http://safety.fhwa.dot.gov/intersection/resources/fhwasa10002/

Access Management in the Vicinity of Intersections

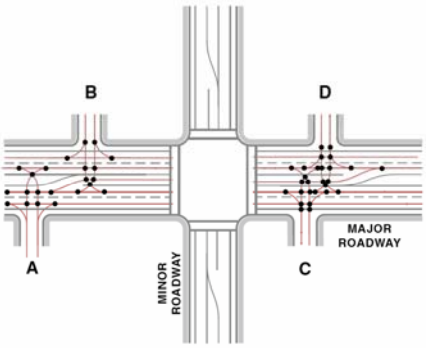


Figure 2: Typical Access Scenario at the Intersection of Two Public Roadways

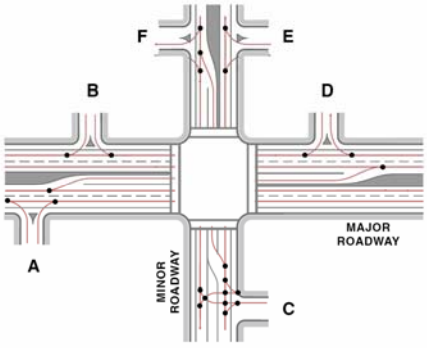


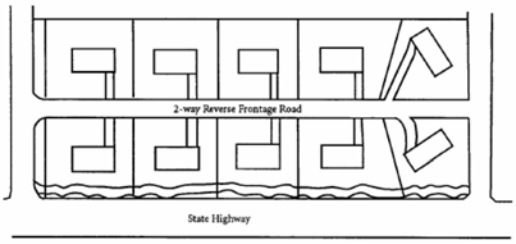
Figure 3: Desirable Access Scenario at the Intersection of Two Public Roadways

Toolboxes have examples and templates

Reverse Frontage Roads

Description:

When land is subdivided for residential use, lots abutting the thoroughfare should not be allowed to obtain driveway connections on the thoroughfare. Instead, the subdivision should be designed so that lots obtain access from an interior street, also known as a reverse frontage street or backage road. Landscaping, berms, or other barriers may be provided at the rear of these properties to buffer them from the noise, debris, and traffic on the thoroughfare. This also reduces the potential for dangerous conflicts between high-speed traffic and residents and other drivers entering and exiting a driveway.



Key Resources

- *Access Management Manual,* TRB 2003.
- Large collection of reports, presentations, references and conference proceeding, http://www.accessmanagement.info
- *NCHRP Report 548: A Guidebook for Including Access Management in Transportation Planning*, TRB, 2005.
- *NCHRP Synthesis 299: Recent Geometric Design Research for Improved Safety and Operations,* TRB 2001.
- *Intersection Safety Issues Brief #8: Toolbox of Countermeasures and Their Potential Effectiveness to Make Intersections Safer*, FHWA, ITE 2004.
- *Transportation and Land Development*, 2nd edition, ITE, 2002.
- *The Access Management Guidebook: Reducing Traffic Congestion and Improving Traffic Safety in Michigan Communities*, Planning and Zoning Center, Inc., for the Michigan DOT, 2001.

More resources

- *"Urban Street Geometric Design Handbook",* Chapter 3, Access Management, ITE (2008).
- *"Traffic Engineering Handbook"* Access Management Chapter, ITE (2009).
- *Impacts of Access Management Techniques,* NCHRP Report 420, TRB, Washington, DC, 1999
- *Driveway and Street Intersection Spacing,* Transportation Research Circular #456, TRB, Washington, DC, 1996
- *Safety of U-turns at Unsignalized Median Openings*, NCHRP, Washington DC 2004
- *Access Management on Crossroads in the Vicinity of Interchanges,* NCHRP Synthesis 332, Washington DC 2004.
- *Access Rights, A Synthesis of Highway Practice,* NCHRP Synthesis 351, Washington DC 2005

Questions

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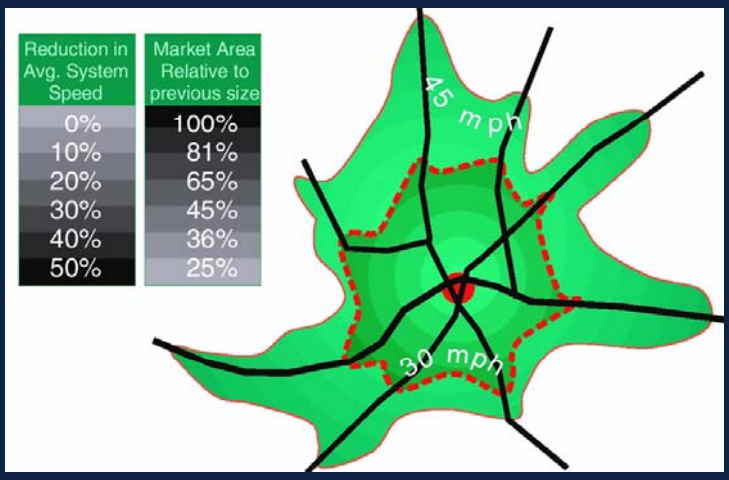
A Few Bonus Slides

How Can Local Governments Institute Access Management Strategies

- Local Comprehensive Plan
- Land development and subdivision regulations
- Roadway & access design standards
- Site plan review criteria
- Corridor management plans

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



Assuming a 20 minute trip, dropping from average speed of 35 mph to 25 means over 50% reduction in market area.

 Source: Florida DOT


Google
DWLEDGE
EARNING

Decreasing crash rates by adding medians

Florida DOT