



Fifth National Conference on Access Management

June 23-26, 2002
Austin, Texas





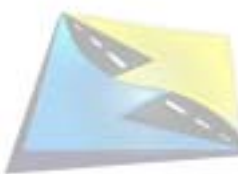
5th National Access Management Conference

Sunday

Monday

Tuesday

Wed

		Click on a block to view session		Welcome Reception
Opening Session	Overview of National Access Management Manual	Access Management at Regional and Local Levels, Part I	Access Management and Public Involvement	Reunion Ranch Evening Dinner Event
		Applying AM to Site Design and Development Review	Recent Research in AM Modeling	
		Use of Graphics for Public Involvement		
Access Management at Regional and Local Levels, Part II	Access Management and Corridor Plans	Access Management Programs at the State Level	Legal Issues in Access Management	
Access Management and its Impacts on Safety	Access Management Techniques at Interchanges	Panel Discussion: "Retrofitting: What Would You Do With This Mess?"	Workshop: "Applying Access Management to Site Design and Development Review"	
Site Impact Pitfalls and their Solutions	Access Management Resources	New Software to Analyze Access Management Impacts		
National Strategies for Access Management	Working Together for Success	Closing Session: Access Management Jeopardy and Closing Remarks	The 6th AM Conference In Kansas City June, 2004	



Opening Session

Moderator:
Eddie Shafie
Vice President
Earth Tech, Inc,

General Remarks

Speakers:
Mike Behrens, RE.
Executive Director
Texas Department of Transportation



Slides

Mary Owen. PE,
District Engineer, Tyler District
Texas Department of Transportation

Ken Bohuslav, PE.
Director, Design Division
Texas Department of Transportation



Overview of National Access Management Manual

Moderator:

Arthur Eisdorfer, RE., P.P.

Manager, Civil Engineering

New Jersey Department of Transportation

 [Slides](#)

 [Other](#)

2.

[Overview of National Access Management Manual](#)

Speakers:

Kristine Williams, AICP

Senior Research Associate

Center for Urban Transportation Research

Vergil Stover, Ph.D., RE,

President

AffiliatedFacu4

Access Management Manual



Federal Highway
Administration

TRB

Transportation
Research Board



Center for Urban
Transportation Research

Why a Manual?

- To capture the state-of-the-art in access management
 - Multidisciplinary and comprehensive
- To provide one-stop shopping for access management information and guidance
- To expand awareness of access management on a national level

A Team Effort

- Content development
- Chapter review
- Oversight



TRB Committee on Access Management

Manual Subcommittees

- | | |
|---|--|
| • Administrative Elements <ul style="list-style-type: none">– Del Huntington, Chair | • Legal and Right of Way <ul style="list-style-type: none">– Phil Demosthenes, Chair |
| • Benefits and Case Studies <ul style="list-style-type: none">– Jerry Gluck, Chair | • Planning and Site Design <ul style="list-style-type: none">– Eddie Shafie, Chair |
| • Design and Standards <ul style="list-style-type: none">– Herb Levinson, Chair | |

Production of the Manual

- Funding
 - FHWA
 - Florida DOT
- Writing, Editing and Graphics
 - CUTR
 - Teach America, Inc.
- Publishing and Editorial Oversight
 - TRB
 - Publication expected in 2002

In Closing

- The Manual will be:
 - a valuable guide for establishing and administering AM programs
 - a great tool for project design and development
 - a comprehensive source of the most recent technical info on AM
- The Manual will not establish national standards and warrants

Overview & Highlights

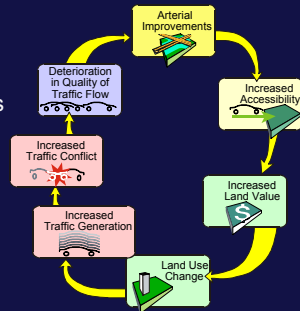


Contents

- Introduction & Concepts
- Effects
- Program Development
 - State, Regional, Local
- Roadway Classification & Access Categories
- Corridor Access Management Plans
- Land Development & Access
- Access Location
- Access Spacing
- Access Design
- Medians and TWLTLs
- Access Permitting
- Coordination
- Public Involvement
- Right-of-Way and Legal Considerations

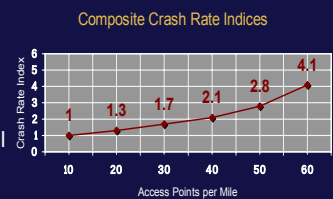
Introduction & Concepts

- Key concepts
- Program elements
- Principles



Effects of Access Management

- Safety
- Efficiency
- Economic
- Environmental



Source: NCHRP Report 420

How to Develop an AM Program

- Assessment activities
- Building consensus and support
- Codes and policies
 - Access classification systems & standards
- Drafting legislation
- Organizational structure & staffing

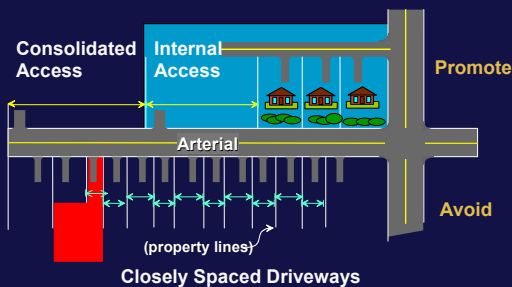
Corridor Ac. Mgt. Plans



135th St. AM Plan,
Overland Park, KS

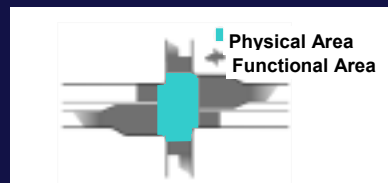
- Public process
- Corridor analysis
- Plan development
- Agreements

Land Development & Access



Access Location

- Determining functional area
- Access window
- Driveway offsets



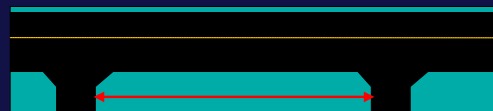
Access Design

- Best practices for driveway geometrics
- Use of auxiliary lanes
- Visibility



Access Spacing

- Signal spacing
- Connection spacing
- Interchange areas

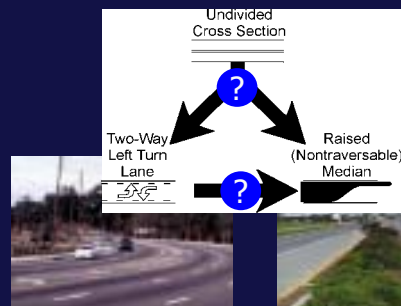


Permitting & Administration

- How can we accomplish access spacing in the "real world"?
- Access permitting best practices
- Variance procedures



Medians & TWLTLs



Public Involvement

- Principles
- Techniques
- Strategies for Addressing Public Concerns



Coordination

- Intergovernmental agreements
- Early communication on permit requests
- Involve DOT early in subdivision review
- Consistent state/local standards
- Combined review committees



Right-of-way & Legal Considerations

- Police Power vs Eminent Domain
- Right to Access
- Circuitry
- Regulatory Conditions & Exactions
- Importance of Sound Regulations and Consistency



Appendix A – Techniques

- Description
- Application
- Special Considerations
- Advantages & Disadvantages
- Examples
- References



Acquisition of Access Rights

Other Appendices

- Appendix B – Case Examples of State and Local Access Categories
- Appendix C – Statute Prototypes & Regulatory Elements
- Appendix D – Glossary of Terms

For further information

www.accessmanagement.gov



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Access Management Programs at the Regional and Local Levels, Part I

Moderator

Donna Lewis, AICP, P.P.

Planning Director

Mercer County, New Jersey

 **Slides**

3A. Access Management Doesn't Start at Site Plan Review...

Michael Wahlstedt, P.E., P.T.O.E.

Associate, TranSystems Corporation

 **Slides**

3B. Understanding the Development Process

Marc Butorac, Steven Ferranti, Pat Hawley

Access Management Doesn't Start at Site Plan Review...

Lessons Learned During the Development of an Access Management Plan For the City of Wichita/Sedgwick County, Kansas

Presented to:

Fifth National Conference on Access Management

By Michael R. Wahlstedt, PE, PTOE, TranSystems Corporation

5th National Conference on Access Management - Austin, TX

June 24, 2002



Introduction

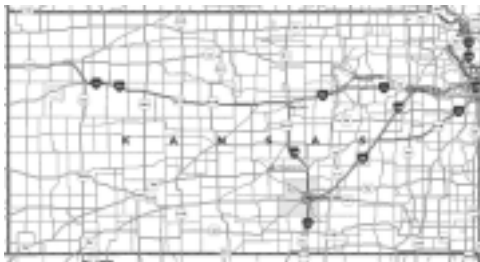
- ◆ Many access management plans are handicapped by the lack of initial planning that supports effective access management including:
 - The Comprehensive Plan
 - Planning of Collector Street System
 - Requirements for Effective Traffic Impact Analyses
- ◆ Wichita Experience
 - Few processes in place that specifically support access management
 - As is typical, development community raised many objections, both constructive and otherwise

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Wichita/Sedgwick County



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Sedgwick County



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The City of Wichita

- ◆ Population
 - County: 443,000
 - City: 327,000
- ◆ MPO
 - Wichita/Sedgwick County Metropolitan Area Planning Department (MAPD)



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The Comprehensive Plan

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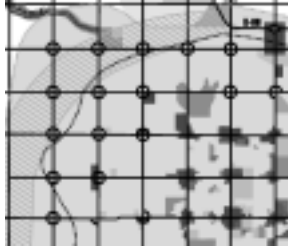
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The Comprehensive Plan

◆ The curse of "node development"

- Small commercial development areas don't fit with access management standards



Excerpt from Wichita Plan

COMMERCIAL: The "Wichita Land Use Guide" suggests the following principles to guide future commercial zoning and development:

Convenience centers; generally ranging from 2-4 acres in size, typically anchored by a mini-market with several other small-scale tenants, and containing up to 40,000 square feet of floor area. Convenience centers would typically be expected to develop at **one or more corners of arterial intersections.** They could also be appropriately located at the intersection of an arterial and collector street, where proper turn lanes are in place or planned, in order to be more accessible to the residents of the immediate neighborhood served by the collector street.

Neighborhood centers; generally ranging from 4-15 acres in size, typically anchored by a supermarket with a variety of other tenants, and containing up to 200,000 square feet of floor area. These centers would be **permitted at one or two corners of any arterial intersection.** This would allow for market competition, but avoid excessive concentration of commercial development and consequent traffic congestion at the intersection.

Large-scale retail areas generally restricted to frontage along Kellogg...

Source: 1999 Wichita Comprehensive Plan (Emphasis Added)

Full Median Opening Standards

Access Class (of Primary Road)	Rural	Suburban	Urban
2	1 mile	1 mile	1 mile
3 and 3R	½ mile (2,640')	½ mile (2,640')	¼ mile (1,320')
4 (Minor Arterial)	--	¼ mile (1,320')	660'

◆ Directional openings only limited by physical restraints

- Sight distance
- Adjacent intersection functional areas
- Queue storage requirements

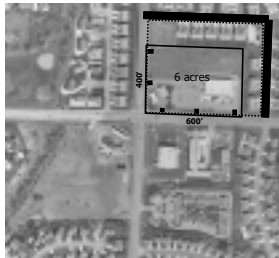
Connection Spacing

Access Class (of Primary Road)	Rural		Suburban		Urban	
	Trav. Median¹	Non-Trav. Median²	Trav. Median¹	Raised Median²	Trav. Median¹	Raised Median²
2	--	¼ mile (1,320')	--	¼ mile (1,320')	--	¼ mile (1,320')
3, 3R, 4R	¼ mile (1,320')	660'	¼ mile (1,320')	660'	660'	330'
4, 5R	660'	660'	660'	330'	330'	245'
5	330'	--	245'	--	165'	--

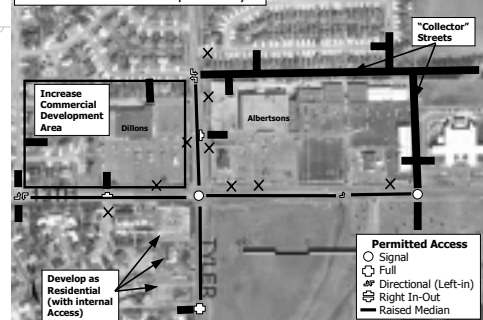
- Full access on roadways with medians controlled by median opening spacing
- Adjacent intersection functional area and right turn bay requirements may further limit spacing

Small Developments Don't Fit

- Developments under 10 acres aren't large enough to reach median openings at arterial/arterial intersections



If this area was developed today...



"But What About "Pass-by" Uses?"

- ◆ Move to Collector/Arterial Intersection
- ◆ Design for future integration with surrounding development



"But You Can't Do That"

- ◆ There are many examples of pass-by type businesses located without direct access to arterial
- ◆ Main concern is typically access relative to the competition

"But My Property isn't That Big"

- ◆ Development areas can be a group of smaller properties
- ◆ AM must focus on ultimate street system, not individual property
- ◆ Interim measures can be used

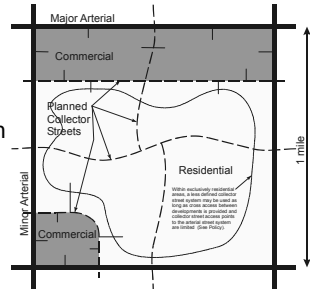
The Collector Street System

Collector Streets

- ◆ Collector streets are the backbone of successful access management.
 - They provide joint access for multiple properties
 - In addition to "official" collector system, additional roads can be "informal" collectors or even private streets internal to developments

Collector Streets

- ◆ Comprehensive Plan/Future Land Use Plan should establish collector street system



Proposed Collector Street Policy

- ◆ MPO to plan collectors in any area prior to development
- ◆ Developers may request changes, but street must remain consistent with guidelines
- ◆ Collectors to be public streets
- ◆ One street may serve both residential and commercial, but should discourage cut-throughs
- ◆ Connect to arterials at median openings and at locations desirable for a traffic signal

But Won't That Require a Lot of Design Work?

- ◆ Intended to be a very rough sketch
- ◆ Can be established with a brief review of topo map and property lines
- ◆ Like Comprehensive Plan, not intended to be set in stone, just provides guidelines and intent
- ◆ Developers can modify streets to some extent to fit their needs
 - Main components are continuity, providing access to maximum number of properties and connection locations to arterial street system

Collector Streets

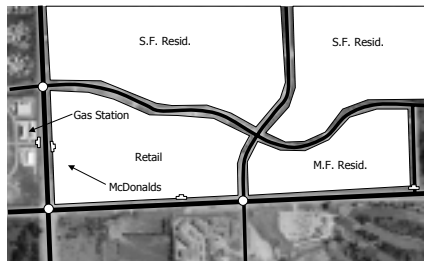
- ◆ Example Future Land Use Plan with Collector Street System



But What About Mixing Residential and Commercial Traffic?

- ◆ The key is to only mix residential and commercial traffic within the commercial areas
- ◆ Develop collector streets in a way that does not encourage cut through traffic
- ◆ Keep residential driveways off collector streets

Collector Street Example



Collector Street Challenges

- ◆ Who pays for them?
 - Development
 - CIP
 - Impact Fee/Excise Tax
- ◆ What about reduced development area?
 - With proper layout, generally not a significant impact with commercial development, larger residential development
- ◆ Existing system doesn't work well – some impact will have to be accepted

While You Are At It...

- ◆ The easiest way to implement access management is to build it into your street system
 - Construct medians and median openings before the development gets there
 - Plan collector streets
 - All it takes is \$\$\$ (but will save you in the long run)

Traffic Impact Studies

When is TIA required

Development Triggers	Minimum Study Requirements
All Applications	Conduct Basic Study
100 to 499 Trips in Peak Hour	Conduct Expanded Study, Review all drives and adjacent intersections
500 or More Trips in Peak Hour	Conduct Expanded Study plus Review Adjacent Streets to Next Major Cross Street

Basic Study

- ◆ Site Plan
 - Conceptual layout depicting land use types and intensities and the arrangement of buildings, parking and access
 - Identify land uses (including types and the arrangement of buildings, parking and access) on property abutting the proposed development site, including property across public streets.

Basic Study

- ◆ Identify other approved developments in area
- ◆ Compare access locations and driveway design to Access Management Policy
- ◆ Estimate number of trips generated per ITE guidelines for existing/master planned use and for proposed use

Expanded Study

- ◆ Submit trip generation (including pass-by and captured trips) and distribution for approval
- ◆ Obtain future traffic growth projections from MPO. Calculate future traffic with planned and proposed land uses.
- ◆ Perform study consistent with ITE guidelines

Expanded Study

- ◆ Perform Capacity Analyses using HCM methodologies. May perform additional "system" analysis (e.g. Transyt, Syncro)
- ◆ Identify improvements necessary to mitigate deficiencies
- ◆ Prepare report, identify and justify deviations from current guidelines/policies

Qualifications to Perform Study

- ◆ Person conducting study must be registered professional engineer with demonstrated experience in the preparation of transportation impact studies for land development
- ◆ MPO shall determine whether an individual professional engineer is qualified to conduct a transportation impact study

Epilogue

- ◆ What happened in Wichita...
 - Developers intervened
 - Watered down proposed access management
 - But...plan set "informal" guidelines
 - Identified planning processes that need to be implemented before real access management can be effective

Conclusions

- ◆ Access Management Plans will always be "retrofit" (focused on a single property) unless the upfront planning is in place.
- ◆ How can you expect developers to design the way you want if you don't formally define what you want?

Questions?

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Understanding the Development Process

Marc Butorac, P.E., P.T.O.E.
Kittelson & Associates

Steven Ferranti, P.E., P.T.O.E.
SRF & Associates

Pat Hawley, P.E., P.T.O.E.
HNTB Corporation

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Have You Met J.R. Developer?



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A Case Study for Discussion



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An Analogy for Discussion



Your \$250,000 Custom Built Dream Home

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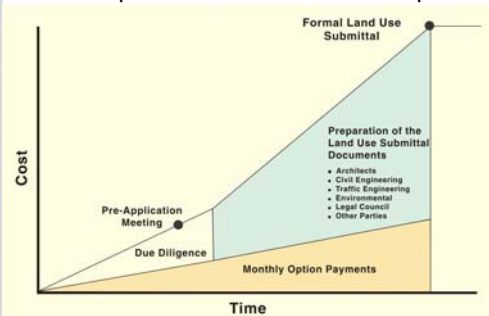
Site Characteristics



- 10 to 12 acres
- 125,000 Square-feet of Retail Development with a Grocery Store Anchor
- \$5 to 7 Million for Land Acquisition
- \$2 to 3 Million for On-Site Construction
- \$6 to 7 Million for Building Construction
- \$500,000 to \$1 Million in Fees
- Total without Off-Site Improvements
>> \$13.5 to 18 Million

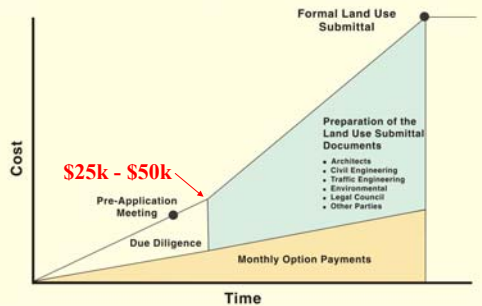
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The Development Process from a Time & Cost Perspective



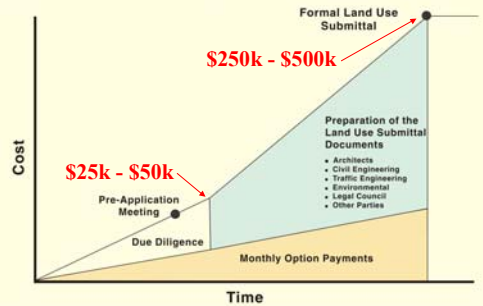
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The Development Process from a Time & Cost Perspective



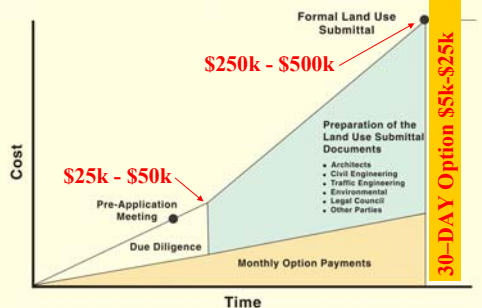
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The Development Process from a Time & Cost Perspective



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The Development Process from a Time & Cost Perspective



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Why is J.R. Developer Mad!

- He has to throw away potential \$50k to \$250k in Design Work
- He has to Pay an Additional \$5k to \$25 in Option Money
- He has to Pay additional Interest on His Design Fees
- He has to Pay for Unaccounted Off-Site Improvements
- His Project Costs Potentially Increase by \$250k to \$500k (3 to 5%)
- His Revenue Stream is Delayed

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Developer Viewpoint

- Time is money
- The numbers have to work
- Consistency
 - Process
 - Quality of review
- Understanding of transportation system
- Customer accessibility
- Tenant requirements

Agency Perspective

When you are reviewing a traffic impact study, how do you measure success?

Agency Perspective (Continued)

- All traffic studies have the same answer ...
No significant impact
- Deep pockets
- Third party independent review savior

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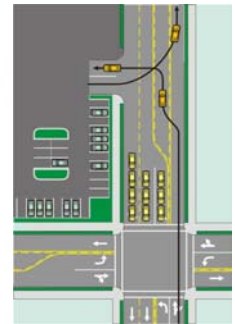
Elements for a Successful Process

- All developers are not the same
- All developments are not the same
- Clear process and timeline
- Early and active agency involvement
- Stakeholder involvement
- Political awareness

Elements for a Successful Process (Continued)

- Sound technical analysis
- Select the right tool for the job
- Understanding of the gray area
- Design within the context of the situation
- Provide reasonable solutions

Existing Conditions



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Existing Conditions

Future Conditions



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Conclusions

A successful project meets the goals of the agencies, the developer, and the stakeholders.

Communication, involvement, and education

Discussion



Understanding the Development Process

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Applying Access Management to Site Design and Development Review



Slides

4A.

Access Management and Unconventional Arterial Designs: How Well Do the Various Designs Accommodate Driveways?

Joseph Hummer, Ph.D., P.E.

Associate Professor

North Carolina State University



Slides

4B.

Sunrise Highway (NY27)

Jerry Gluck, P.E., P.T.O.E.

Senior Vice President

UrbiTranAssociates



Slides

Other

4C.

Florida's Driveway Handbook

Gary Sokolow

Senior Transportation Planner

Florida Department of Transportation



Access Management and Unconventional Arterial Designs: How Well Do the Various Designs Accommodate Driveways?

Joseph E. Hummer, NC State Univ. &
Jonathan D. Reid, PBQD, Inc.

Presented at Fifth National Conference on Access
Management, Austin, TX, June 2002

Congested Arterials

- Conventional measures exhausted
- Widening, bypasses and flyovers expensive
- ITS and transit years away from helping
- Unconventional designs offer hope!

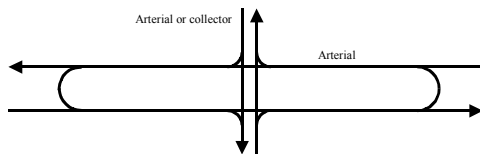
Unconventional Arterial Designs

- Two main principles:
 - Reduce through vehicle delay
 - Reduce and separate conflict points
- Reroute left turns and reduce signal phases
- 12 designs on current “menu”
- All 12 published, most in use in U.S.

Objectives of Paper

- Inform readers about 12 designs
- Review effects of each design on access
 - Most require medians
 - Some restrict access near intersections
 - Some restrict median opening type and spacing
 - Some restrict u-turn capabilities

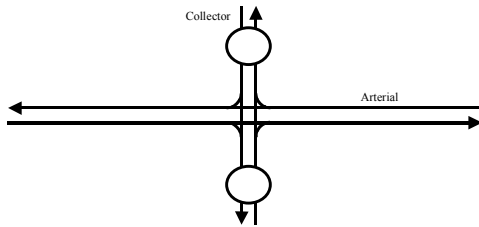
Median U-Turn



Median U-Turn

- Efficiency--usually better, especially with lower turn volumes
- Safety--lower collision rates
- Other--good progression
- Access--
 - One-way median openings must be correctly spaced
 - Wide median means less business visibility
 - RIRO driveways pose few problems

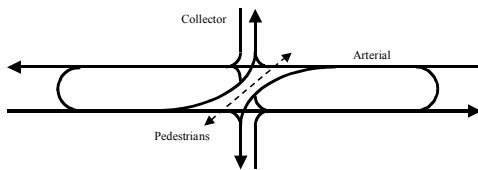
Bowtie



Bowtie

- Efficiency--Competitive when cross street volume is low
- Safety--Should be safer
- Other--Easy for pedestrians
- Access--
 - Developments can tie into roundabouts
 - Difficult major street u-turns, so major street should not have median

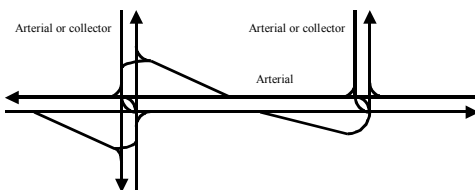
Superstreet



Superstreet

- Efficiency--More efficient with light cross-street through volumes
- Safety--Should be safer
- Other--Perfect two-way progression!
- Access--
 - Works best on an arterial lined with development
 - Be careful with driveways near intersections
 - Similar to median u-turn

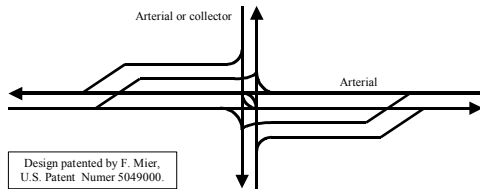
Jughandle



Jughandle

- Efficiency--Through travellers gain, others have more delay
- Safety--No data
- Other--Narrow median, small ROW
- Access--
 - RIRO driveways only
 - Drivers use right-side ramps to begin u-turns
 - Access restricted adjacent to ramps

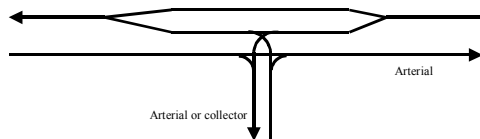
Continuous Flow Intersection



Continuous Flow Intersection

- Efficiency--Lower travel times
- Safety--No problems thus far
- Other--Pedestrian movements difficult
- Access--
 - Access restricted adjacent to ramps
 - No u-turns at intersection

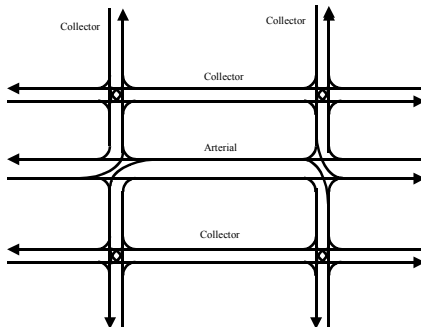
Continuous Green T



Continuous Green T

- Efficiency--Lower travel times
- Safety--No major problems reported
- Other--Good signing and enforcement needed
- Access--
 - RIRO driveways only on top of T

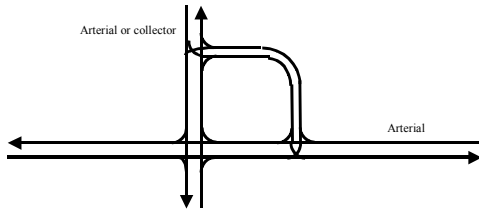
Paired Intersections



Paired Intersections

- Efficiency--Should produce lower travel times
- Safety--Arterial likely safer; corridor unclear
- Other--Very high costs
- Access--
 - Attractive business front, parking in back
 - Indirect access could mean confused customers
 - Developers asked to bear some costs

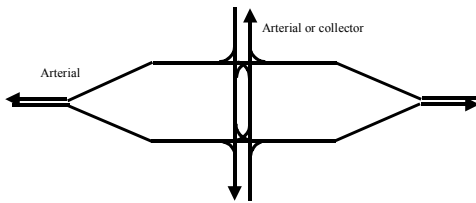
Single Quadrant



Single Quadrant

- Efficiency--Typically vies with median u-turn as best unconventional design
- Safety--No data
- Other--Mixed bag for pedestrians
- Access--
 - No u-turns at main intersection
 - No driveways opposite ends of connector road
 - Connector road provides development opportunity

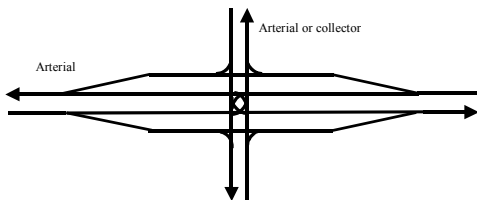
Split



Split

- Efficiency--Lower travel times than conventional
- Safety--No data
- Other--Large right of way needed
- Access--
 - Typically no development allowed in the middle or along the sides of the arterial

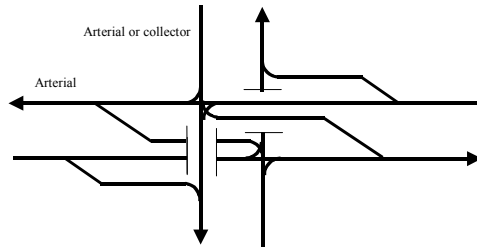
Double Wide



Double Wide

- Efficiency--Much higher capacity than conventional
- Safety--Depends on design details
- Other--Spillback potential
- Access--
 - RIRO driveways within confines of design
 - High capacity could make downstream driveway movements difficult

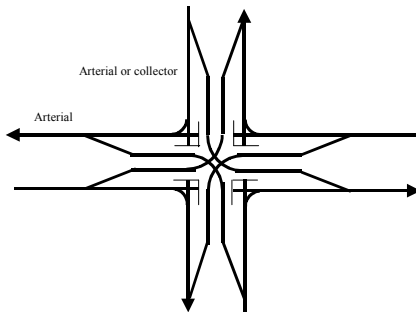
Echelon Interchange



Echelon Interchange

- Efficiency--Much better than at-grade intersections
- Safety--No problems so far
- Other--High structure cost
- Access--
 - Access impaired to 3 quadrants
 - No u-turns at or near interchange
 - Meters traffic to help downstream signals

Center Turn Overpass



Center Turn Overpass

- Efficiency-- Much better than at-grade intersections
- Safety--Should be safer
- Other--Pedestrians slow but safe crossing
- Access--
 - Similar to conventional intersection with medians
 - Visibility to businesses blocked by structure

Summary

- 12 unconventional designs for congested arterials
- Most of the 12 designs compromise access somewhat
 - If the arterial has less delay and fewer collisions, less access is likely acceptable
- More research and trials needed
- Designers should consider these!

Sunrise Highway (NY27)

**Sunrise Highway (NY27)
Cartwright Blvd. to Louden Ave.
Massapequa**

**Safety and Mobility
Improvement Project**
PIN 005895

Jerry Gluck, PE, PTOE
Urbitran Associates, Inc.

URBITRAN PRESENTATION

Sunrise Highway (NY27)

Acknowledgements

NYSDOT Region 10 Planning
*John Schabhuti
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Urbitran Associates, Inc.
*Atma Sookram
Jean Michel
Joon Park*

URBITRAN PRESENTATION

Sunrise Highway (NY27)

Existing Conditions

- **Traffic Safety** - 0.5 Mile Section of NY27 From Sunrise Promenade to Old Sunrise Highway Has Accident Rates that Exceed the Statewide Average Due to the Frequency and Density of Conflicting Traffic Movements
- **High Traffic Volumes**
- **Frequent Driveways**
- **Closely Spaced Signals**
- **Heavy Left-Turn Movements**
- **Overlapping Traffic Backups**

Sunrise Highway (NY27)

Conflicting Traffic Movements & Accidents East of Unqua Road

URBITRAN PRESENTATION

NY27 Near Sunrise Promenade

Sunrise Highway (NY27)

Project Objectives

- **Improve Traffic Safety Along Sunrise Highway**
- **Improve Traffic Operations Along Sunrise Highway**
- **Maintain Reasonable Access to Abutting Properties**
- **Preserve Aesthetics of Area**

Sunrise Highway (NY27)

Concepts:

- Reduce the Number of Conflicting Traffic Movements
- Increase the Spacing between Conflict Points
- Remove Turning Vehicle Queues From Through Lanes
- Add Auxiliary Lanes

Sunrise Highway (NY27)

Proposed Improvements at:

- Unqua Road
- "Sears Center" (Philips Plaza)
- Old Sunrise Highway

NY27 Near Unqua Road



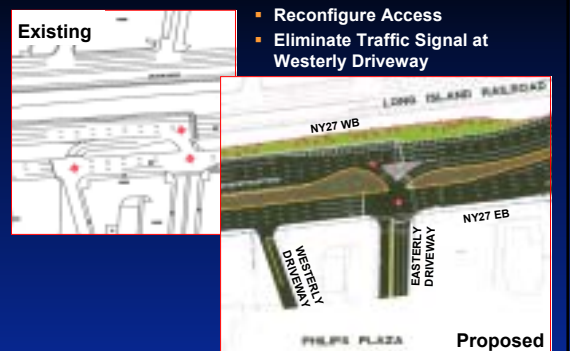
Unqua Road



NY27 Near Philips Plaza & Old Sunrise Hwy.



"Sears Center" (Philips Plaza)



Old Sunrise Highway

Existing



- Eliminate Westbound Connection
- Eliminate Traffic Signal on Eastbound NY27



Proposed

Conflicting Traffic Movements East of Unqua Road



Sunrise Highway (NY27)

Accident Frequency & Reduction

Location	Number of Accidents*	Reduction
Unqua Road	89	46%
"Sears Center" (Philips Plaza)	13	51%
Old Sunrise Highway	15	48%

* 1½-Year Accident Data

Sunrise Highway (NY27)

Percent Reduction in Overall Delay NY27: Block Boulevard to Hemlock Street *

Saturday Peak Hour

Eastbound	Westbound
41%	60%

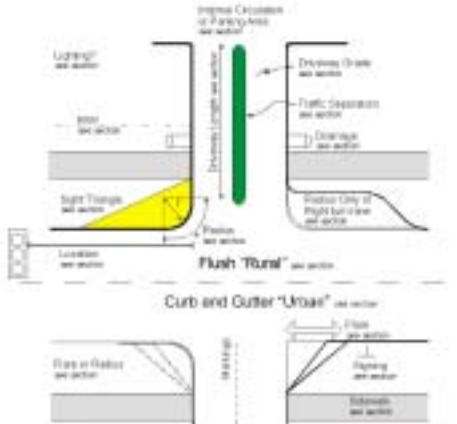
* Based on Simulation Analysis



Development of a Tool for Permitting and Highway Design

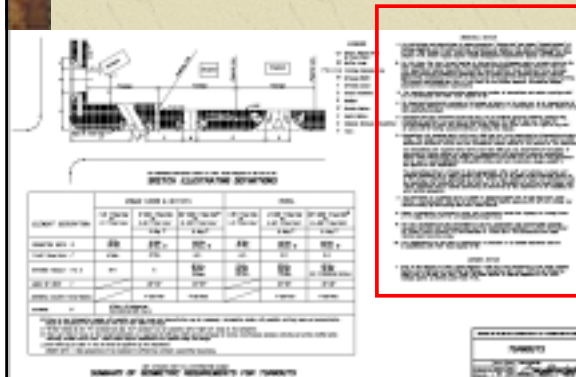
[illegible]

- Guide the professional through the existing **rules, standards and procedures**, as well as current **national guidance** on the geometric design and placement of driveways
- Primarily unsignalized
- Combine guidance from numerous documents
- Design = how you want to function



- Driveway design should be non-controversial
- Permits using radial design for years – not design
- Driveways are intersections
- Lots of documents
 - Need to read fine print
 - Uncommon terms
- Easier to read a table

From FDOT Standard Index



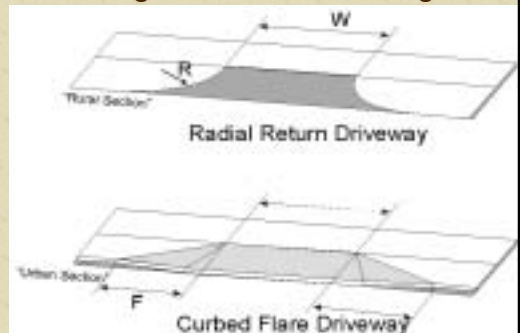
Flush Roadway - "Rural" Section

RURAL SECTION	Type/Day or Trips/Hour	1-20	21-600	601-4000	
		or 1-5	or 6-60	or 61-400	
Center Line Width (2-way)	W	12' min 24' max	24' min 36' max	24' min 36' max	* Note on Width: When more than 2 lanes in either direction are required, the 36' min width may be increased to allow under interference with traffic flow. These cases require a detailed site specific study and design.
Flare (Drop Curb)	F	N/A	N/A	N/A	
Radius (Radius)	R	15' min 20' min 50' max	25' min 50' min 15' max	25' min 50' min 15' max	
Angle of Drive	Y		60 - 90	60 - 90	
Divisional Island - Connector Traffic Separator			4' to 22' wide	4' to 22' wide	

Driveway Volume is Important

Expected Trips on Driveway	Example Land Uses	How to Design Driveway
1-20 trips/day or 1-5 trips/hour	1 or 2 single family homes	Minimum Requirements
21-600 trips/day or 6-60 trips/hour	Quadruplex Apartment building - 60 units Small office in converted home* Mom & Pop business	Driveway with some high volume features (possibly radius, turn lanes, or other features)
601-4,000 trips/day or 61-400 trips/hour	Small "Strip" shopping center (20-75K ft.) Gas station/convenience market	
over 4,000 trips/day over 400 trips/hour	150K ft. shopping center grocery/drug store + 10-15 smaller stores (9,000 daily trips split w/2 driveways)	Design as full intersection

Driveway Types Advantages and Disadvantages



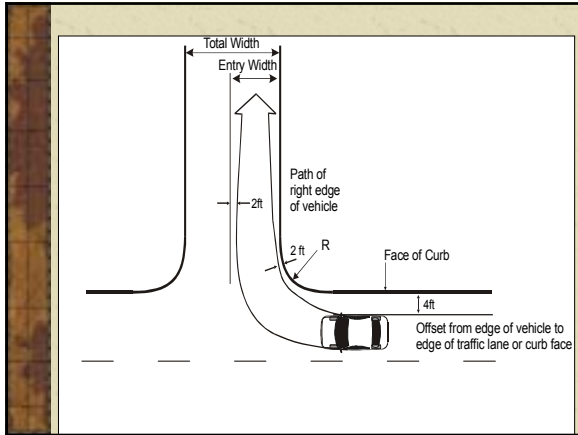
Inadequate Driveway Geometrics



DRIVEWAY WIDTH



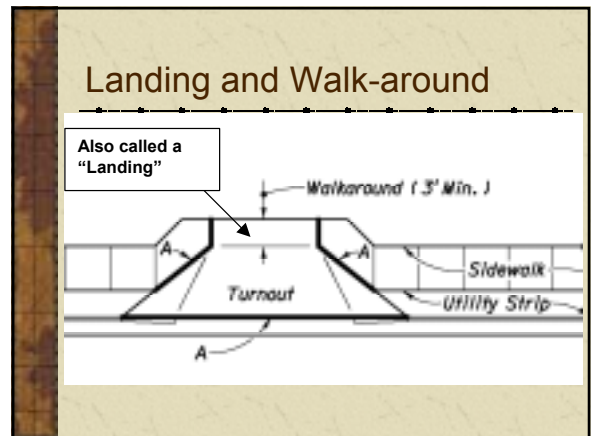
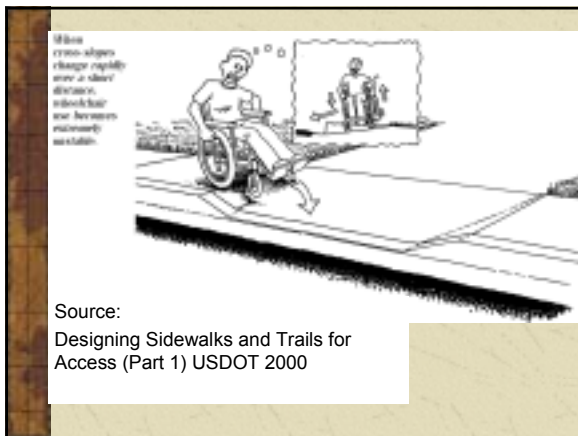
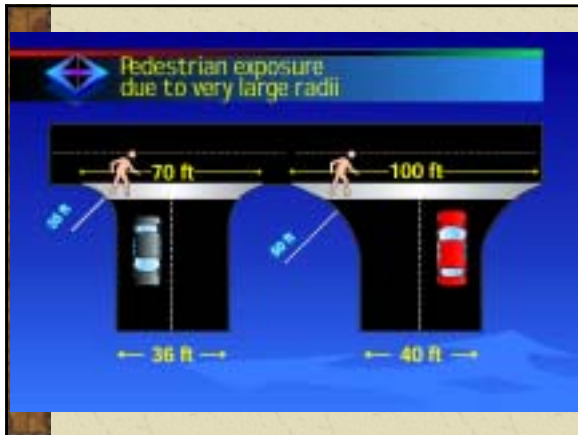
Adequate Driveway Width can also help to get turning vehicles off the road at greater speed and with less encroachment into the oncoming driveway traffic



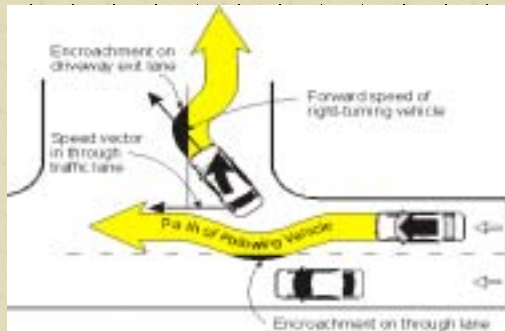
Taking Bike Lanes into Account

Single Entry Lane Width for a 90 Degree Right Turn

Radius or Flare (ft)	With 5' Bike Lane	Without Bike Lane
5	22	30
10	19	23
15	16	20
20	14	17
25	14	14



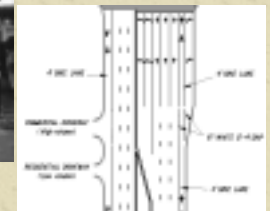
Encroachment of Following vehicle



Right Turn Lane Guidance

- ✓ All highways over 45 mph posted speed limit
 - 30 - 40 rights/hour
 - 30 most "called for" on high volume 2 lane roads
 - 40 most "called for" on multi-lane highways
 - Speed limit of 45 mph may use this criteria if operating speeds at the time of the peak right turn flow are over 45 mph
- ✓ All highways 45 mph posted speed or less
 - 80 - 110 rights/hour
 - 80 more "called for" on high volume and 2 lane roads
 - 110 more "called for" on lower volume roads and multilane
 - Right turn lanes may be unnecessary for 6 lane facilities where the curb lane acts like a right turn lane

Right Turn lanes and Bikes



From Standard Index 17346 (sheet 12)



Use of Graphics for Public Involvement

Poster Session

 Slides

 Paper

5A. Effective Use of Graphics in Access Management Projects

Jeffrey B. Arms, P.E.

Effective Use of Graphics in Access Management Projects

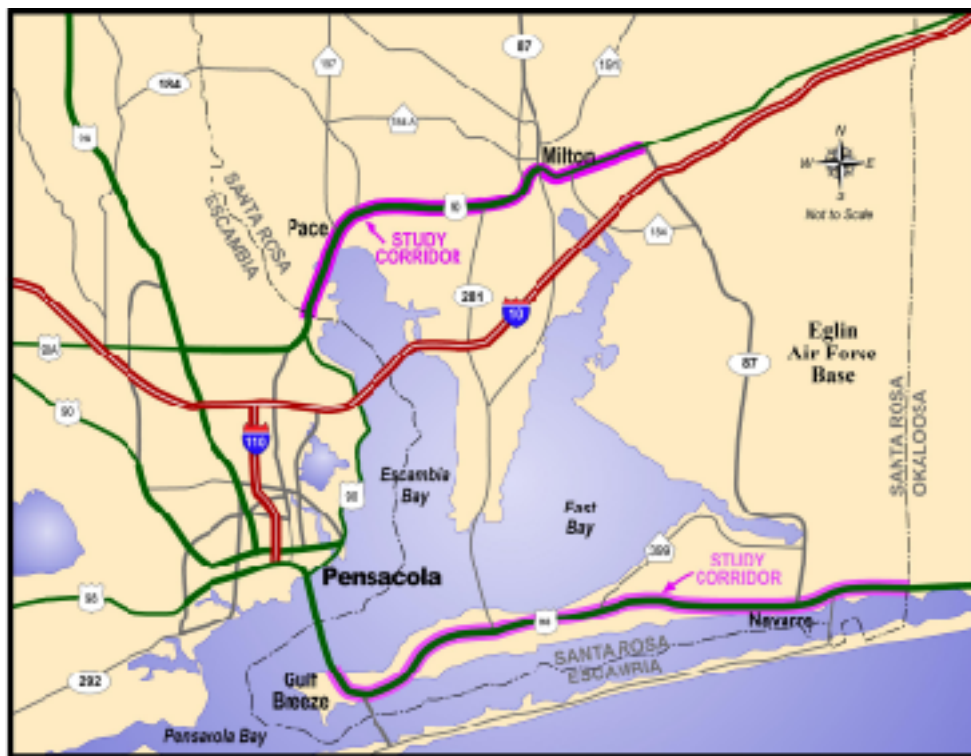
By Jeffrey B. Arms, P.E.

Property owners are always concerned with changes in access along a corridor. In addition, they often become frustrated due to the difficulty reading engineering plans, making it hard for them to understand proposed access modifications. This is especially true if the project is in an area where access management techniques such as directional median openings are not widely used. The clear presentation of access modifications, their impacts, and their benefits can assist in the public involvement process by reducing the time necessary to explain proposed access changes and the frustration of those affected by the proposed changes.

The graphical techniques presented in this paper were used during the US 90 and US 98 Corridor Management Reports (CMRs) in Santa Rosa County, Florida. The study segments of US 90 and US 98 are 16 and 22 miles, respectively. The study corridors are primarily four-lane divided roadways serving residential, commercial, and commuter

traffic. The CMRs were prepared by HDR Engineering, Inc. for the Pensacola Metropolitan Planning Organization (MPO).

The Highways were built prior to the implementation of Florida's Access Management Act, adopted in 1988. This Act established standards to regulate the spacing and location of driveway connections, median openings, and traffic signals. Both US 90 and US 98 fall below the adopted standards in many areas, a problem that grew noticeably worse in the 1990s though significant urban and commercial expansion. Projected growth is expected to exacerbate deteriorating capacity and traffic safety conditions. Few segments of the corridors are planned or programmed for widening because of a lack of funding. Therefore access plans for the roadways were prepared as a part of Corridor Management Reports, in an effort to address the capacity and safety issues along the corridors.

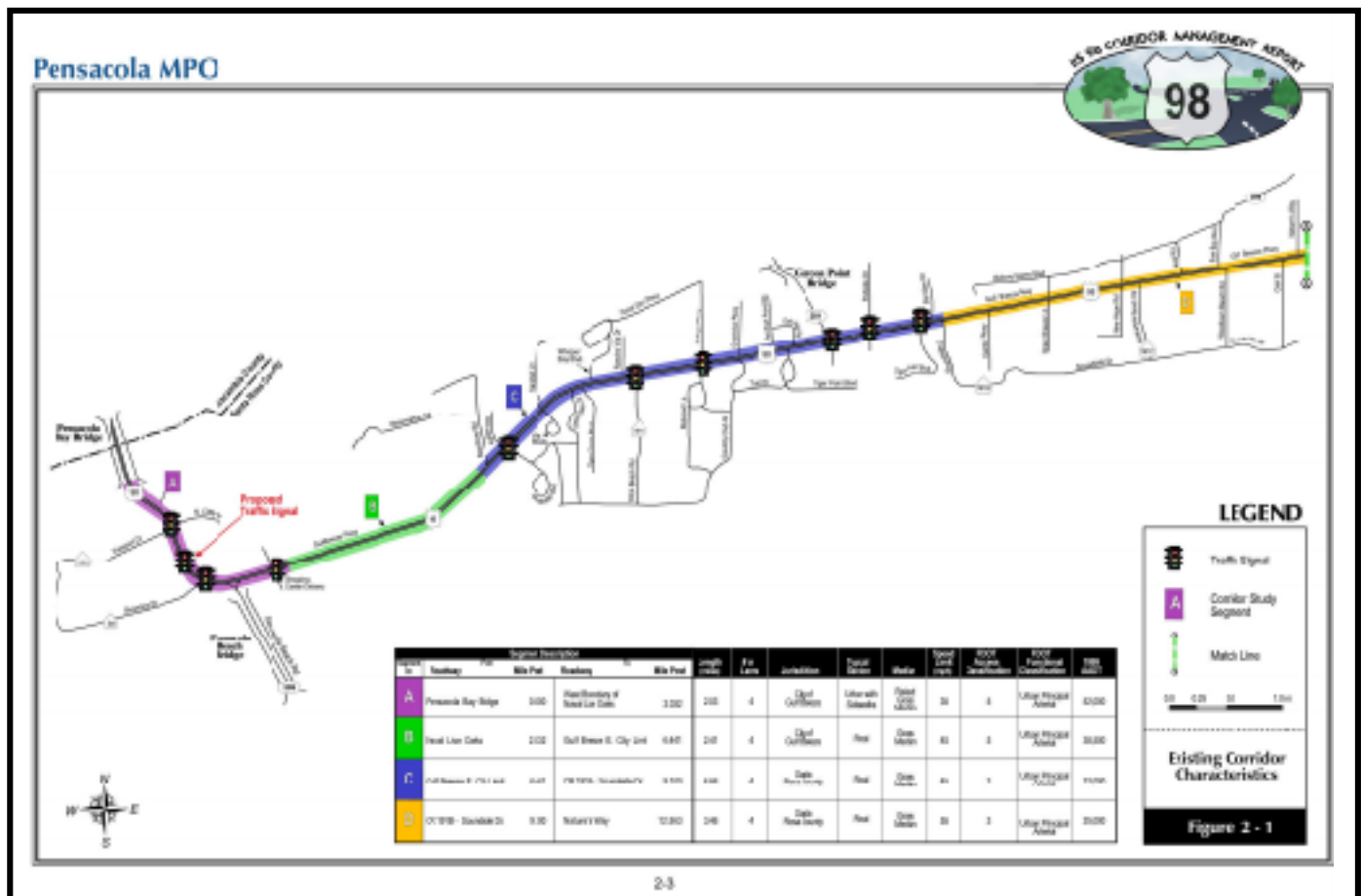


Location of the Study Corridors Within the Pensacola Region

CORRIDOR SEGMENT MAP

Due to the length of each corridor, an overall corridor segment map was prepared and used in the report and at public meetings. The corridors were divided into analysis segments based primarily on where changes occurred in such traffic and roadway characteristics as number of lanes, type of median, posted speed limit, access classification, functional classification, and traffic volume.

The segment map graphic also contained a table that summarized characteristic data for each of the study segments. Each segment was designated with a letter and a unique color that was consistently used to identify that segment throughout the report and at public meetings. This segment map also assisted the public in locating the individual access plan sheet(s) for the area(s) where they had concerns. A sample of the Corridor Segment Map is provided below.



Corridor Segment Map for US 98 in Santa Rosa County, Florida

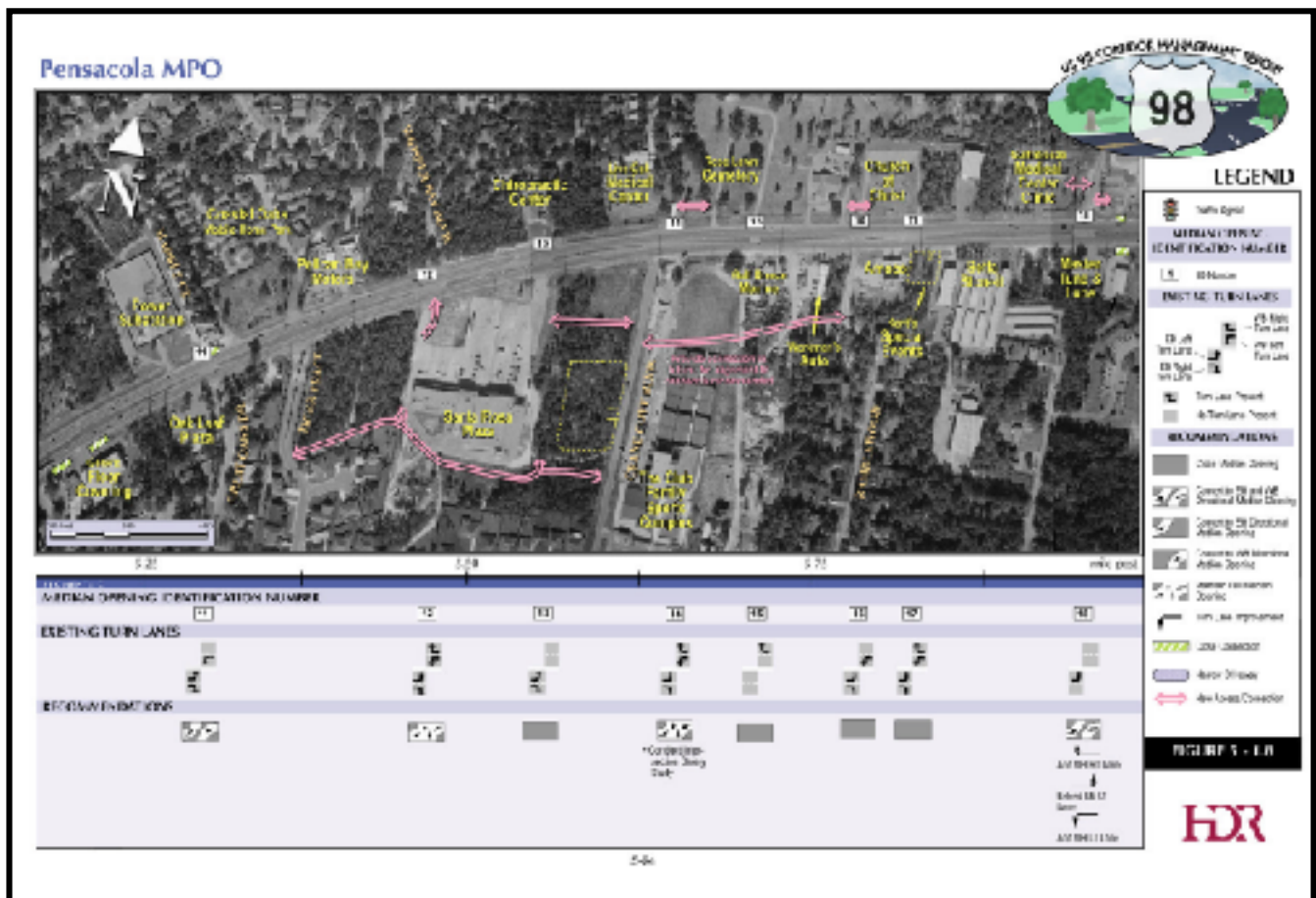
ACCESS PLAN SHEETS

The access plan graphics were developed with the goal of summarizing the existing roadway conditions and reporting project recommendations on one set of easy-to-understand sheets. The land uses were labeled on an aerial base to help the public orient themselves along the corridor. A scale of 1"=300' was chosen for the aerial base because the corridors were relatively long and this scale allows for enough detail while minimizing the number of sheets. Each median opening was assigned an identification number that was labeled on the graphic. The same median identification numbers were also used elsewhere in the report to complete a detailed inventory and recommendation for each median opening.

The roadway milepost information and the assigned roadway segment letter were identified on the bottom portion of the graphic. The presence of existing turn lanes at each of the median openings was also

summarized on the bottom portion of the graphic. If turn lanes were present, then an arrow would appear in the turn lane box. The presence or lack of turn lanes was easily determined by looking at the arrows in the turn lane indicator boxes.

Recommendations regarding the location of driveway closures or driveway narrowing as well as cross access connections were identified on the aerial base map. Because the project was only an operational project and much of the corridor would remain the same, it was important not to cover too much of the aerial base while providing the project recommendations. Therefore, a separate recommendation section on the graphic that was used to identify recommended turn lane improvements and the recommended access type for each median opening. The median opening modification symbols used on the graphic represented the turning movement that would be allowed at that median opening by the use of arrows within the symbols. The result is symbols that graphically represent the proposed access.



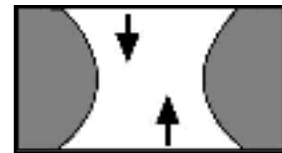
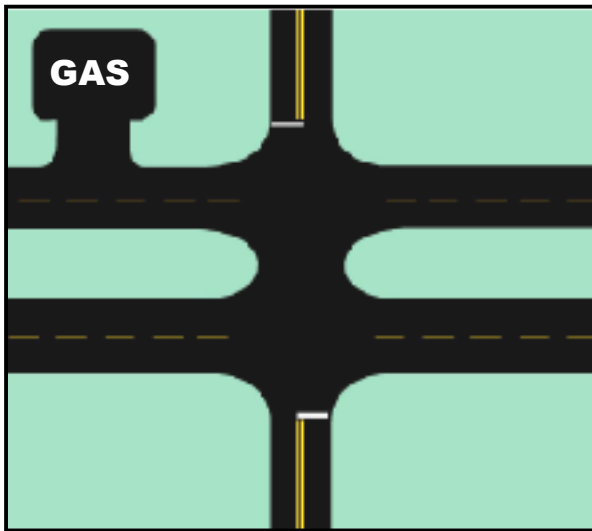
Access Plan Sheet for US 98 in Santa Rosa County, Florida

SUPPORT GRAPHICS

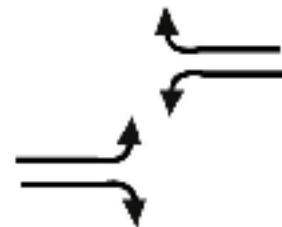
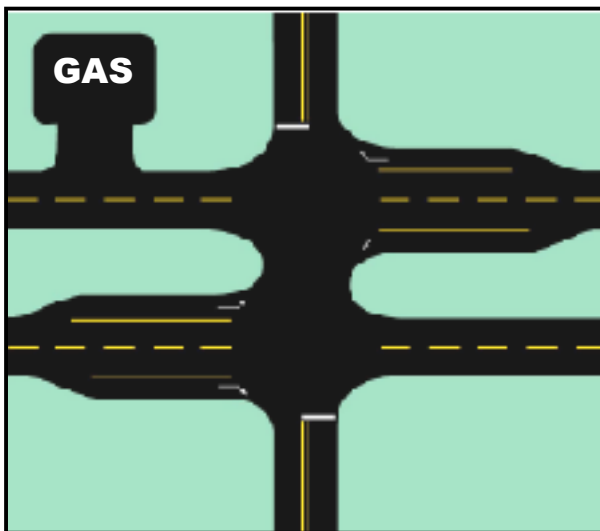
Access Modification Details

A generic representation of different access management improvements was developed for public presentations. The graphics were built on a sample existing bullet nose median opening. Using that as a base, a series of modifications to the median opening or to properties around the median opening was shown. The symbol used on the

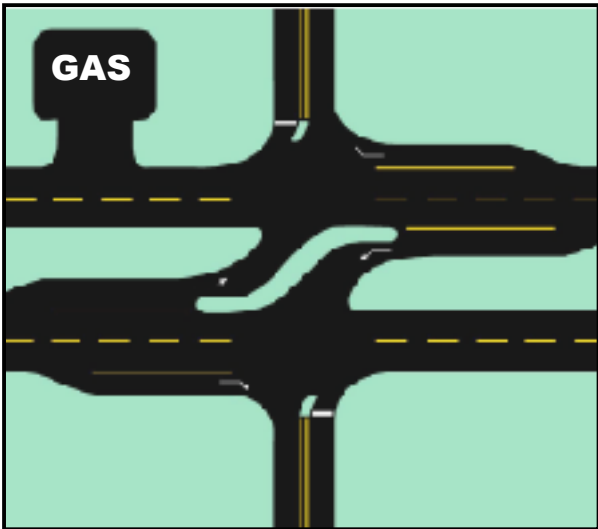
access plan sheets was also shown for each corresponding access modification graphic. This correlation between the sample access modification graphics and the symbols used on the access plan sheets helped facilitate the public's understanding of the proposed access modifications.



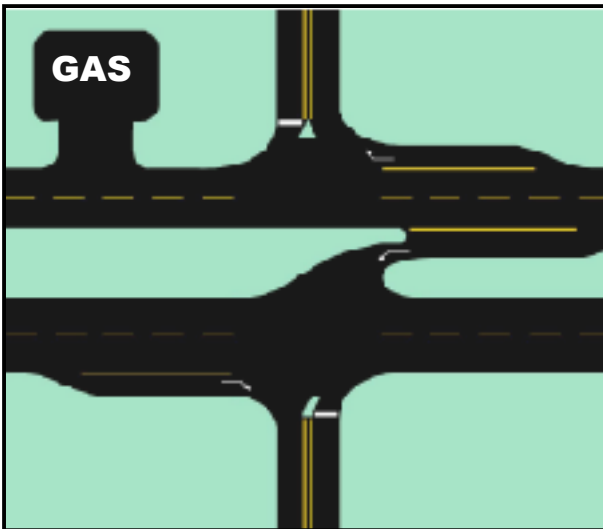
***Bullet nose full
median opening***



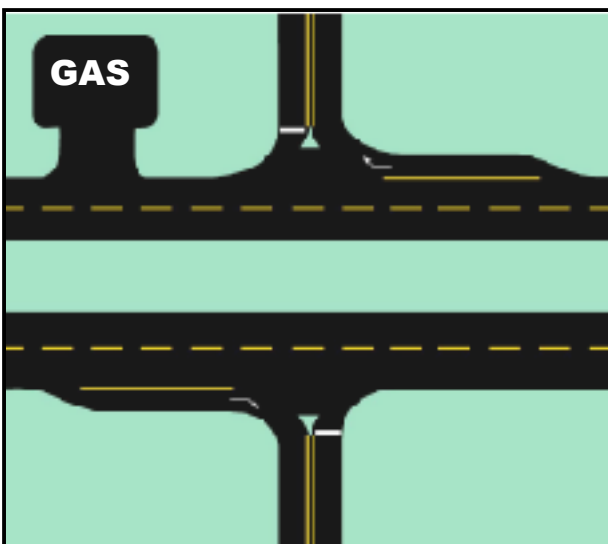
Add turn lanes



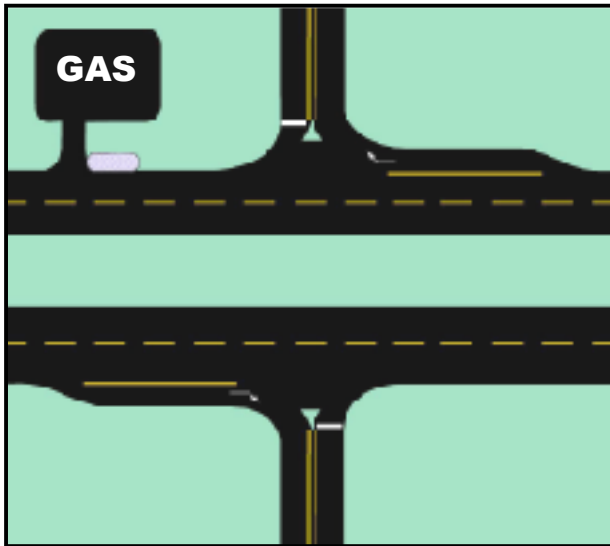
***Convert to a
bi-directional median
opening***



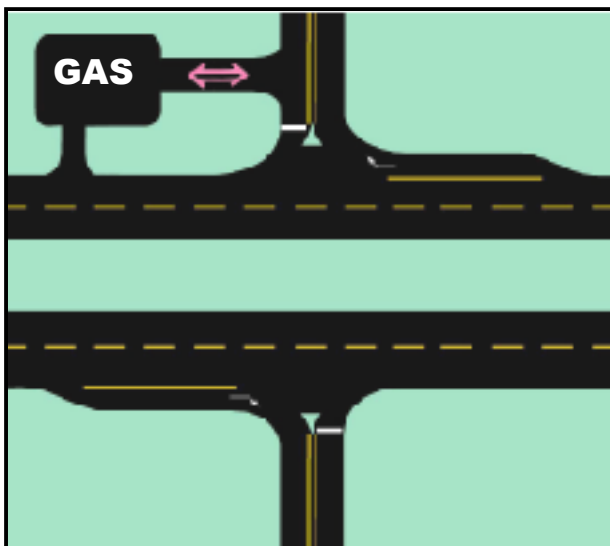
***Convert to a directional
median opening***



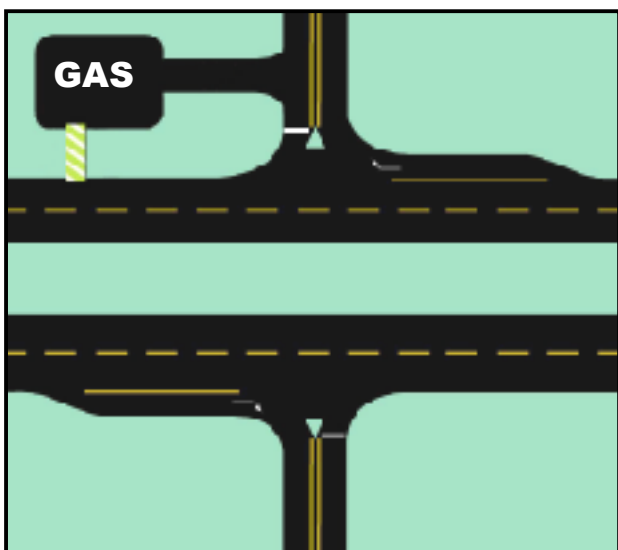
***Close the median
opening***



***Narrow a driveway to
create a more defined
connection***



***Provide a new
access/connection***

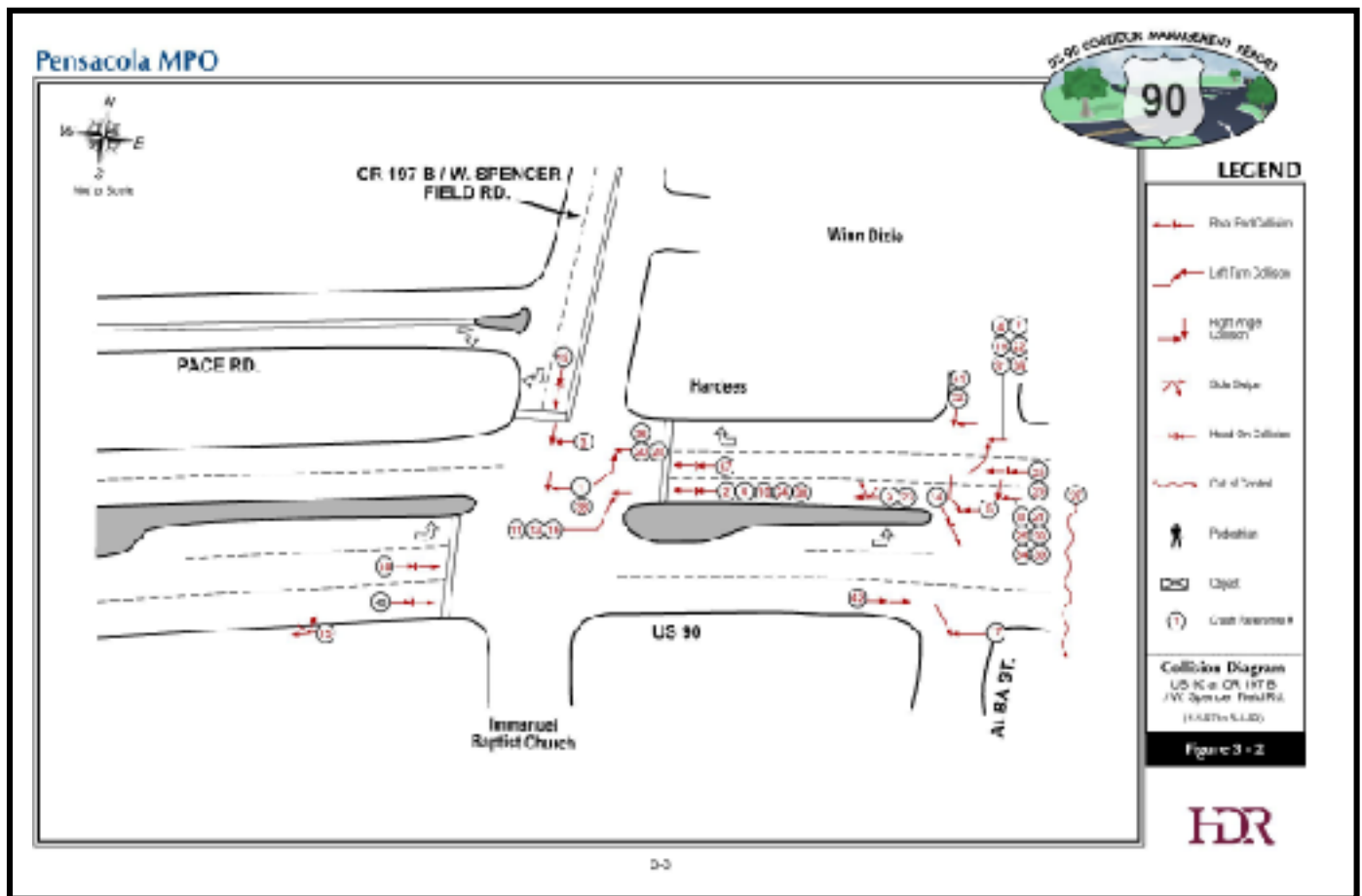


***Close a driveway
connection***

Collision Diagrams

Collision diagrams were used to document unsafe conditions and provide further justification for access modifications at several high accident locations. The collision diagrams also provided a graphical summary of the existing intersection geometry. The collision diagrams clearly identified the types of collisions as well as the problem locations within the intersection area. The collision numbers on the graphic referred to an accompanying table that provided more detail on each collision.

The collision diagrams were presented as 11x17 graphics in both the report and at the Public Meetings. Three collision diagrams were mounted on one 24x36 board for display at public meetings. Color was used for the collision diagram graphics in order to help make the collisions stand out from the background intersection conditions. An example of a collision diagram used during the US 90 Study is shown below.



Collision Diagram from US 90 CMR in Santa Rosa County, Florida

Photographs

Photographs were used in both the report and during public meetings to help convey access issues to the public. An appropriate photograph from the study roadway can be extremely helpful in

demonstrating an access or safety problem. The following photographs clearly present examples of some access issues observed along the US 90 or US 98 corridors.



Closely Spaced Median Openings



Undefined Driveway Affecting Driver Expectancy



Need for a Left-Turn Lane



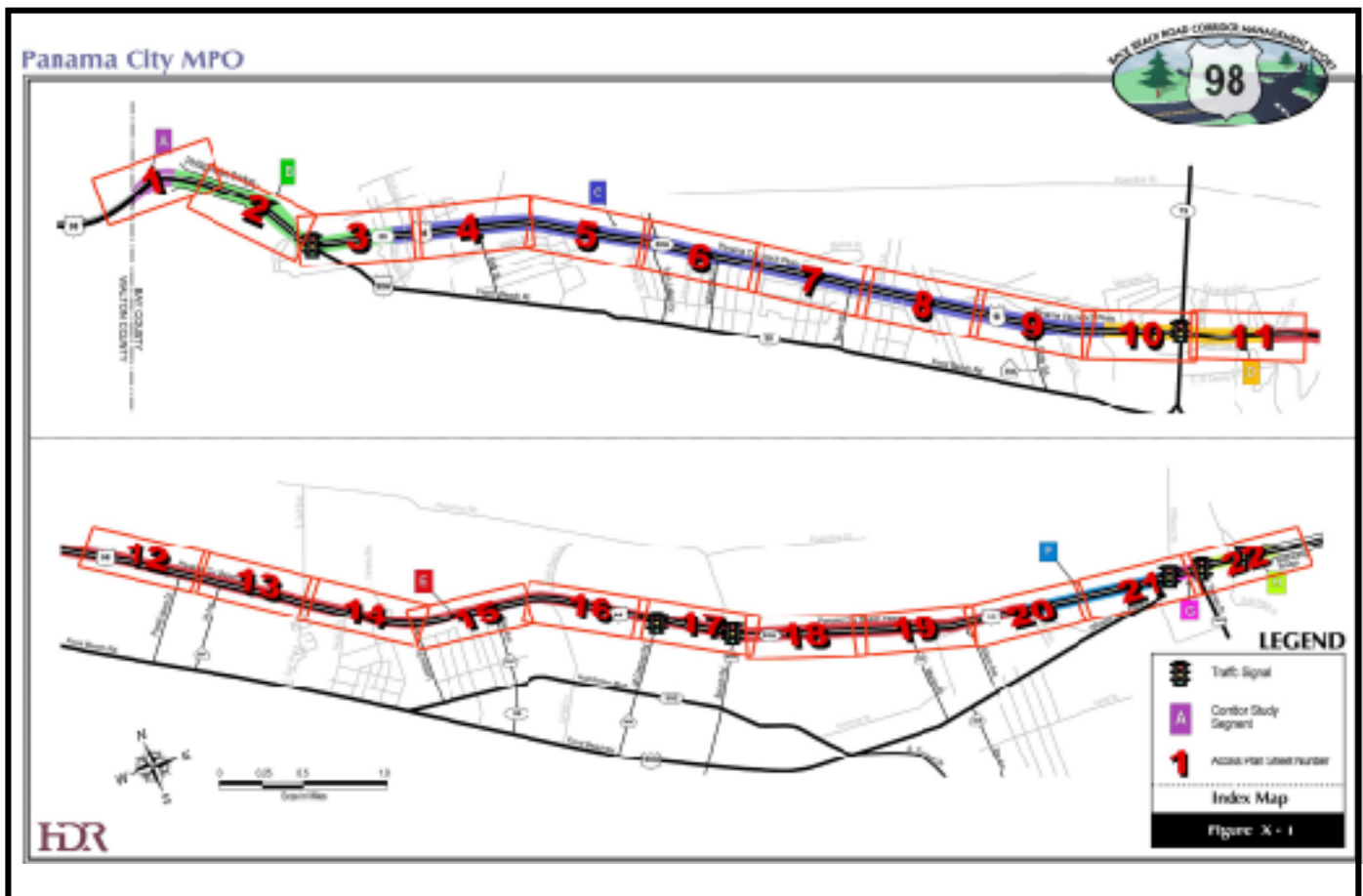
Cross Access Need and Opportunity

Website Applications

The MPO's website was used to make the access plans more accessible to the public. The plan sheets were made available in a portable document format (.pdf) to be viewed or downloaded by the public. An advancement made as a part of a corridor study completed for the Panama City MPO was to provide an overall corridor index map showing each of the individual plan sheet tiles. The web user was able to select which plan sheets they wanted to view by selecting the tile on the index map used in this study is provided below.

CONCLUSION

Providing clear and easy to understand graphics helps in communicating with the public the issues and proposed modifications of an access management project. This paper provides an example of graphic techniques used in a Corridor Management Report where only minor improvements along the corridor are being proposed. Many of these techniques apply to a range of access management projects.



Index Map for Back Beach Road (US 98) in Panama City, Florida



Access Management and Public Involvement

Moderator:

Bill Frawley, AICP

Associate Research Scientist

Texas Transportation Institute

 **Slides**

 **Paper**

6A. Public Involvement for Developing Raised Median Projects (Or, How to Sell Someone Something They Need but Don't Want)

Bob Appleton, P.E.

Director of Transportation Planning and Development

Texas Department of Transportation, Bryan District

 **Slides**

6B. Region of Durham Access Management Policy Study

Gene Chartier, P.Eng.

Manager, Transportation Planning and Design

*Regional Municipality of Durham Works Department,
Whitby, ON, CAN*

 **Slides**

 **Paper**

6C. Getting the Raised Median Design You Want

Mike Battles

District Design Engineer

Tyler District

Public Involvement for Developing Raised Median Projects (Or, How to Sell Someone Something They Need but Don't Want)

Bob Appleton, Texas Department of Transportation

Introduction

As communities experience population, economic, and physical growth, traffic volumes also grow. The importance of a community's arterial network increases as commuter, delivery, and service-oriented traffic searches for the most efficient means to travel around that community. As volumes increase, the need to preserve an arterial street's primary function of mobility becomes more important. Transportation agencies look to access management as a means to preserve that mobility. Many have included the raised median in arterial construction projects as an access management tool.

Including access management through raised medians into the design and construction of an arterial street project can be a challenge. Although extensive research demonstrates the raised median effectively reduces travel delay and increases safety, recent research also shows adjacent land and business owners are concerned that these medians will have an economic impact as well¹. In today's more proactive project development climate; the public raises these concerns earlier in the process. It is essential that the designer both considers those concerns and involves the public in finding the solutions. There are ways to effectively do this.

Local Background

The Bryan/ College Station community experienced considerable growth over the past three decades. Texas A&M University's enrollment has tripled and is currently over 40,000 students. The surrounding community also grew to meet the demand created by the university and the connected commercial, retail, and industry growth. Population and traffic growth is taxing a local roadway network that was originally planned and built to serve a much smaller need. The arterial streets in this network are mostly state-maintained roadways. The Bryan District of the Texas Department of Transportation (TxDOT) has jurisdiction over these state roads in cooperation with the Bryan/ College Station Metropolitan Planning Organization (MPO).

TxDOT has recently widened several of these roadways. Texas Avenue (Business Highway 6) from University Drive to Dominik Drive was a four lane urban roadway with a continuous two-way left turn lane (CTWLTL). TxDOT recently completed a project widening it to six lanes with a raised, curbed median. The district is currently designing another project to do the same to Texas Avenue from Dominik Drive to Harvey Mitchell Parkway. Boonville Road (Farm to Market Road 158) from State Highway 6 to Briarcrest Drive was a two-lane rural highway and is now a four-lane suburban street divided by a raised, curbed median. The next phase will widen FM 158 to a similar typical section to SH 30 and is currently under design. The widening of San Jacinto Avenue (SH 21) from a two-lane road to a four-lane divided highway from William J. Bryan Avenue to Texas Avenue is nearing completion. These projects range from the

upgrade of rural two-lane roads in suburban and urban settings to widening urban arterials and retrofitting a raised median.

The result of all this activity was a crash course, for TxDOT planners and designers and the public alike, in how to develop a project that incorporated the “new” concept of access management. Heavy traffic growth caused problems besides left turn conflicts. The CTWLTL on arterial streets was increasingly used for acceleration and merging maneuvers, as well as left turns, with an accompanying increase in crashes, including a fatality. Everyone agreed increased safety was necessary. However, during public involvement it became immediately apparent that convenient access would be a major issue. Business and land owners along these projects worried that their customers would not remain loyal if their access did not remain convenient.

Public Involvement Process

As a first step in preparing to present a project involving access management to the public, TxDOT designers and planners familiarized themselves with access management techniques. Literature shows there are many operational and safety advantages to raised medians. In suburban areas, arterials with raised medians have significantly lower vehicle crash rates than arterial streets with CTWLTLⁱⁱ. Case studies show that where a two-lane rural highway is expected to develop into a suburban setting with an upgrade to a four-lane facility, the responsible agency should initially use a raised median. It provides the opportunity to manage driveways and land access in an orderly fashionⁱⁱⁱ. The American Association of State Highway and Transportation Officials (AASHTO) recommends that medians should be provided on urban arterial streets wherever space permits^{iv}. Designers and planners became familiar with as much data and literature on this issue as possible before presenting it to the public. This is especially true on projects like those above where the community has little or no experience with raised medians. If possible, an especially effective means of becoming familiar with the state of the practice is to take an active role in a research project.

Another useful step in preparing for public involvement on a project was to enlist the support of the local governments. In Bryan and College Station, local TxDOT engineers worked through the MPO technical advisory committee to educate both city staffs on the benefits of access management and raised medians. Local TxDOT staff then included city staff in preliminary design meetings to discuss issues such as median opening locations. In turn, the cities have since allowed TxDOT to review preliminary development site layouts for access and mobility issues. The local TxDOT office also offered to meet with city councils and planning and zoning committees to discuss these issues. These boards are often very receptive to discussions on preserving the function of arterial streets and improving operations and safety. TxDOT also proposed opportunities for the cities to participate in placing landscape architecture in the raised medians to improve streetscape appearance.

Department staff then introduced the concept of the raised medians at the initial public meetings on these projects. The engineers explained the benefits of the concept and the reasons for exploring its use. They also described other locations with successful raised

median installations. At the earliest stage, TxDOT kept discussions of median opening locations generic, but promised to use public comment as a tool in deciding those locations during detailed design. TxDOT held the meetings in a format that allowed for recording public comments. Leaving the raised median a concept during preliminary development, while promising later involvement in the decision making, let the eventuality of the design to sink in without jeopardizing completion of preliminary development because of a protracted dispute at any single location. It also ensured continued communication with the adjacent land and business owners throughout the project development process.

Median Opening Designs

Once the project received an environmental clearance, TxDOT designers set about the task of locating the median openings. The first step was to establish which major street intersections required median openings. TxDOT designers made these decisions in cooperation with city staff. After establishing those locations, the designers then looked for the optimum locations for any mid-block or minor intersection openings. Table 1 shows an example of guidelines for determining distances between median openings.

Table 1 Minimum Distances between Median Openings^v

Arterial Speed (MPH)	Minimum Distance (ft.)	
	Absolute Minimum ^a	Desirable Minimum ^b
25	140	390
30	190	370
35	240	460
40	300	530
45	360	670
50	430	780
55	510	910

^a 8.0 ft./sec² deceleration rate with 10-MPH deceleration in through traffic lane.

^b 6.5 ft./sec² deceleration rate with no deceleration in through traffic lane.

The designers used these guidelines to establish an acceptable range for locating an opening (Figure 1). Traffic operations and design staff reviewed this location and then TxDOT discussed it with city staff. Once the group discussed all of the parameters and restrictions that might affect that location the designers created a more detailed drawing that graphically represented a permissible range of locations in relation to existing driveways. This drawing (Figure 2 shows a greatly simplified version) became a public involvement display.

Block Meetings

Local TxDOT designers then contacted all land and business owners adjacent to the “block” between intersection openings. They invited all landowners, tenants, and local government staff to attend a meeting to discuss the proposed mid-block median opening. It was usually best to hold this meeting as close to the site as possible. In many instances, the larger businesses offered the use of their conference or training rooms for these meetings. It was also important to poll the attendees to find out whether a meeting during

or after business hours would most convenient. Occasionally, two meetings at different times were necessary.

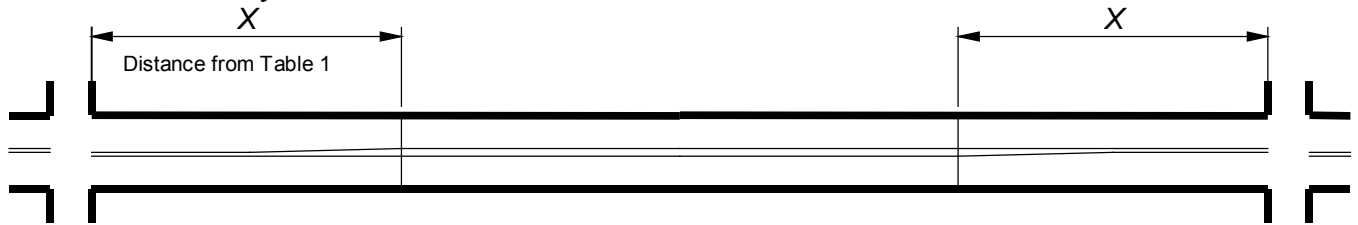


FIGURE 1

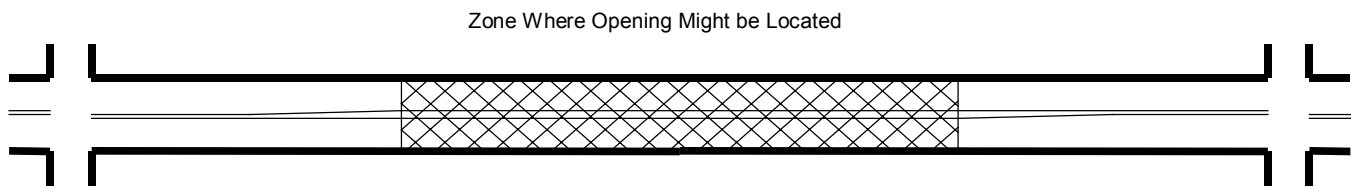


FIGURE 2

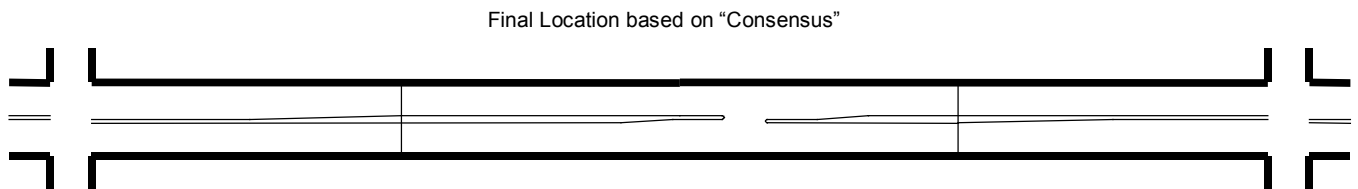


FIGURE 3

Because there was usually an owner who missed all previous public involvement and was not aware of the project, the project designers began the meetings with a project overview. Then they described the design process used to develop the drawings in the display. They gave a brief description of the need to preserve mobility on arterial streets, manage access, and separate median openings. The designers then turned the meetings over to the land and business owners to allow them to discuss the options. This was a facilitated discussion designed to result in consensus on the optimum location of the opening. This optimum location should serve the perceived needs of as many owners as possible. The discussion also provided an opportunity for the designers to suggest ways that driveway improvements or increased internal circulation might also contribute to better access management.

The best possible scenario would be for the owners to pick one location. However, they were often only able to narrow the range of possibilities. In these instances, the designers had to make the final decision based on engineering judgment. If this is the case, it is extremely important that the designers listen carefully to the discussion. When faced

with pleading the case for convenient access to their location in the presence of a competing interest, most owners will try hard to present only the most compelling reasons for favoring their driveway. The designers found the points made by each separate interest useful for decision making.

It is also advisable to have a staff member familiar with urban construction techniques attend the meeting. Many owners were not only concerned with the result of the project. They also had questions about access and traffic control during construction. Having someone there who could address those concerns helped reduce anxiety from the unknown. This anxiety might detract from the group's ability to focus on the median opening task and decrease the likelihood of a satisfactory result. This discussion also made construction staff aware of access issues with sufficient time to plan. Right-of-way acquisition staff members were also part of this process. Their expertise was useful for answering questions about compensable items. The right-of-way staff will also work with land planners and appraisers as part of the acquisition process. The planners and appraisers might have to work with access and circulation issues that are generated by the location of the median opening. Information from the meeting to help better prepare them for their tasks.

The discussions in these meetings can often become spirited. While the owners may have competing business interests, they will find a common opponent in the transportation agency that is proposing the project or in the concept of the raised median itself. They will seek to do whatever they can to protect the source of their livelihood. Many of their positions will have merit. TxDOT designers came to the meetings prepared to discuss the traffic safety and operations benefits of the raised median. They were also aware of evidence that many business owners believe customer service, product quality, and product price are more important factors than accessibility in attracting and keeping customers^{vi}. The designer must also remember that many situations do not have a textbook answer. The best solution may involve some compromise. The designer should look for a way, within the limits of policy, to reach a solution that is truly based on both design and public considerations. The emphasis should be on effectively managing access, not fitting exactly within the numbers on some table.

After weighing all of the information gathered above, the designers decided on specific locations. They then drew up the location (Figure 3) and distributed this drawing to the land and business owners adjacent to that block. They also encouraged those owners to comment on this location or visit their office. Additionally, the designers shared the information with other local government staff and asked for their comments.

Conclusion

Public involvement is not just a chore; it is a useful tool. Its usefulness is also not limited to advance project development. The Bryan District of TxDOT has found it very helpful in making design decisions. When these decisions are made in a design "vacuum" they often cause public controversy at a time, such as during construction, when the department can least afford delays. Making the decisions early in design, with direct

input from the community reduced this possibility significantly. TxDOT found that land and business owners were more accepting of the results if they believed their concerns were heard. This was even true when the decision did not go exactly their way. The district has found the process outlined below to be an effective means of implementing access management on both retrofit and new divided arterial streets.

- Prepare for public involvement by researching literature on access management.
- Do not include exact locations for mid-block and minor intersection median openings in advanced project development documents or meetings. Discussions should only include the concept and purpose of access management.
- Once a project moves to design and right-of-way acquisition, find a range of locations along the median where openings will work.
- Invite adjacent land and business owners to meet and discuss each individual location with design staff and local government staff. Include construction and right-of-way staff in the meetings.
- Finalize the location and design based on these discussions.
- Inform the public of those decisions.

Access management is a partnership between those who want access and those who seek to control it. This process allows both a voice.

ⁱ Eisele, W. L., W. E. Frawley. *A Methodology for Determining Economic Impacts of Raised Medians: Final Project Results*. Research Report 3904-4, Texas Transportation Institute, College Station, Texas. October 2000.

ⁱⁱ Bowman, B., R. Vecellio. *Effect of Urban and Suburban Median Types on Both Vehicular and Pedestrian Safety*. Transportation Research Record 1445, 1993.

ⁱⁱⁱ Mukherjee, D., A. Chatterjee. *Choosing Between a Median and a TWLTL for Suburban Arterials*. ITE Journal, July 1993.

^{iv} *A Policy on Geometric Design of Highways and Streets*. American Association of State Highway and Transportation Officials, Washington, D. C., 1994.

^v Stover, V. G., W. G. Adkins, J. C. Goodknight. *NCHRP Report 93: Guidelines for Medial and Marginal Access Control on Major Roadways*. Highway Research Board, College Station, Texas. 1970.

^{vi} Eisele, W. L., W. E. Frawley. *A Methodology for Determining Economic Impacts of Raised Medians: Final Project Results*. Research Report 3904-4, Texas Transportation Institute, College Station, Texas. October 2000.

Region of Durham Access Management Policy Study



Fifth National Conference on Access Management
Austin, TX - June 23-26, 2002

Gene Chartier, P.Eng.
Manager, Transportation Planning and Design
Regional Municipality of Durham Works Department, Whitby, ON, CAN

Ray Bacquie, P.Eng.
Vice President
ITRANS Consulting Inc., Richmond Hill, ON, CAN



Preliminaries

- Long-standing policy of controlling access
 - First *Entranceway By-law* in 1976
- Current regulation (By-law No. 211-79):
 - All roads controlled-access
 - *Property Access Permit*



Region of Durham Access Management Policy Study



Preliminaries

- Permits require conformity with *Policy for Entranceways*:
 - Guidelines for granting access
 - Criteria applied in designing entranceways
- Policy not updated since 1980



Region of Durham Access Management Policy Study



Presentation Overview

- Legislative and policy context
- Study process
- Elements of policy
- Next steps and future actions
- Closing remarks



Region of Durham Access Management Policy Study



The Structure of Government in Canada

- *The Constitution Acts* (1867-1982):
 - Two orders of government (Federal and Provincial)
 - Responsibilities
- Most powers assigned to one of the two levels
 - Province responsible for municipal institutions



Region of Durham Access Management Policy Study



Municipal Government in Ontario



- Two levels:
 - Local (lower-tier)
 - County/Region (upper-tier)
 - Upper-tier typically has broader responsibilities
- Municipal Act defines:
 - Powers and duties
 - Internal organization
 - Municipal structure
- Regional Municipalities Act provides further authority for Regions



Region of Durham Access Management Policy Study



Regional Municipality of Durham



- Upper-tier municipality
- Created in 1974
- Population - 531,000
- One of Canada's fastest growing municipalities
- Responsible for:
 - Strategic land use planning
 - Police and ambulance
 - Health and social services
 - Water, sewage and waste
 - Arterial roads and signals



Region of Durham Access Management Policy Study



Legislation - Regional Municipalities Act

- Authority to pass by-laws to:
 - Designate controlled-access roads
 - Prohibit or regulate connections
 - Close or correct accesses in contravention



Region of Durham Access Management Policy Study



Legislation - Planning Act

- Mechanism for integrating access management with land use planning
- Tools:
 - Official Plans
 - Zoning By-laws
 - Site-Plan Control By-laws
 - Plans of Subdivision and Severances



Region of Durham Access Management Policy Study



Planning Act - Official Plans

- Provide policy basis to guide land development and growth
- Application for access management:
 - Regulatory and policy basis for application review
 - Policies for growth management, land use, urban structure and form, financing
 - Framework for development and management of transportation system



Region of Durham Access Management Policy Study



Planning Act - Zoning By-laws

- Control use of land
- Application for access management:
 - Land use details
 - Location and type of structures and their use
 - Lot sizes, parking, building heights and setbacks
 - Holding provisions



Region of Durham Access Management Policy Study



Planning Act - Site Plan Control By-laws

- Specify how developments are built and maintained
- Application for access management:
 - Primary tool for commercial land use
 - Conditions and constraints to development
 - Access provisions
 - Road widenings
 - Agreements for financing improvement costs



Region of Durham Access Management Policy Study



Planning Act - Plans of Subdivision and Severances

- Divide land
- Application for access management:
 - Primary tool for residential development
 - Conditions and constraints to development
 - Number of lots
 - Location, width and names of streets
 - Intersection locations
 - Road widenings
 - Agreements for financing improvement costs



Region of Durham Access Management Policy Study



Policy - Regional Official Plan

- Transportation system goals, policies and components
- Hierarchy of major roads:
 - Three categories of arterials (Types A, B and C)
- Details arterial road design characteristics:
 - ♦ Access spacing
 - ♦ Typical intersecting roads
 - ♦ Operating speed
 - ♦ Right-of-way
 - ♦ Traffic engineering considerations



Region of Durham Access Management Policy Study



Characteristics of Arterial Roads

Design Parameter	Type A Arterials	Type B Arterials	Type C Arterials
Access spacing (urban areas)	200 m	80 m	



Region of Durham Access Management Policy Study



Policy Study - Objectives

- Policy and technical guidelines
- Based on existing information and best practices:
 - 1999 Transportation Association of Canada *Geometric Design Guide for Canadian Roads*
 - Ministry of Transportation guides
 - AASHTO and TRB publications
 - Other municipalities



Region of Durham Access Management Policy Study



Policy Study - Objectives



- Safety, economic, risk management, consistency, operational implications
- Provisions of Regional Official Plan
- Consistency with adjacent municipalities

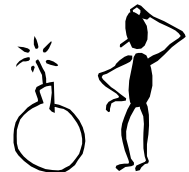


Region of Durham Access Management Policy Study



Policy Study - Considerations

- Risk and liability
- Precedent setting decisions
- Third party impacts
- Costs to the Region
- Interaction with lower tier jurisdictions



Region of Durham Access Management Policy Study



1. Access Management Context

- Introduction
- Access management philosophy
- Road classification system
- Road safety context
- Access management tools
- Access management policy



Region of Durham Access Management Policy Study



Access Management Policy

- Discourage direct access
- Maintain efficient movement of traffic
- Apply sound engineering practice within Central Areas and Hamlets
- Prohibit or remove access where operational and/or safety concerns



Region of Durham Access Management Policy Study



2. Access Approval Guidelines

- Alternative forms of access
- The merits of access approval
- Operational concerns
- Sight distance analysis
- Number of driveways



Region of Durham Access Management Policy Study



2. Access Approval Guidelines (con't)

- Mitigation of access impacts
- Right-of-way requirements
- Documenting access needs - Traffic impact studies
- Funding of access improvements



Region of Durham Access Management Policy Study



Merits of Access Approval



- Landlocked
- Unique site constraints
- Alternate access creates problems
- Rely heavily on pass-by



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3. Access Design Guidelines

- Driveway dimensions
- Vehicle turning path
- Driveway grades
- Corner clearance
- Driveway spacing
- Driveway alignment
- Angle of intersection



Region of Durham Access Management Policy Study



3. Access Design Guidelines (con't)

- Mutually-shared driveway
- Turning restrictions and prohibitions
- Signal spacing
- Lay-by
- Emergency access
- Construction access

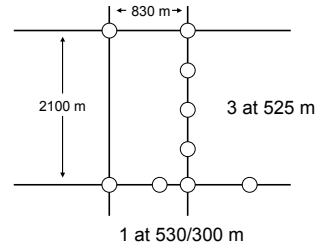


Region of Durham Access Management Policy Study



Signal Spacing

- Dictated by existing grid of arterial roads



Region of Durham Access Management Policy Study



4. Site Operations

- Clear throat distance
- Drive-thru and carwash stacking
- Turnaround area
- Pedestrian accommodation
- Service facilities



Region of Durham Access Management Policy Study



Drive-thru Criteria

- Separate traffic
- Delineate area
- Provide adequate queue storage to meet peak demands



Region of Durham Access Management Policy Study



Next Steps



- Complete policy and by-law updates
- Seek Regional Council approval
- Integrate into *Arterial Road Corridor Design Guidelines*
- Update permitting process



Region of Durham Access Management Policy Study



Future Directions

- Proactive access management based on network screening
- Safety impact studies
- Promotion of access management



Region of Durham Access Management Policy Study



Closing Remarks - Study Outcome

- Reflects new policy direction, design guidelines and knowledge
- Reinforces importance of access management
- Achieves buy-in, or at least understanding, of access management principles
- Improves access permitting process



Region of Durham Access Management Policy Study



GETTING THE RAISED MEDIAN DESIGN YOU WANT: US 69 (SOUTH BROADWAY) IN TYLER, TEXAS

Prepared by

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For

**Fifth National Conference on Access Management
Austin, Texas
June 2002**

BACKGROUND

The Texas Department of Transportation (TxDOT) Tyler District is located in the Piney Woods of East Texas. While the district is primarily rural, there are two urbanized areas, Longview and Tyler. The US 69 – South Broadway corridor is located in the southern part of Tyler, a growing city of approximately 85,000 people. Tyler is the seat of Smith County, which has a population of 178,000.

Over the past decade, the Tyler District has been very progressive with the use of raised medians on urban arterial streets. TxDOT has installed raised medians on several corridors in Tyler, Longview, Jacksonville, and Henderson. The use of the raised medians follows the goals the District has established for reducing conflict points and increasing safety and mobility on arterial roadways.

CORRIDOR DESCRIPTION

The South Broadway corridor is located on the south side of Tyler, a distance of 2.6 miles between Loop 323 on the north and Cumberland Drive on the south. The existing cross-section is six lanes with a continuous two-way-left-turn-lane (TWLTL). This segment of South Broadway has an ADT of approximately 41,000, with 61,200 projected by 2023.

This segment of South Broadway is Tyler's major retail shopping district, including a regional shopping mall and scores of other businesses located in strip centers and on single lots. The businesses range from discount store and home improvement supercenters to national chain restaurants to specialty retail stores. The retail industry has shown continuous growth over the last decade with new construction and redevelopment. The corridor also contains apartment complexes, churches, motels, and mid-rise office buildings. Some single-family dwellings back up to South Broadway, but there none have driveways onto the thoroughfare.

Currently there are more than 130 driveways and minor intersections on the corridor and seven major signalized intersections. The raised medians are to be installed in three phases, beginning at the north end. Driveway densities range from 42 per mile on the north end to 79 per mile on the south end. Crash studies show that between 1995 and 2000, there were 727 left-turn crashes and 24 opposing crashes, resulting in 865 injuries and no fatalities.

Figure 1. Crash on US 69 Corridor



CONSENSUS-BUILDING GROUP

The success of the project design is due in large part to the cooperation between the TxDOT Tyler District and the City of Tyler. The two agencies determined early in the process that it would be wise to form a consensus-building group. TxDOT representation was comprised of:

- Director of Traffic Operations
- Director of Transportation, Planning, and Development
- Tyler Area Engineer
- Project Design Manager
- Project Design Engineer

The City of Tyler was represented by:

- City Traffic Engineer
- City Engineer
- Director of Parks and Recreation
- Director of Planning
- Mayor and City Council

The consensus-building group held meetings to make sure that both agencies were coordinated on several issues. Through these meetings the agencies developed the project scope. The group also determined configurations of the major intersections and discussed median treatments and median opening criteria. These discussions were important so that the two agencies could present a unified goal for the project to the public and businesses. From the onset of the project, TxDOT and the City had very similar goals and ideas about managing access on the corridor. That preliminary agreement set a positive tone for the entire process.

Recommendations

The consensus-building group meetings resulted in several recommendations. One recommendation was to develop a traffic model of the corridor. The group wanted to use the traffic model to analyze various alternatives for median opening types and spacings, as well as intersection treatments. One of the intersection concerns was the need for and ability to include dual-left-turn lanes at signalized intersections. This need was anticipated due to U-turns and additional left-turns required for drivers to access driveways on the opposite side of the street after raised medians installation. Other intersection improvements the group studied were right-turn lanes and traffic signal upgrades.

The consensus-building group recommended that the TWLTL be replaced with a combination of landscaped and “hardscaped” raised medians. The group then developed median selection criteria. The criteria used to determine where median openings should ideally be located included locations of existing major city street intersections, shared private access points, and driveway consolidations at joint-use easements. The group

also considered intersections (including private driveways) with high turning movement volumes and potential U-turn locations.

After this process of studying distances between existing signalized intersections and necessary queue capabilities, the group made initial recommendations for possible median openings. While these recommendations were based on maximizing access management and accommodating existing intersections, the group realized that the final design would vary based on discussions with business owners and the public.

In order to put the project alternatives before the business owners and the public, the consensus-building group recommended that conceptual drawings of the medians be produced. The group desired to present photographs and other graphics at future meetings to most accurately describe what the project would entail.

CORRIDOR MODEL DEVELOPMENT

Once the consensus-building group decided that the corridor should be modeled, it was realized that neither the TxDOT Tyler District nor the City of Tyler had the latest corridor modeling software or the expertise to use it. Therefore, the TxDOT Tyler District entered into an interagency agreement with the Texas Transportation Institute (TTI) for the purposes of technology transfer and training. TTI staff assisted TxDOT staff in each step of developing the model. Through the interagency agreement work, TTI trained TxDOT staff how to develop and use the model so they could perform similar tasks unassisted in the future.

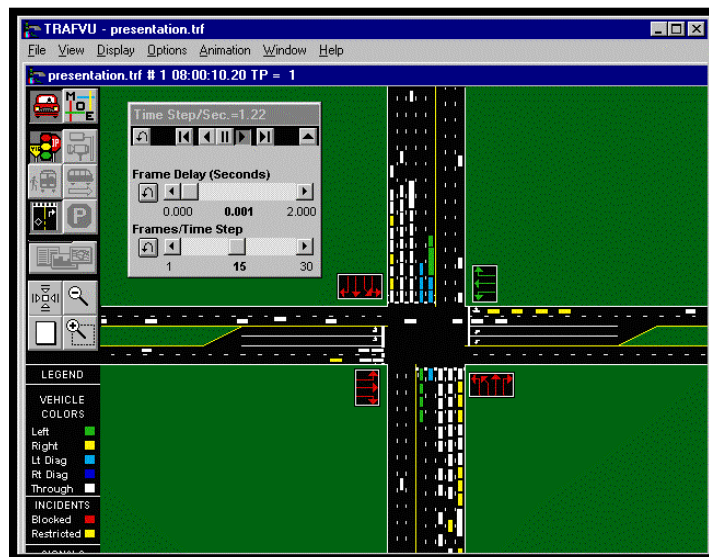
The first step of the model development process was to perform a land use and driveway inventory. This inventory listed each building and individual business, their land use types, and each driveway. Staffs also collected traffic counts on the corridor, including turning movements at each major intersection and at almost every driveway on the corridor. Team members videotaped the traffic in order to capture numerous driveways at one time, and then reduced the data at a later date. Owners of some of the taller buildings along the corridor allowed cameras to be set up on top of their buildings; these vantage points allowed great amounts of data to be collected per session.

Figure 2. View From Mid-Rise Building Along Corridor



The team then created the corridor model using CORSIM software. The model allowed TxDOT and the City of Tyler to consider various median opening spacing and intersection treatment alternatives. The agencies also used the model as a public involvement tool to show the public how design alternatives were developed and analyzed.

Figure 3. CORSIM Model Screen Shot



The agencies used previous raised median impacts on adjacent businesses research that was conducted by TTI. TxDOT compared the corridor businesses with the research results to get an idea of what could be expected on South Broadway. The agencies also used the research results in public meetings and meetings with business owners to discuss possible impacts.

PUBLIC INVOLVEMENT

By the time TxDOT took the project to public meetings, it and the city staff were in agreement on project goals and basic design concepts. TxDOT used public meetings, including a temporary booth at a local shopping mall, to educate the public about access management and raised medians. TxDOT staff also went through various design options with members of the public and business owners to inform them about the reasons for median opening designs and spacings. During these public meetings, members of the public and business owners also gave valuable input to the design process and thereby felt some ownership in the process.

Figure 4. First Public Meeting



Figure 5. Public Information Booth at Local Shopping Mall



At the meetings TxDOT used picture boards that showed the existing corridor, as well as conceptual images overlaid on the photographs. These picture boards gave the public and the business owners the best possible idea of what the project would look like when completed. The conceptual images included landscaping and various median opening designs, including full and directional.

Figure 6. Picture Board Existing Image Used at Public Meetings



Figure 7. Picture Board Conceptual Image Used at Public Meetings



In addition to the public meetings, TxDOT met one-on-one with business owners to discuss particular design options and engineering limitations. At these meetings business owners also expressed their specific concerns about the project, which resulted in important dialogue among the stakeholders.

KEYS TO SUCCESS

There were several key elements of the project development process that led to the design success. One of the most vital elements was regular communication among TxDOT, city staff, and elected officials. This communication ensured that both agencies were coordinated in terms of goals and design options.

The process also included a team effort among various city departments and TxDOT groups. The team effort afforded a valuable sense of cooperation. This cooperation was important in making continued progress through the project development process.

TxDOT staff was very careful in communicating with the public. The staff explained the safety and mobility goals related to installing the raised medians, as well as the alternatives being considered. TxDOT also made sure the business owners were included in discussions and felt that they had parts in the decision-making process. TxDOT tactfully educated the business owners and public about access management, including applicable research results, so they would be better informed as the project progressed. The Tyler Chamber of Commerce also became actively involved in the process. Finally, the agencies conducted public meetings with stakeholders. These efforts led to buy-ins from the local business community.

EVIDENCE OF SUCCESS

There are several issues that point to success achieved in this project. First, the business community bought-in to the raised median concept for the corridor after education by and discussions with TxDOT and the City of Tyler. The TWLTL will be replaced by a raised median with only three mid-block openings, in addition to the openings at signalized intersections. This minimal number of mid-block median openings provided for maximum spacing between openings. This design, which includes consolidated driveways, resulted in a reduction of conflict points from approximately 1,700 existing to about 400 proposed.

In addition, improvements such as dual-left-turn lanes, right-turn lanes, and upgraded traffic signals will be made to nine major intersections.



Recent Research in Access Management Modeling



Slides

7A.

A Planning Tool to Estimate Delays Due to Driveways on Various Cross-Sections

Joseph Hummer, Ph.D., P.E.

Associate Professor

North Carolina State University



Slides

7B.

Process to Identify High Priority Corridors for Access Management Near Large Urban Areas in Iowa

David Plazak

Associate Director of Policy Center for Transportation Research and Education/

Director, Midwest Transportation Consortium



Paper

A Planning Tool to Estimate Delay Due to Driveway on Variable Cross-Sections

Joseph E. Boman
University of Texas
Austin, Texas, 78712

For the 1997 National Conference on Highway Management, Austin, TX, June 1997

1

Highway Agency's Dilemma

- Old two-lane road
- Driveway (single lane)
- Driveway volume growing
- Level of service declining
- Recent HCM's ability to deal with it?
- What if it is, how much and when?

2

No Good LOS Tool Available

- HCM unsuitably chapters limited
- Two or more sub-section signals
- Truck and heavy vehicle
- HCM unsuitably limited on chapter
- While having to correct errors
- HCM unsuitably chapter then used by signals

3

Objective: Method to Estimate LOS

- Research signals
- Design area
- Future levels of service development
- Planning level
- How and when using network models
- Signal, Lane, and undivided Lane

4

Simple Model

- LOS based on through vehicle speed
- $S = S_0 (1 - \frac{V}{S_0})^2$, where
- S_0 is through vehicle speed, mph
- V is through vehicle speed, mph
- All through vehicle speed is through vehicle speed
- All through vehicle speed is through vehicle speed
- All through vehicle speed is through vehicle speed

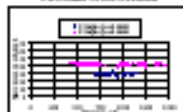
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Average Speed Between Intersections

- No available speed data between intersections
- One field data observation
- Primary vehicle
- Fast, simple
- Low speed vehicle
- No study vehicle
- No study vehicle

6

Two-Lane Cross-Section



7

Delay Due to Left Turns

- HCM unsuitably limited on chapter
- Two key assumptions
- No through vehicle speed
- All through vehicle speed is through vehicle speed
- First assumption is OK, second doubtful

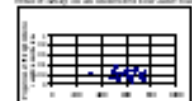
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Data Collection Site

- Single lane
- Undivided two-lane road
- Through vehicle speed
- Through vehicle speed
- Through vehicle speed
- Through vehicle speed

9

Modifying the HCM equation for through vehicle speed on an undivided two-lane road



10

Delay Due to Right Turns

- Adapted model by Boman
- Microscopic, deterministic
- Theoretically sound
- Reasonable inputs and assumptions
- Field observation to compare
- Comparing delay to HCM's one field data
- Through vehicle speed

11

Level of Service Standard

- What is the standard for through vehicle speed
- What is the standard for LOS
- How particular standard is placed in HCM
- What is the standard for HCM's one field data

12

1997 HCM percent reductions from free-flow speed by LOS

Level of Service	Percent Reduction	Level of Service	Percent Reduction
A	0	D	20
B	5	E	30
C	10	F	40
D	15	G	50
E	20	H	60

13

Recommended 1997 Two-Lane Chapter LOS Standards

- Microscopic
- Microscopic to determine
- Requires micro-simulation or calculation to apply
- Standard difference in HCM's one field data
- Through vehicle speed

14

Summary Table of Results

- Single page, no table for distribution
- Range of volume and driveway structure
- Also check two-lane chapter LOS
- Key assumptions
- $S = 60$
- $V = 100$
- Through vehicle speed

15

Sample LOS Results

Volume (vph)	LOS	Volume (vph)	LOS
100	A	100	A
200	B	200	B
300	C	300	C
400	D	400	D
500	E	500	E

16

Factors in Results

- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay

17

Conclusions

- LOS standard based on planning level is through vehicle speed
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay

18

More Conclusions

- One page summary suitable for planning
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay
- Through vehicle speed sensitive to driveway delay

19

ABSTRACT

When access via driveways and minor public roads from arterial and collector roadways to land development is not effectively managed, the result is often increased accident rates, increased congestion, and increased delays for motorists. The most common access management problem in Iowa involves allowing a high density of direct driveway access via private driveways to commercial properties located alongside arterial highways, roads, and streets. Although access management is often thought of as an urban problem, some of the most difficult access management issues occur in areas at and just beyond the urban fringe. Like most other states, Iowa is becoming more urbanized, with large urban centers accounting for more and more employment and inbound commuting from rural hinterlands. This research project is intended to produce a strategy for addressing current and future access management problems on state highway routes located just outside urban areas that serve as major routes for commuting into and out of major employment centers in Iowa.

There were two basic goals for the project: (1) to develop a ranking system for identifying high-priority segments for access management treatments on primary highways outside metro and urban areas and (2) to focus efforts on routes that are major commuting routes at present and in the future. The project focused on four-lane expressways and two-lane arterials most likely to serve extensive commuter traffic. Available spatial and statistical data were used to identify existing and possible future problem corridors with respect to access management. The research team developed a scheme for ranking commuter routes based on their need for attention to access management.

This project was able to produce rankings for corridors based on a variety of factors, including proportion of crashes that appear to be access-related, severity of those crashes, and potential for improvement along corridors. Frequency and loss were found to be highly rank correlated; because of this, these indicators were not used together in developing final priority rankings. Most of the highest ranked routes are on two-lane rural cross sections, but a few are four-lane expressways with at-grade private driveways and public road intersections. The most important conclusion of the ranking system is that many of the poor-performing corridors are located in a single Iowa Department of Transportation district near two urban areas—Des Moines and Ames. A comprehensive approach to managing access along commuting corridors should be developed first in this district since the potential benefits would be highest in that region.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Iowa Department of Transportation.

CTRE's mission is to develop and implement innovative methods, materials, and technologies for improving transportation efficiency, safety, and reliability while improving the learning environment of students, faculty, and staff in transportation-related fields.

INTRODUCTION

Overview of Access Management in Iowa

Iowa has completed and received national attention for its program of access management research. Access management is a process that provides or manages access to land development while simultaneously preserving the flow of traffic in the surrounding system in terms of safety, capacity, and speed. Managing access involves the control of spacing, location, and design of driveways, medians/median openings, intersections, traffic signals, and freeway interchanges. The most common access management problem in Iowa involves allowing a high density of direct driveway access via private driveways to commercial properties located alongside arterial highways, roads, and streets (1). Access issues are thought to be a contributing factor in over 50 percent of all highway crashes; however, this figure is much higher in built-up urban and suburban areas than in rural areas.

Problem Definition

Iowa's highways play a dual role of serving through traffic and providing direct access to adjacent land and development. When access via driveways and minor public roads from arterial and collector roadways to land development is not effectively managed, the result is often increased accident rates, increased congestion, and increased delays for motorists. Research in Iowa and elsewhere has shown access management to be highly effective in increasing highway safety and improving traffic operations.

Although access management is often thought of as an urban problem, some of the most difficult access management issues occur in areas at and just beyond the urban fringe. Fringe areas are the most rapidly developing areas in Iowa. Like most other states, Iowa is becoming more urbanized, with large urban centers accounting for more and more employment and inbound commuting from rural hinterlands.

In urban fringe areas considerable commuting occurs inbound to employment centers within the suburban areas and urban cores. Two-lane and four-lane arterials that were originally designed to serve long-distance, high-speed travel may also serve growing numbers of commuters and sometimes will also have land development and recreational facilities such as trails and parks in place alongside. Unless access to minor public roads and land development is carefully managed, such highways can lose their effectiveness in terms of serving through travel. They can also become considerably less safe rather quickly.

Project Objectives

This research project is intended to produce a strategy for addressing current and future access management problems on state highway routes located just outside urban areas that serve as major routes for commuting into and out of major employment centers in Iowa. There were two basic goals for the project:

1. Develop a ranking system for identifying high-priority segments for access management treatments on primary highways outside metro and urban areas. Identify routes that could become candidates for corridor management pilot projects.
2. Focus efforts on routes that are major commuting routes at present and in the future.

It was important to the project's sponsor, the Iowa Department of Transportation (Iowa DOT), that the research focus on finding a limited number of four-lane corridors with at-grade intersections ("expressways" in Iowa DOT terminology) that ought to be given high priority for proactive access management attention based on both current safety problems and future growth in traffic and development.

Project Formulation

This research project will assist the Iowa DOT in systematically identifying "commuter corridors" radiating out from urban areas that are the most likely to need attention in terms of access management. Existing as well as likely future indicators of access management issues will be considered. The project is focused on four-lane expressways and two-lane arterials most likely to serve extensive commuter traffic.

This research used available spatial and statistical data to identify existing and possible future problem corridors with respect to access management. The research team developed a scheme for ranking "commuter routes" based on their need for attention to access management. To do this, a number of Iowa DOT, local government, and other data sources were integrated using geographic information systems (GIS) technology. Sources integrated included crash data, Census data, roadway configuration data, and traffic data.

Key Conclusions and Implications

This project was able to produce rankings for corridors based on a variety of factors, including proportion of crashes that appear to be access-related, severity of those crashes, and potential for improvement along corridors. The most important conclusion of the ranking system is that many of the poor-performing corridors are located in a single Iowa DOT district (District 1) near two urban areas—Des Moines and Ames. In fact, over half of the problem corridors identified are in Iowa DOT District 1. A comprehensive approach to managing access along commuting corridors should be developed first in District 1 since the potential benefits would be highest in that region. The second highest concentration of high-ranking corridors is in Iowa DOT District 6—the Cedar Rapids–Iowa City area. There are other high-ranking (problem) corridors spread throughout the state, but they tend to be more isolated in nature.

Key findings of the analysis include the following:

- Frequency and loss are highly rank correlated (as might have been expected since loss is partially a function of crash frequency); because of this, these indicators were not used together in developing final priority rankings.
- Most of the highest ranked routes are on two-lane rural cross sections, but a few are four-lane expressways with at-grade private driveways and public road intersections.

Table 1 indicates routes (including both two-lane and four-lane routes) that are suggested for consideration as corridor management pilot projects based upon the results of the analysis.

Table 1. Potential Corridors for Corridor Management

Corridor ID	Route	Nearby City	Growth Factor	Access Class.	Within 20 Miles of Metro	Driveway Density	No. of Lanes	Direction from City
14	982	Sioux City	3	6 to none	Yes	2.70	2	Southeast
26	20	Dubuque	4	2 to 3	Yes	1.21	4	West
29	52	Dubuque	4	none	Yes	0.71	2	North
34	67	Davenport	3	4 to 3	Yes	6.56	2	Northeast
35	956	Davenport	4	6 to none	Yes	3.41	2	North
37	130	Davenport	3	4 to none	Yes	0.63	2	Northwest
47	13	Cedar Rapids	3	3	Yes	0.29	4	East
49	94	Cedar Rapids	3	none	Yes	3.82	2	Northwest
51	151	Cedar Rapids	3	4 to 6 to 3	Yes	4.51	2	Southwest
59	6	Iowa City	3	6	Yes	3.99	2	Northwest
66	69	Ames	4	3 to none	Yes	0.23	2	South
68	17	Ames	3	6 to none	Yes	0.31	2	West
69	69	Ames	4	none	Yes	8.47	2	North
70	931	Des Moines	6	none	Yes	0.12	2	North
71	65	Des Moines	3	3	Yes	2.84	4	Northeast
72	415	Des Moines	6	3 to 4	Yes	6.12	2 to 4	Northwest
73	6	Des Moines	4	3	Yes	3.51	2	West
74	28	Des Moines	2	4 to none	Yes	2.79	2	South
75	92	Des Moines	5	none	Yes	8.08	2	Southeast
76	65	Des Moines	3	3	Yes	6.54	4	South
77	5	Des Moines	3	3	Yes	2.36	4	Southeast
81	191	Council Bluffs	2	6	Yes	0.35	2	East
82	183	Council Bluffs	9	none	Yes	5.11	2	North
87	275	Council Bluffs	4	none	Yes	0.18	2	Southeast
107	163	Des Moines	3	3	Yes	0.12	4	Southeast
109	52	Dubuque	3	none	Yes	3.05	2	South

Note: Four-lane routes are shaded.

METHODOLOGY AND RESULTS

The research methodology consisted of two distinct activities. The first focused on finding corridors that exhibited signs of having access management problems at present. The second activity involved finding corridors likely to have future access management problems. In Iowa, outside built-up areas, there is a limited number of routes where capacity and operations are current issues. Therefore, the current problem phase of the research focused almost entirely on safety and safety data.

This overview details the methodology used to create a statewide mapping and database system of Iowa's non-access-controlled primary commuting corridors to locate and proactively identify access management problems. The project used ESRI ArcView GIS (geographic information systems) to develop a mapping system of these corridors, corresponding attribute tables of the corridors, databases of crashes related to these corridors, and databases created for analysis of the corridors, their crashes, and their possible problems as related to access management. Data sources included crash databases, Iowa state, county, and city databases, roadway and vehicle databases from the Center for Transportation Research and Education (CTRE) database, and an access ratings database from the Iowa DOT.

The goals of utilizing GIS technologies to create and analyze the chosen Iowa commuter corridors were twofold:

1. Develop an ArcView project illustrating the current access classifications of Iowa's primary road system.
2. Generate an ArcView project portraying the chosen commuter routes of Iowa and the automobile crashes occurring on these corridors.

An innate benefit of using ArcView GIS over traditional statistical or mapping techniques is the ability to integrate data into the maps. This allows for a much "smarter" map; this allows for data analysis to occur within the program, and for results to be displayed graphically in map form.

In general, the following four ranking indicators were used to identify high-priority corridors:

- **Frequency**—This indicator represents the number of crashes that appear to be access related, in particular those that involve turning vehicles. All turning crashes were included, whether they occurred at private driveways or public road intersections.
- **Rate**—This indicator is the frequency of access-related crashes per million vehicle miles traveled (VMT).
- **Loss/severity**—This indicator measures the estimated cost of access-related crashes in dollars, including an estimate of the cost of fatalities, personal injuries, and property damage.
- **Percentage access related**—This indicator represents the percentage of total crashes that appear to be access related.

The distribution of ranking indicators was compiled for all 109 corridors for each of the four indicators. Access-related crash frequency over a three-year period ranged from a high of 529 down to zero; the mean frequency was 60. Access-related crash rates per million VMT ranged from a high of 5.61 down to zero; the mean rate was 1.21. Access-related crash losses for a three-year period ranged from a high of 43.5 million dollars down to zero dollars; the mean loss was just over five million dollars. The percentage of crashes deemed to be related to access ranged from a high of 33.3 percent to a low of zero percent; the mean value for this indicator was 10.6 percent. The 109 corridors being analyzed are located primarily outside built-up urban areas. If similar percentage calculations were conducted inside urban areas, it is very likely that these percentages would be significantly higher.

Corridors with Current Access Management Problems

The process of identifying current problem corridors involved the following nine steps:

1. Mapping Iowa DOT's Access Priority Classifications

The first objective of the GIS work was to create a statewide mapping and database system depicting how the primary road system in Iowa is classified due to each road's assessed access management objectives. CTRE developed the access classifications database from basic information supplied by the Iowa DOT, but a need was seen for it to be presented in a GIS format to integrate mapping and database capabilities. The definitions of the six access classifications are located in Tables 2 and 3.

Table 2. Access Priority Classifications (Metric)

Rating	Description
1	Access points at interchanges only
2	Access points spaced at minimum 800 m
3	Access points spaced at minimum 300 m rural, 200 m urban
4	Access points spaced at minimum 200 m rural, 100 m urban
5	Iowa DOT has minimum access rights acquired
6	Iowa DOT has no access rights acquired

Source: Iowa DOT.

Table 3. Access Priority Classifications (English Conversion)

Rating	Description
1	Access points at interchanges only
2	Access points spaced at minimum 2625 ft
3	Access points spaced at minimum 984 ft rural, 656 ft urban
4	Access points spaced at minimum 656 ft rural, 328 ft urban
5	Iowa DOT has minimum access rights acquired
6	Iowa DOT has no access rights acquired

Source: Iowa DOT.



Reunion Ranch Dinner Event

8. Cowboy-style fun at a real dude ranch!

Attendees experienced Access Management, Texas style. We boarded buses, and got a first hand look at the frontage roads built along the expressways. After we arrived at Reunion Ranch, we were invited to have our pictures taken on a Texas longhorn, play horseshoes, and just relax. After a great barbecue with all the trimmings, a storyteller kept us spellbound by recounting stories in verse. Line dancers then entertained us with high kicking and high energy. Those brave enough to try something new learned how to line dance.





Access Management Programs at the Regional and Local Levels, Part II

Moderator:

Kathy Facer

Realty Specialist

Federal Highway Administration

 [Slides](#)

 [Paper](#)

9A. Land Use Regulation As An Access Management Tool

Carol Gould, AICP, CEO

Principal Planner

Fitzgerald & Halliday

 [Slides](#)

 [Paper](#)

9B. Development of an Access Management Guidebook for Local Units of Government

David Geiger

Transportation Planner

Michigan Department of Transportation



[AM Guidebook](#)

[Welcome to Guidebook](#)

 [Slides](#)

 [Paper](#)

9C. Corridor Preservation The Florida Experience

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LAND USE REGULATION AS AN ACCESS MANAGEMENT TOOL

Transportation and land use planners have long recognized the complex relationship between land development and the transportation system. There is the classic question of which comes first, the development or the road. We understand that new roads stimulate new development just as new development creates the need for more roads. Access management is a tool that deals directly with the interface between land use and roadway functionality.

Access management is the process of strategically controlling access to land development while simultaneously preserving the safety and capacity of the surrounding roadway system. Access management can, over time, reduce the number of driveways and intersections along a road and guide their location to optimize safety and traffic flow. This can extend the functional life of existing roads and reduce the need for roadway widening. In turn, this may reduce the contribution that roadway improvements make to development sprawl. Thus, access management directly addresses the relationship of roads to development in a dynamic process that can respond continuously to specific development trends in individual communities, counties, or larger regions.

Access design characteristics along a roadway that directly impact traffic flow and safety include driveway and intersection location and design as well as location of signals, medians, and turn lanes. These design elements are controlled both by the authorities that design and construct roads, and local land-use regulators who manage the approval process for new development. Land use regulations are an administrative tool used at the local level to manage development and its associated access at its conceptual stage. The land use approval process allows local planners to envision how new development will integrate with existing land use and the impact it will have on the roads that will serve it. It also provides an opportunity for planning and zoning boards to project the cumulative effect of new driveways along a system of roads with each new development proposal. This paper explores how land use regulations (zoning, subdivision, and local ordinances) can be used as a tool for managing access and promoting goals for the future character of a community roadway system. It examines the legal framework, local regulatory options, and benefits and challenges of land use regulations as an access management tool.

LEGAL FRAMEWORK FOR ACCESS MANAGEMENT

Constitutional Foundation For Access Management

Every United States citizen has basic property rights that are protected through the Constitution. These provide the fundamental foundation for the authority of governments to regulate land use and its associated access. The Constitution provides that private property cannot be taken for public use without just compensation. This property right defines the degree to which governmental jurisdictions, state, county, and municipal, can regulate the use of land. The authority to oversee private property use is established through individual state enabling legislation for land use regulation, based on the concept of police power to protect public health, safety, and welfare. There are no national standards for land use regulation, and the authority established to regulate land use varies in character from state to state.

As part of basic property rights, each private landowner has an inherent right to reasonable access to his/her property from a public street and the right to limit access to his/her property by others. This right evolved through varied court cases in which abutting landowners experienced hardships caused by roadway construction. As early as 1839 a Kentucky court determined that streets should serve both the public and persons who owned land adjacent to them. The courts ultimately decided that property was 'taken' in a constitutional sense in cases when the government interfered with access to a public street by its actions. The right to access to an adjacent public street from private property was determined to be "appurtenant" to a lot. Consequently, the authority to regulate access is guided by those principles. The defining word in this context is 'reasonable'. Governments can control the location, design, and number of access drives to a property as long as the manner in which that control is applied still provides the property owner with reasonable access.

State-level Authority to Regulate Access

Generally, state-level authority to regulate access derives from the collective legislative acts in each state code detailing the powers and responsibilities of the state department of transportation. Overall, the state departments of transportation and/or highway departments have the authority to establish limited access highways and to regulate access to and from highways and other state routes. Several states, most notably Florida and Colorado, have adopted statewide access management codes that give the state broad authority to alter, relocate, or replace access on the state highway and route system. In addition, the Florida Department of Transportation (FDOT) has authority to enter into agreements with local governments to integrate state established access design standards within local land development regulations, making them applicable to development proposals for parcels accessing a state road. Conversely, some states such as Connecticut and Texas have a more constrained authority for control of access to state highways and no authority to enter into agreements with local governments with regard to access management.

LOCAL PLANNING AND REGULATORY TECHNIQUES

As noted above, the primary ability of state governments to regulate access is in relation to state highways and routes. The power to manage access on all other roads rests with county and municipal governments, primarily through their basic authority to regulate land development. This is particularly important because access management is first and foremost a local issue. The impacts of poor access design along any single roadway are felt locally in terms of inhibited access to businesses, accidents that affect residents' lives, delay and costs associated with congestion, and demands placed on police, fire, and ambulance services. The decisions made by municipal or county planning and zoning commissions regarding new development and its associated access have both immediate, short-term impacts in terms of roadway safety and congestion as well as long-term effects on patterns of development and overall performance of the roadway system. No state-level regulation of access location and design can, in the existing regulatory environment, address access design on all roads in any community, county, or region. Accordingly, the use of county and municipal land use regulations for access management not only complements state efforts for managing access by covering those roads not addressed in state programs, but provides direct benefits to the communities where it is applied.

County and Municipal Options For Regulating Access

The state codes that enable counties and municipalities to regulate land use vary widely and this in turn limits the powers granted to each governmental level with regard to access control. Generally, counties and municipalities have the authority to incorporate access management language into their zoning and subdivision regulations and to adopt driveway-related ordinances. While the range of authority granted by individual states to county and municipal governments to enact and implement land use regulations varies, the general structure of zoning and subdivision regulations nationwide have common denominators. Therefore, there is a commonality in the general manner in which local governments can integrate access management language into their regulations. The following description of how this can be done has general applicability nationwide.

The basic principle of access management is to reduce potential traffic conflict points. Roadway and driveway design objectives for implementing access management include:

- Separating vehicle turning movements from through movements
- Designing adequate corner radii at intersections and driveways,
- Designing driveway widths that adequately serve traffic flow and turning movements
- Providing adequate visibility for vehicles entering and exiting a driveway
- Providing sufficient stacking area for vehicles to wait in a driveway before exiting onto a street
- Providing sufficient stacking area for vehicles waiting to turn into a driveway from the street
- Providing sufficient distance between driveways and between driveways and intersections
- Accommodating vehicles other than cars such as trucks, buses, and ambulances

Local governments can address each of these objectives by incorporating access design goals into local planning documents, adopting a curb-cut plan for a specified geographic area, adopting access design standards and related language within zoning and subdivision regulations, and adopting ordinances to require permits for all driveways. Access goals and standards can be used to ensure that new development or redevelopment incorporates safe, efficient access design. Specific site development considerations relative to access design include:

- Limiting the number of driveways from a development onto a roadway, particularly for integrated developments where several parcels are consolidated
- Maximizing spacing between proposed driveways and in consideration of the locations of other existing driveways and intersections
- Providing joint or shared access for multiple properties where feasible and practical
- Providing cross access between properties where feasible and practical
- Limiting the number of long access drives to interior lots
- Reasonably projecting anticipated traffic volumes to be generated by a site
- Using turnaround driveways for residential lots

- Providing access onto the street with the lowest daily existing traffic volume for lots that have frontage on more than one street

It is useful to note that local planning and regulatory processes can be applied in either a formal or informal manner. A formal use of a planning or regulatory technique is one in which a plan, regulation, or ordinance is adopted by the governing body and/or its Planning and Zoning Commission by formal vote. It thus becomes part of the legal foundation for decisions made by those two bodies. An informal use of a planning or regulatory technique for access management is one in which access design guidelines are drafted to serve as reference materials in the local decision making process. Those individuals making applications for development permits or approvals are asked to follow the standards presented in the access design reference guide, but are not required to do so.

Local Planning Documents

In the local transportation planning process one implementation technique for access management is the establishment of a community policy for safe access onto streets. Transportation system planning in a community can take the form of a transportation section within the overall plan of development, a separate comprehensive transportation plan, and/or a capital improvement plan that includes priorities for implementing transportation projects. Access management can be incorporated as part of any one or all of these approaches.

Access management goals and objectives, when part of a formally adopted overall plan of development, are generally included as part of a future roadway/street circulation plan for the community. The roadway circulation plan will show, most often in map form, the location of all existing public streets, where new public streets should be located, and the functions each street is expected to serve. Goals for safe access are stated in terms of promoting the preferred roadway system plan. Alternately, access management can be included as part of a general transportation plan, one not formally adopted by a governing body. Instead, the county or municipal planning and engineering staff would use the transportation plan as a guide in their review of the adequacy of proposed developments affecting the roadway system.

Finally, the capital improvement plan for a community can include priorities for specific roadway projects which address locations with poor access design and which can improve local intersections or provide such features as turning lanes and medians.

A sample of a general policy statement for access management that may be incorporated into community planning documents would be:

The Town of _____ intends to manage the number, size, and location of driveways and access points and their relationship to any public street in order to promote the safety and convenience of travel and the orderly use of land and to protect the community character.

Curb-cut Plan

A curb-cut plan is a specific design for an identified roadway or roadway segment indicating what is considered by the community to be the ideal layout for all access points along that roadway. It is presented in a similar fashion to a site plan for future development. Generally, a curb-cut plan is designed for a roadway segment that has a need for improved access design and is in an area where future development pressures are expected to increase. A curb-cut plan can be used informally to express the goals of the community for design of a roadway or can be used formally as the standard against which all development proposals must be measured. The curb-cut plan can simply be placed on file in the county or town engineer's office and utilized as a guide to the evaluation of the suitability of access plans within development proposals. It can alternately be incorporated into the overall plan of development as part of the future roadway circulation plan. In this case it can be adopted by the governing body and become formal policy and part of the legal foundation supporting local regulatory processes.

A curb-cut plan can also be adopted as a part of the local zoning and subdivision regulations such that any application for zoning approval or subdivision approval must conform to the design laid out in the plan. However, the degree to which the curb-cut plan must be followed can be flexible. If a curb-cut plan is adopted and integral to local regulations, the language used can either require strict conformance with the plan or be phrased to allow more flexibility for applicants. A sample of flexible language for use of a curb-cut plan within local regulations would be:

To the extent feasible, all access proposed onto Route ____ is encouraged to be in conformance with the Route ____ Curb-cut Plan, hereby made part of and appended to these regulations.

Such language clearly indicates the intention of the Planning and Zoning Commission for access design for a specific roadway while allowing alternate designs that can achieve the same goals for safe, efficient access.

Zoning Regulations

Zoning regulations are established to control the location and suitability of development within a community. As a part of these regulations, the Planning and Zoning Commission may control any site development features that will impact the health, safety, and welfare of the community. Thus, access design is one aspect of site development that may be addressed within the zoning regulations. Any zoning language that addresses access would necessarily be a formal approach to access management in that its basis would be in law. However, there are a variety of options for the level of control exerted by the regulations. These can be grouped together in two categories. The zoning regulations can establish a specific Access Management Overlay Zone, or they can include language establishing access design standards applicable to all proposed development in the community and integrated throughout the regulations. These two zoning approaches are discussed below.

Access Management Overlay Zone - An Access Management Overlay Zone can be established as a specific geographic area of the community within which specific access design criteria apply. Generally, this geographic area would be centered along a roadway in the community of particular concern for future development. A curb-cut plan can be incorporated within an Access Management Overlay Zone. Thus, the access design reflected in the curb-cut plan becomes the access design requirement for development within the Access Management Overlay Zone. If a curb-cut plan is not applied in the Access Management Overlay Zone, general access design standards can be adopted specifically for the area covered by the zone.

The benefits of using an Access Management Overlay Zone is that stringent access design standards can be applied where the need is greatest without adding undue regulatory burden on development throughout the entire community. The drawback to use of an Access Management Overlay Zone exclusively as a means of access management is that safety may be compromised on other roadways in the community by unanticipated development trends. Again, zoning language for conformance with standards for access design within an Access Management Overlay Zone can be made flexible such that as each unique development proposal is presented, the Planning and Zoning Commission and the developer have the ability to arrive at the most appropriate access plan. A sample of flexible zoning language implementing access design requirements within an Access Management Overlay zone would be:

The Route___ Access Management Overlay Zone is established in order to promote the orderly development of land uses along Route___ as a unique Major Arterial roadway in the community. A curb-cut plan for access design has been drafted for this area which depicts the optimal spacing and design of access points onto Route___ in support of future development and to protect the integrity of traffic safety, capacity and flow on the roadway. All development within the Route ___ Access Management Overlay Zone shall conform to the curb-cut plan to the extent feasible and practical.

Such flexible language should be accompanied by additional language that describes how the Planning and Zoning Commission will determine whether a proposed access design that does not strictly conform to the curb-cut plan can meet their goals for safety and convenience.

Integrated Language for Access Management - If a community chooses to integrate access design standards and related supporting language for access management throughout the zoning regulations, there are four specific areas where access issues can be efficiently addressed. These sections may include: the Statement of Purpose, the Definitions, general Access Management section (which could follow parking regulations), and Site Plan Review requirements. While it is possible to address access in some but not all of these areas (e.g. adopt access design standards but not adopt a general statement of policy in the Statement of Purpose section), the strongest legal foundation for control of access related to land development would be to include access management language in all four of these sections of the regulations. Access management provisions as can be used in each of these four sections is detailed below.

The Statement of Purpose is a section used as a preface to the zoning regulations and restates the intent of the community to protect the general health, safety, and welfare of its citizens. It reinforces the legal foundation for the regulatory language that follows. The Statement of Purpose is often listed in an itemized format to include issues of particular concern in the community such as water quality, compatibility of land use and the like. If safe access is an important issue to be addressed in the regulations, reference should be made to the purposes of access management in the Statement of Purpose section.

Most zoning regulations also include a Definitions section that clarifies how terms are used within the regulations. Terms such as ‘lot coverage’ or ‘accessory building’ can be subject to a variety of interpretations. In addition, terms such as ‘non-conforming use’ are unique to each community and each set of regulations. There may also be terms such as ‘interior lot’, which have applications for land use as well as for access management. The use of such terms in the context of each may vary somewhat. Therefore, all terms used in reference to access design features should also be defined clearly within the regulations.

It is common for zoning regulations to include a section titled Supplementary Regulations that covers issues relevant to all land uses regardless of the zoning classification. These can include parking requirements, sign restrictions, landscaping requirements, and erosion and sedimentation control measures, among others. A general section with access design requirements can also be included as a separate subsection within the section containing supplementary regulations. While an Access Management Overlay Zone provision may be included in the zoning regulations to address the need for safe and efficient access design for a single roadway or roadway segment, a separate, comprehensive set of access design standards within a general Access Management subsection of the regulations would set criteria for access design for all roads in a community. Such an Access Management section would specify that all access must be designed for the safe and convenient flow of vehicle and pedestrian traffic. Any references to access design standards or an access design manual and/or a curb-cut plan could be included here. A sample table of access design standards is as follows:

Sample Table of Access Design Standards For a Suburban Arterial Road

Minimum Spacing Between Roadway Intersections	1,320 feet (4 per mile)	
Optimum Spacing for Signalized Intersections: (Where typical signal cycle length is 70 seconds) ¹		
When the Speed Limit is:	Signalized intersection spacing should be:	
30 mph	1,540 feet apart	
35 mph	1,800 feet apart	
40 mph	2,050 feet apart	
45 mph	2,310 feet apart	
Spacing of Access Drives/ Curb-Cuts	When Speed Limit is:	
Minimum Spacing Needed to:	<u>30 mph</u> <u>45 mph</u>	
Prevent Right Turn Overlap Conflict	100 feet300 feet	
Maintain Through Traffic Speed within 15% of Posted Speed Limit	375 feet700 feet	
Provide Maximum Egress Capacity at Curb-Cuts	320 feet860 feet	
Driveway Spacing by Type of Traffic Generator: Based on Projected Driveway Volume/ Average Daily Traffic (ADT)	Distance from Nearest Intersecting Road or Driveway	
< 500 ADT	50 – 60 feet	
500 – 1500 ADT	100 – 400 feet	
> 1,500 ADT	300 – 800 feet	
Corner Clearance for Minor Arterials Flowing Onto Arterial	400 ft. Upstream, 350 ft. Downstream	
Minimum Stopping Sight Distances for Vehicles on an Arterial	200 feet (30 mph) to 400 feet (45 mph)	

Source: Transportation Research Circular Number 456, Driveway and Street Intersection Spacing, Transportation Research Board, March 1996, NCHRP Report 348, Access Management Guidelines for Activity Centers, Transportation Research Board, 1992

¹ Optimal spacing is directly proportional to signal cycle length and speed limit.

As can be noted in the table above, the access design standards should be relative to the type or function of road being accessed. Where driveways may be safely spaced 50 feet apart on a residential road where drivers travel less than 30 miles per hour (mph), this would not be appropriate for a major arterial road lined with retail businesses where traffic travels 45 mph or more. Therefore, the access design standards should be linked to the character of the roadways with different standards for different roads.

The definition of roadway character and function is usually represented by a roadway classification system. This classification system would categorize streets based upon such

features as number of lanes, the character of traffic flow (whether through or local, for example) and the speed at which traffic is expected to travel. The roadway classification system can be included in the General Access Management subsection of the zoning regulations and/or in local planning documents. If a roadway classification system were included in the local transportation plan or overall plan of development, it should be referenced in the zoning regulations.

A general Access Management section could also provide for incentives to developers for providing the most beneficial access design possible. For example, this section could establish the authority of the Planning and Zoning Commission to waive certain landscaping or signage requirements, reduce parking requirements, or to allow greater use of land area for buildings if the access design for the site provides for improved traffic flow and safety over current conditions. Finally, this subsection could require or encourage all existing unsafe access designs to be remedied whenever re-use or expansion of an existing site is proposed.

While a general subsection on access requirements sets the criteria for design of access from proposed developments, the Site Plan Review section can establish criteria for access information displayed on the site plan and/or in a traffic impact report to be provided to the Planning and Zoning Commission so that they may adequately review a proposal. A traffic impact report is generally one that evaluates existing traffic conditions on roadways adjacent to the proposed development site and estimates the impact of traffic to be generated by use of the site. The Site Plan Review section is also a place in the regulations which provides an opportunity for the Planning and Zoning Commission to require review of an application by professional county or town staff and others as an aid in their decision making process. If the zoning regulations do not include a direct set of standards for access design, the Site Plan Review section can be the section where the zoning regulations refer to a manual of access design criteria which will be used by the county or municipal professional staff in reviewing an application for its adequacy.

Subdivision Regulations

Most state statutes provide the authority to counties and/or municipalities to control the subdivision of land, but limit that authority according to a state definition of what constitutes a subdivision. Therefore, most subdivision regulations have a similar format. Local subdivision regulations generally establish the authority of a jurisdiction to control the subdivision of land and promulgate design standards for proposed subdivisions, including those for access and streets.

The purpose of addressing access management within subdivision regulations is to control the potential proliferation of access points along a roadway resulting from the division of undeveloped land not accompanied by a specific land use proposal and thus not covered under the zoning regulations. In addition, access management language within the subdivision regulations can control the impact of proposed new streets in relationship to the existing public roadway system. Finally, access management language within the subdivision regulations can control the relationship of new development to adjacent undeveloped land. The access drives and streets within a new subdivision can be required to be designed such that future development

of adjacent parcels may be connected to them without undue burden on the existing public roadway system.

Access management can be addressed within the subdivision regulations in the same ways in which it can be addressed in the zoning regulations: in the Statement of Purpose, in the Definitions section, in the Site Design Criteria, and in the Site Plan Information requirements. The Statement of Purpose for the subdivision regulations can include a statement that one purpose is to promote the safe and convenient flow of traffic to and from development onto the roadway system. The Definitions section can include terms as they are used in the context of access design including a roadway classification system for existing as well as proposed streets. The Site Design Criteria section can include access design standards and/or a reference to a curb-cut plan and/or reference to an access design manual. Finally, the Site Plan Information section can require that specific information relating to existing and proposed site access be included on the site plan and/or presented in a traffic impact report.

Local Ordinances

While the zoning and subdivision regulations are promulgated to control land use in the community, they are not intended to create an unreasonable regulatory burden for property owners. These regulations are composed therefore, to address primarily larger scale development as opposed to the construction of a single-family home on an existing residential lot or construction of a small retail business on an existing retail parcel. Uses such as these are commonly required to obtain a simple zoning permit showing compliance with the regulations and a building permit. However, as each single parcel is developed with its individual driveway, the number of access points onto a road increases, which can result in a proliferation of driveways in close proximity to one another, thus creating unsafe roadway conditions.

Many communities have a local ordinance that requires a permit for any new driveway. The purpose is generally to ensure that the physical layout of the driveway is compatible with the existing roadway geometry and storm water drainage. The property owner is often referred to the county or municipal engineer for review and consultation on driveway design. The local driveway ordinance can also be used as a means to control the location of a single access drive from a single property not otherwise covered by the land use regulations of the community. A local ordinance can require that a permit be acquired for all new driveways and that the proposed layout of the driveway be approved by the Engineer's office. The County, City or Town Engineer should have access design standards on hand to use as a guide in determining how individual driveways should be located to avoid the proliferation of single driveways onto a roadway.

Challenges and Benefits of Using Land Use Regulations for Access Management

The benefits of using land use regulations as an access management tool are outlined above and essentially derive from the cumulative, long term effect of carefully managed access design within new development or redevelopment on a system of roads. Benefits are felt in quality of life for residents and enhanced local economic stability supported by an effective transportation system. However, challenges also arise from the long-term nature of the access management

process. In order for any land use management regulations to be effectively administered, there must be strong understanding of their limitations and potential by local professional staff that oversees the development application process as well as Planning and Zoning Commission members. Planning and Zoning Commission membership changes on a regular basis, as do county and municipal staffs. Access management language in any local regulations and ordinances must be clearly stated to be useful to individuals new to its intent and applicability.

The addition of access management language to land use regulations will, necessarily, create a new layer of regulatory review. When development proposals are evaluated by local planning and engineering staff, and subsequently by local Planning and Zoning Commissions, each individual in the review process will need to be aware of the access management requirements and understand how to 'read' access design as part of a site plan. This presents varying degrees of burden for county and municipal governments depending on the character of their commissions and staff resources available.

Nearly everyone involved in the local development approval process would agree that to some extent it is a negotiation process between developer and community. The developer wants to make the most profitable use of his/her property and presumably also wants to meet the letter if not the spirit of regulatory requirements. In turn, communities are not necessarily adverse to new development, but want to encourage economic development that enhances their stability and character. Where these two objectives meet is where some level of negotiated agreement often occurs.

It is not always readily apparent how efficient, safe access design as envisioned by the community will also contribute to the economic viability of a development. It is incumbent on local governments to discuss this potential benefit with both the developer and the community at large in the course of public hearings for development approvals. This will facilitate the decision-making process for everyone involved. At the same time, when a developer provides an access design that provides roadway system benefits beyond those required by the regulations, local government should also be prepared to 'negotiate' some return benefit. Such a system of incentives for good access design can be incorporated into the regulations but can be complex to administer, be sensitive to mismanagement, and can lead to the appearance of unequal treatment of applicants under the law. While an incentive system can be effectively applied, there are arguably few planners, engineers, and commissions trained with the skills necessary to implement this facet of achieving good development design. So, while static access design standards may not always provide the best access layout for every parcel of land, providing for flexible access design and a system of incentives also presents challenges for communities.

Equally important is the fact that when any standards are incorporated in land use regulations for access design, this necessarily creates non-conforming properties. That is, there will be properties on which driveways do not meet required spacing or location requirements at the time the regulatory language is adopted. Therefore, when access design standards are adopted within zoning regulations, there must also be provisions for how non-conforming driveways will be treated and for retrofitting them as the opportunity arises. In many, many areas of the country where poor access design contributes to congestion issues, and development is already very intense, the retrofitting of any single driveway location on a property-by-property basis is

particularly challenging. Local governments must be prepared to seize opportunities for retrofitting when property redevelopment or improvements are proposed.

Final Thoughts

Land use regulations are one tool among many for implementing access management. While the challenges for using this tool can be substantial, the unique contribution that the regulation of access design offers long-term makes their use fully worthwhile. Simply stated, land use regulations for access management are foremost about providing opportunities for careful review of proposed new driveways as part of a development proposal. If the location and design of driveways are managed in the context of surrounding land use, there will be a beneficial effect over time that is difficult to achieve through other means. There are many players in the land development approval process and somewhere along the line one or more of those players should be considering the relationship of proposed access in the context of existing access and roads and communicating that to decision-makers. This highlights the need for professional engineers and planners to be educated about regulatory language for access management and to have a hands-on approach to the development process and to the implementation of access management in particular.

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**Development of an Access Management Guidebook
for Local Units of Government
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Introduction:

In July of 2000, the Michigan Department of Transportation began efforts to assemble an Access Management Guidebook for use by local units of government in a cooperative effort with state, county and city transportation agencies. The following paper will explain the rationale for assembling a guidebook, a brief overview of how this document was developed, the contents of the document and finally how this document has been introduced to representatives in local units of government.

Why an Access Management Guidebook?:

1. The Michigan Political Climate

The rationale for an access management guidebook was based on a series of events and conditions that existed or developed within the State of Michigan over the past four years. The first is the political climate of Michigan government, the second is the organizational structure of the Michigan Department of Transportation, thirdly changes that occurred in the financial and road condition picture in Michigan and finally the general need to educate and secure local agencies as partners within the access management effort.

Michigan is a strong “Home Rule” state which has developed with the establishment over 1,800 units of local government. These includes counties, cities, villages and townships. Land use legislation, enacted based on national models from the 1920's and 1930's, permits each of these units of government to exercise local planning and zoning authority. To-date, over 1,300 units have chosen to exercise, which is second in number only to the State of Pennsylvania and three to five times more than in most states. It's also notable that Michigan legislation that authorized these units of government to engage in land use planning and zoning was done independently for each tier of government. Land use planning between the levels of government is not necessarily consistent in its realm of control nor is it required to be coordinated.

Individual units of government, have largely planned and zoned independently and there are no sanctions for not coordinating with neighboring agencies. Within metropolitan areas, Section 134 of Title 23 of the U.S. Code requires a comprehensive, continuous and cooperative planning effort for transportation planning. This section does not require a coordinated effort with regards to land use development and site plans, but coordinated efforts for access management are encouraged.

Regional planning agencies were established in the 1960's in hope that intergovernmental planning would take place and that wise land use and infrastructure decisions would precipitate from planning efforts conducted by these agencies. Some successes in the transportation arena have occurred through this program, but there are no penalties on local agencies for any marginal performances or “lip service” efforts.

More recently, the Michigan Legislature debated legislation to repeal four separate planning

enabling acts and replace them with a single statute that would require counties, cities and townships to coordinate the preparation of local plans and follow the same procedures. That effort failed to result in a unified act but did result in legislation that requires new intergovernmental cooperation when plans are prepared or amended.

Intergovernmental cooperation between local units of government regarding land use development has been a nemesis for many years. However, in the area of access to and from roadways, there may be even less intergovernmental cooperation due to the perception that the right-of-way line is a line of demarcation between government responsibility.

Very often communities do not administer access management within their zoning regulations as they perceive that to be the responsibility of the Michigan Department of Transportation or the county road commission. As a result, they fail to consider the traffic impacts that development will have on the roadway and only consider other infrastructure issues.

In turn, the road agency representative generally reviews the site plan only for the location and design of the requested driveways. Seldom do elements like site plan layout and site circulation patterns receive road agency comment. As a result, many site plans have been approved and driveway permits granted without a complete and comprehensive evaluation of traffic impacts, need or justification for the number of driveways requested or an analysis of site plan circulation impacts on roadway operations.

2. The Organization Change of MDOT

During the past five years the Michigan Department of Transportation has gone through an organizational change which focused on being more responsive and “customer friendly”. The organization was originally organized so that the primary decisions on the highway construction program were managed through its central office in Lansing, Michigan. There were nine district offices established which were responsible for routine maintenance of the highway system and for construction inspection. In 1997, there was a change in organizational philosophy and movements were made to decentralize some of the financial and design programs.

The organization was changed with the creation of seven regional offices and 26 transportation service centers. A transportation service center services up to a five county area. Each is assigned the responsibility of monitoring the condition of the roadways, and developing a reconstruction and rehabilitation program that would achieve statewide maintenance goals. The driveway permit process was transferred from a nine district office function into a 26 transportation service center function. This also meant recruiting new and additional staff members to serve as permit engineers/agents. It also meant new faces and additional training sessions for the program, and a hope for statewide consistency within that process.

An added challenge occurred when the Governor of Michigan announced an early retirement program during the time when MDOT was in the middle of its transition from a central control to one where control was dispersed to service centers. Early retirement incentives resulted in a reduction of 17% of the senior staff within MDOT. Under an Executive Order from the Governor,

only 25% of the vacancies from early retirement could be filled with “new hires”. Many of the nine permit engineers and agents were able to seek advancement within the organization and with the expansion of those positions from 9 to 26, many new faces were added to the MDOT driveway permit program.

The political climate and the MDOT organizational structure were underlying factors that made the development of an access management guidebook a MUST. However, MDOT had been promoting access management prior to its internal changes and that was another reason to establish a guidebook.

3. Change in Statewide Road Strategies:

In January of 1997, the State of Michigan ranked 44th in the nation in the state fuel tax collected per gallon while being the 8th largest state in the nation. Its revenue resources were low and its highway system was beginning to reflect the results of marginal revenues. It was during that same year that the Michigan Legislature increased the fuel tax by 4 cents, to 19 cents per gallon. Subsequently in 1998, there was an increase in the amount of federal funding being returned to Michigan. Since Michigan’s road revenue was limited for nearly a decade, much of its system needed immediate maintenance attention.

Total revenues nearly doubled MDOT began assembling a 10 year program to re-establish its road system so, at minimum, 90 percent of the road system would be in good or fair condition by the end of year 2007. This meant a focused effort on the Department’s Road Reconstruction and Rehabilitation (R&R) program. To maintain that focus and to make the public aware of this effort, MDOT publishes a five year Road and Bridge Program.

In order to accomplish its goal, MDOT is channeling 90 percent or more of its revenue into road and bridge rehabilitation with 10 percent or less being authorized for capacity improvements. As a result of this policy, it became evident that access management must be emphasized even more strongly in order to preserve existing arterial capacity, improve safety features and stretch road improvement dollars even further.

With 1551 units of local government being directly served by state trunkline facilities and with nearly 1,300 units of government maintaining authority for land use planning and zoning, it became evident that initiating coordinated access management between MDOT, county road commissions and local units of government was imperative. Thus, Michigan began a program of Access Management education.

4. The Need for Local Government Guidance:

In 1996, the Michigan Department of Transportation published a booklet entitled, “Improving Driveway and Access Management in Michigan”. This was a twelve page educational booklet intended to introduce local government officials to the concept of access management and the need to incorporate the concept into their local planning programs, in cooperation with State, County and City transportation agencies.

In addition to the booklet, MDOT began conducting educational seminars in cooperation with the Michigan Township Association and several land use planning organizations. However, with the increase in motor fuel revenues, the education program was viewed as essential. Therefore, in Year 2000, MDOT sponsored a dozen three hour seminars around the state with an attendance exceeding 500 persons. The program presented the benefits of access management, gave illustrations of the many roadway and/or land use control techniques available and identified several Michigan communities which had instituted corridor and community-wide access management programs. Even with this material, many participants were requesting more “hands-on” material that they could use, specifically the process by which they could develop corridor access management plans and the development of corresponding zoning ordinance language. These requests were significant enough in number that MDOT developed a work plan and set aside funding to develop a guidebook to assist local officials beyond the seminar program in hope that local agencies would partner with MDOT, County and City transportation agencies to establish better control of roadside development and access between the roadway and that development.

In 2000, immediately following the 2000 National Access Management Conference, the Michigan Department of Transportation began working with the consulting firm, the Planning and Zoning Center, Inc., of Lansing, Michigan to outline the contents of a guidebook and the process through which this guidebook would be reviewed and approved.

Developing the Access Management Guidebook:

1. Multi-discipline Input through Committees:

It was essential that a cross-section of interests be represented within the development process of the guidebook’s content and format. Three committees were formed for that purpose. The first committee was a statewide overview committee composed of MDOT staff having a background in the driveway permit process along with the highway development program/process. In addition, that committee contained representatives from outside MDOT who provided guidance on land use planning and zoning issues, provide a local/county government perspective, an insight on metropolitan planning and a county road agency perspective. A 14 member committee was created which contained seven MDOT representatives split between the central Lansing office and the seven MDOT region offices. The other seven members of the committee included a director-manager from a county road agency, a director of a township planning commission with an active access management program, a township board member, an administrator of a metropolitan planning commission and several land use planning consultants with access management experience.

A subcommittee was also established. The subcommittee reviewed geometrical and spacing specifications that were to be included in the guidebook to assure they met, at least, specifications and/or guidelines that had been established by MDOT. This committee was composed of seven MDOT staff that were associated with or members of the Traffic & Safety Division of MDOT.

A third committee composed of national access management experts, was created. Individuals

sought for this committee were persons who were working on the National Access Management Guidebook. Four individuals were secured who provided various perspectives on access control based on personal experience, and were also aware of the elements being included in the national guidebook.

Originally the guidebook was to focus on land development issues and how they impact or influence the traffic operations on the highway system, methods and procedures in developing overlay or corridor access management plans, the importance of interagency cooperation and finally, sample access management ordinance language. However, the statewide committee felt it was important to identify common traffic problems which relate to access and possible options to remedy those options based on common traffic engineering and land use planning techniques. Through the discussions and recommendations of the committee, the guidebook was expanded from five chapters to one which now contains nine chapters.

2. Guidebook Organization:

The guidebook was developed with six principal purposes;

1. Identify and explain the role and benefits of access management in contributing to solutions of common traffic problems.
2. Present a set of access management principles to serve as a foundation for effective access management techniques on both developed and undeveloped corridors.
3. Provide a description of effective access management techniques for a wide variety of situations.
4. Identify the steps to prepare an access management plan and access management regulations by local governments in Michigan.
5. Describe the desired relationship between the Michigan Department of Transportation (MDOT) and county road commissions with local governments on access management issues.
6. Describe how guidebook readers can make a difference on common access management issues in their communities.

Using these principles as a basis for development, the guidebook was then divided into three parts; the first part to address common traffic problems and to identify possible solutions using road geometry, traffic operations and/or site plan techniques. The second part of the guidebook addresses the land use/transportation planning process and how plans can be developed with an access management element within a comprehensive Corridor plan or a specific Corridor access management plan. Those plans are then implemented through a well defined ordinance which delineates access controls along the Corridor. The following is a listing of the three parts to the guidebook and the chapters contained within those parts;

Part I - Common Problems and Solutions

Chapter 1 - Common Traffic Problems

Chapter 2 - The Relationship Between Access and Roadway Function

Chapter 3 - Design Techniques to Solve Common Traffic Problems

Chapter 4 - Local Regulatory Techniques to Solve Common Traffic Problems

Part II - Model Plans and Ordinances

Chapter 5 - Coordinating Permit and Access Management Decisions Between State, County and Local Agencies

Chapter 6 - A Model Planning Process for Developing an Access Management Program

Chapter 7 - Access Management Plan Elements

Chapter 8 - Sample Access Management Ordinances

Chapter 9 - Next Steps

Part III - Bibliography and Appendices

Distribution and Training in the Use of the Guidebook:

1. Pre-publication Training:

Since the guidebook focuses on both the highway elements of access management and also the corresponding land use development elements, a comprehensive training program on the guidebook was necessary. As an MDOT publication, it was obligatory that MDOT staff receive advanced instruction into the purpose, principles and content of the guidebook. Therefore MDOT distributed copies to central office staff in Lansing, to the seven regional offices and to the 26 transportation service centers. Arrangements were made for four training sessions at which recipients of the guidebook could receive a 3 hour overview of the guidebook and the importance of partnering with local units of government. MDOT staff needed to clearly understand that with a corridor access plan adopted by local units of government, in cooperation with MDOT, that elements like driveway spacing, requirements for shared driveways and cross-access between properties could be part of the plan. Then one of the sample ordinances in the guidebook could be used as the tool through which the plan becomes reality.

A second group was also provided training. With nearly 1,300 units of government having land use and planning authority, many of these local agencies rely on land use planning consultants to aid them in the development and implementation of their plans. That being the situation, MDOT contacted 24 land use planning consulting firms having their primary offices within the state. These firms were invited to attend a similar program as was presented to MDOT staff. This advance review of the guidebook gave them knowledge of its contents and provided them a first hand opportunity to raise questions about any of the techniques, methodologies or wording within the text. In addition, those firms gained enough knowledge that they promote access management among those clients who had not broached the subject or had not made an effort to include access management within their local plans. By participating, they also became eligible as guidebook trainers and to receive request for proposals for future MDOT sponsored joint access management plans.

The staff from consulting firms were also informed that MDOT was sponsoring, through a working agreement with the Michigan Society of Planning, a series of ten access management workshops, for local planning officials or staff.

2. Local Government Introduction and Training in the Use of the Guidebook:

Distribution of the guidebook was a item that was given some consideration before a decision was made. After some thought and discussion with the Michigan Society of Planning (MSP), it was decided that a training program on the guidebook could best be implemented through the MSP for several reasons; 1.) MSP has nearly 4,000 members from local planning commissions and staff members and 2.) MSP conducts regular training sessions on many planning and zoning topics each year and therefore has the experience in organizing and delivering training programs.

MDOT , in a work agreement, requested that the MSP reproduce copies of the Access Management Guidebook and then arrange and advertise the 10 Guidebook training sessions which were held around the state. Each training session included a 3 hour overview of the content of the guidebook, followed by an interactive workshop during which participants were given questions to answer based on techniques and methods outlined in the guidebook. Finally, the workshop session provide would provide participants the opportunity for local agencies to assemble by a common geographic area and discuss where access management needs within their areas. They were asked to identify prime access management corridor opportunities and determine their priority. This process included MDOT Region/TSC personnel and county road commissions from those areas.

Access Management Workshops were offered in the following communities:

7. Lansing - December 11, 2001
8. Traverse City - January 8, 2002
9. Grayling - January 9, 2002
10. Flint - January 10, 2002
11. Clinton Township (North Detroit Suburbs) - January 22, 2002
12. Ypsilanti - January 23, 2002
13. Mt. Pleasant - January 24, 2002
14. Lake Michigan College, Benton Harbor - January 29, 2002
15. Grand Rapids - January 30, 2002
16. Escanaba - April 9, 2002

Assessing the Success of the Access Management Guidebook and Training:

The ten access management workshops had an attendance of 422 participants from various organizations around the state. Because the workshops were concentrated within a short time frame there were numerous situations where participants traveled considerable distance in order to attend a workshop that would fit within their schedule. Table # 1 below provides the general distribution participants by the type of agency and/or firm they are associated.

Table # 1
Michigan Access Management Workshop

Attendance by Agency

	<u>Agency</u>	<u>Attendance</u>
1.	State Agencies	34
2.	Region Planning & MPOs	30
3.	County Planning & Road Agencies	39
4.	City & Townships	255
5.	Educational Institutions	25
6.	Developers or Consultants	39
	Total	422

MDOT Sponsored Corridor Access Management Plans:

1. The Program Organization and Funding

The development, publication and distribution of the Access Management Guidebook was considered to be an important endeavor within MDOT. However, with the MDOT construction program focused on maintenance and reconstruction/rehabilitation of the highway system, a means of preserving the capacity of state highway arterials was also a concern. The guidebook should provide the proper instruction to local agencies in partnering with MDOT, but MDOT felt there needed to be an added incentive. Therefore, MDOT developed a Corridor Access Management Program funded with Federal-State Planning and Research revenue.

The program, initially funded for fiscal year 2002, contains \$500,000.00 which is intended for statewide use. Each of the seven MDOT region offices were notified of the fund and were encouraged to submit one corridor proposal. However, if supplemental funding was provided by local units of government, then a Region could propose more than one corridor be established within this program. There were criteria established which help select the final list of corridors which would be funded under this program. The corridors submitted must be corridors where capacity improvements are programmed and MDOT would like to preserve the future operations of any reconstruction and widening projects or the route is nearing its capacity limits and it can be demonstrated that access management would extend the time frame to when the route would need additional capacity.

Supplemental funding was another factor considered in the selection of a corridor along with the length of the segment to receive an access management plan and the number of local units involved in the effort. Each segment submitted for funding must also have a local resolution of support that each and every agency along the corridor segment was supportive of the access management being planned along the corridor.

The funding within this program was intended to provide each of the seven MDOT Regions with at least \$50,000 to \$60,000 for Corridor access management planning.

2. Response to the Corridor Access Management Planning Program

The following is a list of the proposed corridor access management studies which are being developed by the Michigan Department of Transportation. The studies are being developed in cooperation with the local units of government which abut these routes. In some instances the study goes beyond access management and may include the development of other ordinances; i.e., sign regulations, landscaping of the roadside, provisions for non-motorized facilities or even the control of land use categories. Any element beyond access management becomes the financial responsibility of the local unit of government.

Each MDOT Region is provided the opportunity to submit a proposal. A Region may submit more than one proposal if there is local funding or if the total funding of all the proposals does not exceed the designated limit of \$70,000. Some Regions have not submitted a corridor study as they have multiple corridors that are being considered and need to resolve the priority and assess the local commitment to the study and the enforcement of the final plan.

Access Management Corridor Planning Studies

<u>Region</u>	<u>Trunkline</u>	<u>Location</u>	<u>Approximate Distance</u>
Bay	M-84	Bay-Saginaw Counties	10.5 miles
SW	To be determined		
Metro	To be determined		
Superior	US-41	Chocolay Twp	8 + miles.
University	M-43	Meridian Twp line to M-52	8+ miles
Grand	M-104	Ottawa County	7.3 miles
North	US-131	Wexford County	6.0 miles
	US-31	Manistee to M-22	4.0 miles
	M-55	Houghton Lake	9.0 miles
	M-32	Alpena	
Total	\$438,200		

Establishing a Local Corridor Preservation Program: Insights From Florida

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ESTABLISHING A LOCAL CORRIDOR PRESERVATION PROGRAM – INSIGHTS FROM FLORIDA

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INTRODUCTION

Corridor preservation involves the coordinated application of measures to prevent or minimize development within the right-of-way of a planned transportation facility, as well as access management measures to preserve the safety and efficiency of roadways. Such measures enable government agencies to provide a transportation system that will serve existing and future development within a local community, region or state.

Effective corridor preservation provides numerous benefits to communities, taxpayers and the public at large. Yet most communities lack a systematic program for preserving right-of-way and managing access. In addition, a variety of legal and practical questions continue to surround corridor preservation practices. This paper explores right-of-way preservation issues and practices in Florida, right-of-way preservation and access management strategies, and techniques for addressing legal and property rights concerns.

Benefits of Corridor Preservation

Preserving right-of-way for planned transportation facilities promotes orderly and predictable development. As communities grow and metropolitan areas expand, land must be set aside for the transportation infrastructure needed to support development and to maintain a desired level of transportation service. The decisions each community makes regarding the location and design of this transportation network will have a lasting impact on growth patterns, community design, and modal alternatives. For these reasons, effective corridor preservation is critical to accomplishing a wide range of community planning objectives.

Another obvious benefit of corridor preservation is that it minimizes damage to homes and businesses and the corresponding costs of acquiring right-of-way when improvements are made. Right-of-way costs often represent the single largest expenditure for a transportation improvement, particularly in growing urbanized areas where transportation improvement needs are the greatest.

Corridor preservation also reduces adverse social, economic, and environmental impacts on people and communities. The social and economic costs of relocation can be high for some communities, particularly low-income, ethnic, or elderly populations and small businesses that cater to a local population. In addition, where viable transportation corridors are foreclosed by development, roadways may need to be relocated into more environmentally sensitive areas, thereby increasing adverse impacts on the environment.

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The private sector benefits from greater clarity of public intentions regarding the location and timing of roadway improvements and the desired level of access control. This reduces the risk associated with timing and phasing of development projects. Advanced notice of public corridor preservation intentions also enables developers to plan projects and site-related improvements in a manner that is more compatible with the planned transportation functions of the corridor.

Contemporary Challenges

Although transportation infrastructure is necessary for urban development, preserving right-of-way for future projects is difficult in today's development environment. Citizens and stakeholder groups have substantial power to block or delay a transportation project and may choose to exercise that power for a variety of reasons. These reasons range from neighborhood or environmental concerns to protection of property rights. Given such volatile and potentially conflicting concerns, common ground can be difficult to find and legal challenges are not uncommon. Adding to the tension is the potential for inconsistencies in the transportation planning objectives of the state, metropolitan planning organization, and local governments.

Legal and political concerns have caused many agencies to take a conservative approach to right-of-way preservation that focuses on widely accepted or less controversial methods. The most accepted technique is fee simple purchase of land for transportation right-of-way. Most local agencies also employ basic policy tools, such as building setbacks from road rights-of-way, and many have subdivision regulations that provide for dedication of local subdivision roads. Many local agencies also attempt to obtain voluntary donations or dedications of right-of-way for planned improvements during the land development process.

However, a variety of other tools are available to preserve right-of-way and mitigate hardship on property owners. These include land banking, regulatory controls, options to purchase, purchase of development rights, density credits, and interim use agreements. What is lacking in most communities is a systematic program for preserving right-of-way and managing access that uses the full range of governmental powers and tools to their maximum advantage. The Florida experience reveals the importance of a systematic, proactive approach to corridor preservation that is grounded in local comprehensive plans and codes.

THE FLORIDA CONTEXT

In 1988, two important laws were enacted authorizing the Florida Department of Transportation (FDOT) to take a lead role in right-of-way preservation and access management for the state highway system. The access management legislation directed FDOT to establish a comprehensive access management program for the state highway system – a program that is still active today. The “Transportation Corridors” legislation authorized FDOT and local governments to designate transportation corridors for protection by recording an official map. Local governments were then required to withhold development permits in the mapped corridors for a five-year period through a centerline setback requirement.¹

In 1990, the Florida Supreme Court ruled that the right-of-way reservation provisions were unconstitutional and a violation of due process, *Joint Ventures v. Florida Department of Transportation*, 563 So. 2d at 625, 626 (Fla. 1990). One reason was the onerous nature of the five-year blanket moratorium on development within mapped rights-of-way, which could be extended for another five years without a purchase commitment from the State. In addition, the

stated purpose of the statute was to freeze or otherwise hold down land values in anticipation of condemnation. FDOT had also argued that allowing development permits to be issued in mapped rights-of-way would increase the cost of future land acquisition if the state were to initiate condemnation proceedings.

Weighing eminent domain law and the potential 10-year reservation period with no purchase commitment, the Court concluded that the statute was “a thinly veiled attempt to acquire land by avoiding the legislatively mandated procedural and substantive protection” and a deliberate attempt to “depress land values in anticipation of eminent domain proceedings.” The decision resulted in a halt to FDOT corridor protection actions, as alternatives were explored.

In 1993, another landmark corridor preservation case was decided by the Florida courts, with decidedly different consequences. In *Palm Beach County v. Wright*, the Florida Supreme Court was asked to consider whether a County’s thoroughfare plan map and policies were also unconstitutional. The thoroughfare plan was adopted as part of a local comprehensive plan, under the requirements of the Florida Growth Management Act. Any land use activities in the mapped corridors that would impede development of the future transportation network were prohibited by the comprehensive plan.

The Court upheld the constitutionality of the County thoroughfare plan map, distinguishing it from the state official map in *Joint Ventures* for several reasons. These included the following:

- Adequate transportation facilities must be provided concurrent with the impacts of development under Florida law (concurrency)² and this avoids the need to curtail development, thereby benefiting affected property owners;
- The map has a foundation in a state mandated comprehensive plan, which includes objectives for right-of-way preservation, consistent with Rule 9J-5 of the Florida Administrative Code;
- By meeting the statutory objectives of planning for future growth and development, the thoroughfare plan map is an invaluable planning tool and a proper subject of the police power; and
- Local governments may amend their plan twice per year under Florida law and this provides flexibility for mitigating hardships that may be incurred by affected property owners.

The 1995 Corridor Management Legislation

In 1995, the Florida legislature amended state transportation planning law (Chapter 337, F.S.), and the “Growth Management Act” (Chapter 163, F.S.), to greatly expand the local role in right-of-way preservation. The policy shift was designed to encourage closer coordination between the FDOT and local governments on preserving right-of-way for planned facilities. It was also a logical outgrowth of the *Palm Beach County v. Wright* opinion supporting corridor management efforts in the context of local comprehensive planning and growth management programs.

The intent of the amendments was to coordinate transportation and land use planning through local comprehensive plans for a variety of legitimate public purposes. As noted in the amendments:

“Transportation corridor management means the coordination of the planning of designated future transportation corridors with land-use planning within and

adjacent to the corridor to promote orderly growth, to meet the concurrency requirements of this chapter, and to maintain the integrity of the corridor for transportation purposes.” §163.3164, F.S.

Rather than designating corridors for preservation in the Florida Transportation Plan, the amendments called for designation of state highway corridors in local comprehensive plans. The amendments also replaced the term “corridor protection” with “corridor management” to reflect the desired emphasis on providing for compatible development along designated corridors, as opposed to strictly limiting development.

Local governments were authorized to adopt transportation corridor management ordinances to manage development in an along designated corridors. The new statute called for transportation corridor management ordinances to establish the following:

- Criteria to manage land uses within and adjacent to the corridor;
- The types of restrictions on residential and nonresidential construction within the corridor;
- Uses that are permitted within the designated corridor;
- A public notification process for notifying affected property owners of the corridor designation; and
- An intergovernmental coordination process that provides for the coordinated management of transportation corridors with the plans of adjacent jurisdictions.

Local governments were directed to notify the FDOT before approving any rezoning, building permit, subdivision change, or other permitting activity that would substantially impair the future viability of the corridor for transportation purposes. The intent of this provision was to provide FDOT an opportunity to determine whether to purchase the affected property or initiate eminent domain proceedings. Early monitoring of corridor development activity would also provide FDOT an opportunity to identify problems and negotiate acceptable alternatives.

CORRIDOR PRESERVATION STRATEGIES

Florida’s corridor management legislation set the stage for a systematic approach to corridor preservation that begins with the comprehensive plan. The basic concept involves designating transportation corridors in the local comprehensive plan. Future transportation networks are comprised of a variety of state, regional and local transportation projects within a jurisdiction. An effective transportation element of a local comprehensive plan would identify transportation projects expected to be completed in the planning horizon, particularly those projects that are part of the MPO cost-feasible plan, the state transportation improvement program, and the local capital improvements program.

Right-of-way needs for each planned transportation facility will need to be determined, based upon typical (or corridor specific) cross-sections, and then mapped. This map is part of the comprehensive plan or a related thoroughfare plan and effectively designates a corridor for preservation. Another step is to establish access levels for mapped roadways based on their access versus mobility functions. Goals, objectives and policies for right-of-way preservation and access management are also included in the transportation element of the comprehensive plan to establish the strategic and policy intent of the community.

To carry out the transportation plan, local governments must then adopt certain measures to manage corridor development. These include measures to avoid development in the path of a planned transportation improvement and to manage roadway access as development occurs. A comprehensive local access management policy or ordinance will include most, if not all, of the following regulatory components:^{3, 4, 5}

- Access connection spacing standards for each roadway classification;
- Requirements for joint and cross access, driveway consolidation, interparcel connections, and unified access and circulation plans (including regulations for shopping center outparcels);
- Policies and guidelines relative driveway location and design, including driveway radius/flare, throat length and width, corner clearance, and sight distance considerations;
- Policies and guidelines relative to nontraversable medians and median opening spacing standards and review procedures, where applicable;
- Criteria for managing access in the vicinity of freeway interchanges, where applicable;
- Traffic impact assessment requirements and procedures, that are keyed to access management requirements and provide for mitigation where needed in the context of a development proposal;
- Redevelopment or “change in use criteria for bringing existing situations into conformance when there is a change in use; and
- Special requirements for older developed areas or nonconforming situations.

Additional regulatory components for right-of-way preservation generally include, but are not limited to, the following.⁶

- Restrictions on building in the right-of-way of a mapped transportation facility without a variance;
- Criteria for right-of-way exactions and a process for determining the amount of right-of-way dedication that is roughly proportionate to the impact of the proposed development;⁷
- An option for clustering developments by reducing setbacks or other site design requirements to avoid encroachment into the right-of-way;
- Allowances for some interim use of transportation right-of-way for uses having low structural impact through an agreement that requires the property owner to relocate or discontinue the use at their expense when the land is ultimately needed for the transportation facility;
- Allowances for on-site density transfer from the preserved right-of-way to the remainder of the parcel;
- Allowances for impact fee credits for transportation right of way dedication; and
- Procedures for notifying the state transportation agency of development proposals that would substantially impair the viability of the future transportation corridor.

CURRENT PRACTICES IN FLORIDA

In 2001, the Center for Urban Transportation Research at the University of South Florida contacted a sample of Florida counties to determine whether they had active corridor preservation programs and if so, the nature of program policies and practices. An overview of these findings follows.

Palm Beach County

Palm Beach County first developed a Thoroughfare Right-Of-Way Identification Map (the map) in the mid-1970's as a component of the Transportation Element of the County's approved comprehensive plan. The map identifies the network of roadways required to meet future traffic demands. While rudimentary traffic modeling was employed, the map was primarily developed based on local knowledge of existing and anticipated growth patterns.

The map is primarily composed of a grid system of roadways with an approximate spacing of 1-mile in the eastern portion of the County with a much looser pattern of connected roadways in the western portion of the County. Roadway corridors identified on the map are not classified according to functional use, but are instead identified by the right-of-way width required to preserve the corridor (example: 80' ROW width requirements are identified by a dashed line on the map).

The map is the basis for preserving roadway right-of-way within Palm Beach County, as stated in Policy 1.4-d of the Transportation Element of the County Comprehensive Plan:

“The County shall require conveyance of roadway, intersection and interchange rights-of-way consistent with the adopted Thoroughfare Right-Of-Way Identification Map when there is a rational nexus between the required dedication of land, the needs of the community, and the impacts of the transportation network due to the development.”

The requirements of this policy are implemented during the development review process. The County allows interim use of the right-of-way by special agreement and provides for on-site density transfers as well as impact fee credits under certain conditions. Thus, the County does not have a separate corridor management ordinance per se, but rather relies on plan policies and the development review process.

Broward County

The Broward County Trafficways Plan was developed in the early 1960's by the Broward County Area Planning Board and adopted under the Board's enabling legislation. The responsibility for the Trafficways Plan was transferred to the Broward County Planning Council in 1975. Membership of the Broward County Planning Council is comprised as follows: one member is a County Commissioner selected by a majority vote of the Commission, each County Commissioner individually appoints two members from their respective seven County Commission districts (one member in each district being an elected municipal official and one being an elector not holding elected public office), and one member representing the Broward County School Board.

The Trafficways plan is the ultimate roadway right-of-way preservation plan for Broward County. It is used to provide for an adequate regional roadway network and is implemented through the County and local government development review processes. Proposed plats, and in some cases properties that are exempt from platting, must dedicate, by deed or easement, right-of-way consistent with the requirements of the Trafficways Plan. Planning Council staff review plats and other development proposals for conformity with the Trafficways Plan and provide technical assistance in interpreting countywide platting requirements.

Any unit of local government, the Broward County Board of County Commissioners, the FDOT, or the Broward County Planning Council can initiate plan amendments. The Council also

considers requests for waivers of the right-of-way dedication requirements of the Trafficways Plan. Council's review of waivers focuses primarily on the specific characteristics of individual parcels of land and the corresponding impacts of proposed developments.

The right-of-way dedication process in Broward County has been highly successful. Staff attributes this success to the following factors:

- The long standing nature of the practice,
- A recognition that some development would not occur without the infrastructure provided by the process due to concurrency issues,
- The significant development representation on the Planning Council Board,
- The Trafficways Plan can be amended twice a year, and
- There is a clear and fairly administered waiver process.

Indian River County

The Indian River County Thoroughfare Plan is contained in the Transportation Element of the County's Comprehensive Plan. It identifies the County's estimated future right-of-way needs for roadways based on the MPO 2020 Long-Range Transportation Plan model and traffic analysis. The Thoroughfare Plan outlines timeframes, locations and amounts of right-of-way required to meet the projected infrastructure needs based on a 20-year land use projection in the County.

Objective 4 of the Transportation Element governs right-of-way protection. Policy 4.2 requires appropriate land dedication from property owners through the plat and site plan review and approval process based on the right-of-way needs outlined in the Thoroughfare Plan. Right-of-way dedication is required, without any monetary or other compensation, up to the standards for local roads (60 feet). Dedication for right-of-way exceeding local road standards is compensated through traffic impact fee credits, density transfers or purchase. Policies also call for acquisition of additional right-of-way at intersections and landscaping areas and for the county to use available funding, such as the one-cent local option sales tax revenue, to pursue advance right-of-way acquisition.

Only that portion of the County within the Urban Services Boundary is subject to the thoroughfare planning requirements. However, an implementation issue has led the County to consider acquiring right-of-way dedications from property owners outside of the Urban Services Boundary. The case involved a golf course development outside of the Urban Services Boundary, but in the path of a designated Thoroughfare Plan corridor.

Although the corridor preservation policies and regulations did not apply, the golf course was a conditional use, which provided the County with negotiating leverage. The County was able to negotiate a settlement with the developer to retain an option to purchase right-of-way up to 30 years in the future at current land prices. Also, the developer agreed to leave an envelope on the site for the eventual extension of the identified Thoroughfare Plan corridor. While the situation was resolved, this brought to light the limitations of ending corridor preservation programs at Urban Service Area boundaries.

CONCLUSION

Corridor preservation is an issue of growing concern throughout Florida. The Florida Transportation Commission has addressed the issue in their strategic agenda, and the Florida Department of Transportation is considering appropriate actions. Several counties, including Hillsborough County (Tampa) and Tallahassee-Leon County, have recently started corridor preservation initiatives. Others have requested training to familiarize themselves with the legal and technical requirements of corridor preservation.

The reason for such widespread interest is clear. Florida has seen several decades of phenomenal growth and the costs of providing the transportation infrastructure are escalating. Those costs include environmental damage, adverse community impacts, business and property damages, and right-of-way acquisition costs. If right-of-way costs become so high that jurisdictions are unable to provide needed transportation infrastructure in the future, the existing transportation system will fail to function as intended and the quality of life in Florida for visitors and residents will be adversely affected.

Corridor preservation is a proactive strategy to help address future transportation needs. Interim use agreements, density credits, impact fee credits, and cluster development options are among the methods being applied to preserve development rights and reduce adverse impacts on property owners. The Florida Supreme Court and the Florida legislature have provided a roadmap for successfully implementing corridor preservation programs at the local level. That guidance and the lessons learned in Florida can serve as a guide to transportation agencies across the nation struggling to find solutions to this critical issue.

NOTES

¹ Rivkin Associates, *Corridor Preservation – Case Studies and Analysis Factors in Decision-Making*, Federal Highway Administration, Office of Real Estate Services, 1996.

² “Concurrency” requires that adequate public facilities and services will be available within a reasonable amount of time to serve the impacts of development. It involves withholding development permission when public facilities or services are not adequate to serve a project, as established by adopted level of service standards, unless the developer provides those necessary facility or service improvements.

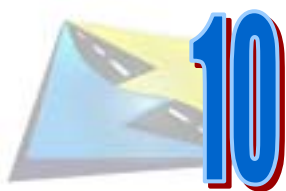
³ K. Williams and V. Stover, *Access Management Manual*, Transportation Research Board, Washington, D.C.: National Academy Press, (in progress, Winter 2002, kfisher@nas.edu).

⁴ K. Williams and J. R. Forester, *NCHRP Synthesis 233, Land Development Regulations that Promote Access Management*, Transportation Research Board, 1996.

⁵ CUTR/FDOT, *Model Land Development and Subdivision Regulations that Support Access Management*, 1994, www.cutr.usf.edu.

⁶ K. Williams and M. Marshall, *Managing Corridor Development – A Municipal Handbook*, Center for Urban Transportation Research, 1996.

⁷ In *Dolan v. City of Tigard* (US 1994), the US Supreme Court held that private property owners may not be required to carry a disproportionate share of a public burden. Regulatory exactions, such as mandatory dedication of transportation right-of-way, must be roughly proportional, both in nature and extent, to the impact of the proposed development.



Access Management and its Impacts on Safety

Moderator:

Phil Demosthenes

Access Program Administrator

Colorado Department of Transportation



Slides

10A.

Left Turns vs Right Turns Followed by U-turns

Sunanda Dissanayake, Ph.D.

Research Assistant Professor

University of South Florida

John Lu, Ph. D., P.E.

Nelson Castillo, E.I.T.

Kristine Williams, A.I.C.P.



Slides

10B.

The Relationship Between Intersection Density and Crash Rate on the Kansas State Highway System

Chris Huffman, P.E.

Corridor Management Administrator

Kansas Department of Transportation



Paper



Slides

10C.

Investigation of the Impact of Frontage Roads as an Element of Controlled Access Facilities

Kara Kockelman, Ph.D.

Assistant Professor of Civil Engineering

University of Texas



Paper

Left Turns vs Right Turns Followed by U-turns



College of Engineering
University of South Florida

John Lu, Ph. D., P.E.

Sunanda Dissanayake, Ph.D.

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Acknowledgement

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Introduction

- Safety
 - Traffic Conflicts
 - Crash Data Analysis
- Operations
- Simulation

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Introduction

- Direct Left Turns (DLT) create safety concerns
- Right Turns followed by U-Turns (RTUT) as an alternative for DLT
- General public also concern about U-Turn movements



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Introduction



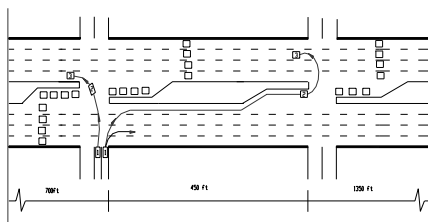
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DLT Conflicts



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DLT vs RTUT



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Objectives of Study

- DLT and RTUT conflicts
- Compare the average number of conflicts and conflict rates
- Evaluate and compare the severity

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Methodology

- 7 Sites selected in Tampa Bay Area, Florida
- Data collected during peak and non-peak periods
- 9 types of traffic conflicts

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Methodology

- Severity was Objectively and Subjectively Measured:
 - ✓ Objective : Time To Collision (TTC)
 - ✓ Subjective : Risk Of Collision (ROC)

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Methodology

TTC and ROC Scores		
Score	TTC (Seconds)	ROC (Risk)
1	1.50 <	Low
2	1.00 – 1.50	Medium
3	0.00 – 0.99	High

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Data Analysis

- Two conflict rates were considered:
 - ✓ Conflicts Per Hour
 - ✓ Conflicts Per Thousand Involved Vehicles

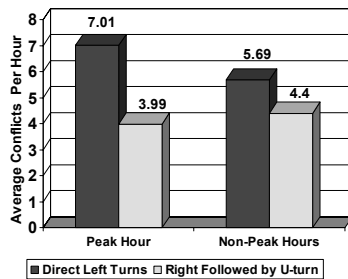
$$R_1 = \frac{\text{Number of conflicts}}{\text{Number of hours}}$$

$$R_2 = \frac{\text{Number of conflicts}}{\sqrt{(V_1) \times (V_2)}} \times 1000$$

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Data Analysis

Average Number of Conflicts per Hour



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Data Analysis

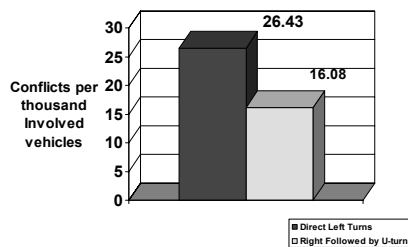
Number of Conflicts per Thousand Involved Vehicles

Site	DLT	RTUT	Δ
1	N/A	19.61	N/A
2	39.36	10.12	-75%
3	28.46	11.69	-59%
4	26.90	12.10	-55%
5	11.33	17.74	+56%
6	26.12	12.41	-52%
7	N/A	28.90	N/A
Average	26.43	16.08	-37%

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Data Analysis

Average Conflict Rates for DLT vs RTUT



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Data Analysis

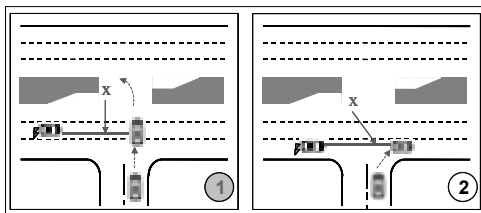
■ Two tests were performed to determine the severity of the conflicts

- ✓ 1) Analysis of ROC scores only
- ✓ 2) Analysis of conflicts with ROC and TTC

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Data Analysis

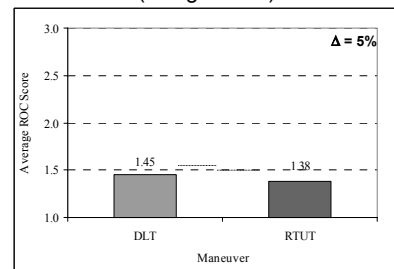
- $TTC_1 = TTC_2$
- $ROC_1 > ROC_2$



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Data Analysis

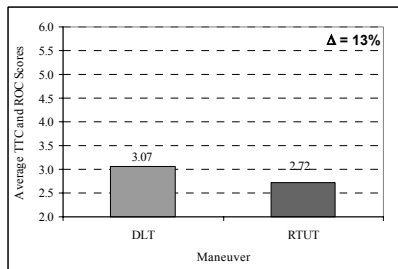
Average Severity of Conflicts based on ROC Score
(Range = 1-3)



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Data Analysis

Average Severity of Conflicts based on
ROC and TTC Score (Range = 2-6)



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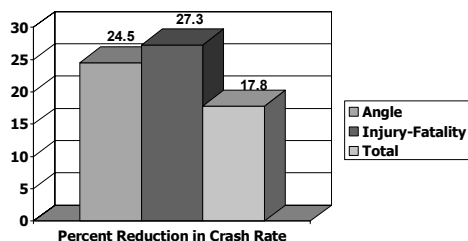
Crash-Data Analysis

- 133 DLT Sites (2,175 Crashes)
- 125 RTUT Sites (1,738 Crashes)

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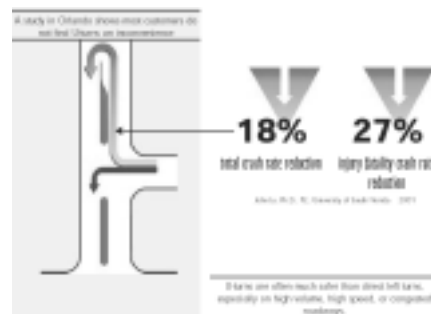
Crash-Data Analysis

Crash Rate Reductions Comparing Direct Left vs. Right
Turn Followed by U-Turn



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Crash-Data Analysis



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Summary and Conclusions

- Safety comparison of DLT and RTUT at 7 sites
- Conflict rates lower for RTUT
- Average severity of conflicts generated by RTUT was lower

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Summary and Conclusions

- Crash-data analysis conducted
 - ✓ Total crash rate reduced by 18%
 - ✓ Injury/fatality crash rate reduced by 27%
 - ✓ Angle crashes reduced by 24%

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**The Relationship Between Intersection Density
And Vehicular Crash Rate
On the Kansas State Highway System**

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Abstract

The Kansas Department of Transportation (KDOT) and Kansas University (KU) have undertaken a study to investigate the relationship between vehicular crash rate (crashes per million vehicle miles) and highway operational factors such as Average Daily Traffic (ADT), posted speed (miles per hour), and intersection density (points per mile). The study was designed to examine each of the highway factors as independent variables against crash rate as dependent variable in order to determine the coefficient of correlation (R-square) in each case.

In conducting this study the Kansas State Highway System was divided into classifications by cross-section. The classifications included 2-lane undivided, 4-lane undivided, 4-lane divided, and five lane. Each classification was further subdivided into rural and urban sections except for the 5-lane section which was limited to urban sections only. Fully access controlled sections were eliminated from the sample. Statistical analysis was performed on the data sets using the Minitab 2.0 software package.

From these analyses, several conclusions were drawn. It was found that ADT, though a factor in the calculation of crash rate, showed low correlation. The relationship between posted speed and crash rate was shown to be inverse in each category, indicating that when speeds decrease crash rates generally increase. Intersection density and crash rate were shown to have a direct relationship and there is indication that entering volumes from intersections may also effect the strength of correlation. Thus, there is a clear nexus between management of access and protection of the public safety.

Key Words: access management, safety, property rights

Acknowledgement

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Introduction

The Kansas Department of Transportation (KDOT) and Kansas University (KU) have undertaken a study to investigate the relationship between vehicular crash rate (crashes per million vehicle miles) and highway operational factors such as Average Daily Traffic (ADT), posted speed (miles per hour), and intersection density (points per mile). The study was designed to examine each of the highway factors as independent variables against crash rate as dependent variable in order to determine the coefficient of correlation (R-square) based upon linear regression analysis for each case. The R-square, loosely defined, is the amount of “scatter” in the dependent variable data that is explained or accounted for by the independent variable. A low R-square value indicates a weak relationship between the independent and dependent variables. The slope of the line also provides information about the relationship between the independent and dependent variable. A best-fit line with a negative slope indicates an inverse relationship while a positive slope indicates a direct relationship. The investigation also included crashes as dependent variable as well as an investigation of possible predictive models utilizing both build-up and tear-down equation building techniques. This report is limited to the results of crash rate as independent variable while remaining topics will be discussed in a full report of the study.

Experimental Design and Analysis

The purpose of this study was to examine possible relationships between vehicular crash rate and highway factors such as ADT, posted speed, and intersection density. If such relationships could be established, then the KDOT's efforts to protect the public safety may be directed to maximize return. Independent variables, then, were limited to items over which KDOT has control or significant influence. Variables involving driver behavior or vehicle malfunction were not considered as such variables are beyond KDOT's significant influence. With this in mind, independent variables selected included ADT, which KDOT can influence through constructed capacity, posted speed, over which KDOT has statutory control, and intersection density which is a matter of regulatory control. Selection of these variables was also influenced by the availability of reliable data and upon KDOT's experience regarding the travelling public's perception regarding these variables' effect on crash rate.

With the independent variables selected, the next step in the study's design was to identify the classifications of highway to be analyzed. Analysis was limited to state highway system mileage because of availability and reliability of data. Rural 2-lane highway represents slightly less than 90% of the 10,000 mile Kansas highway system, making a 100% sample infeasible. A 5%, or 418 mile, sample was randomly selected to ensure manageability as well as statistical significance. For 2-lane urban, 4-lane divided and undivided, and 5-lane classifications a complete sample was sought. Success in obtaining a complete sample ranged from 65% to 100%. Table 1 contains information on sampling rates for each of the classifications analyzed. Other highway classifications which are part of the state highway system but not considered for the study include 2-lane divided, 3-lane, 5-lane rural, and 6-lane and above. These classifications were not

considered because of the low number of non-access controlled miles on the state highway system.

With the samples obtained, the data sets were constructed from three discrete data sources. Section identification information, section length, posted speed, and ADT was obtained from KDOT's CANSYS road section database. Crash information was obtained from the KARS database and matched to the geometric data by section identifiers. Intersection density including basic information regarding each intersection was obtained by manual take-off from statewide videolog. An intersection, for purposes of this study, was defined as any public or private street or driveway connecting to the highway at a single point. Thus, a typical "four-leg" intersection counted as two points of intersection to the highway.

Matching three discrete data sources showed some potential inconsistencies in the data. Sections in which data could not be matched with confidence were eliminated from the final data sets. Sections in which construction was observed in the videolog, making intersection take-off's unreliable or impossible, were also eliminated from the final data sets. This completed the process of preparing the data sets for analysis.

The statistical analysis performed by KU was designed to perform three distinct tasks. The first task was to analyze the previously defined independent variables against the dependent variable crashes. The second task was to analyze the independent variables against crash rate as dependent variable. The third task was to investigate the formulation of predictive models for crashes and crash rates using build-up and tear-down equation building techniques. Detailed discussion of all three tasks is beyond the scope of this report, and will be covered in a complete report currently under development. This report is limited to discussion of crash rate as dependent variable.

Results

With crash rate as dependent variable, results of independent variable correlation were surprisingly consistent across the highway classifications analyzed. The relationship between ADT and crash rate was found to be inverse for some classifications and direct for other classifications. Strength of correlation for the various classifications was generally low with values ranging from near zero to approximately 8%. The relationship between posted speed limit and crash rate was found to be inverse for every classification with correlation ranging from approximately 2% to approximately 28%. The relationship between intersection density and crash rate was found to be direct for all classifications with correlation ranging from near zero to 18%. Figures 1 through 7 graphically portray these results. Given the scatter in the data, and the decision not to eliminate outliers from the data sets, and the relatively low R-squares, linear regression did not prove to be a reliable means of prediction. These results do not support quantitative analysis. They do, however, support qualitative analysis. It can be stated that a positive relationship exists between intersection density and crash rate on the Kansas State Highway System.

Though ADT is included in the calculation of crash rate, it was judged to be an important variable for analysis because of the travelling public's perception of the importance of traffic volume to safety. The travelling public is generally skeptical of explanations of crash rates being "normalized" for traffic volume. Though this analysis is more of a sensitivity analysis than a true correlation analysis, it is useful to illustrate that increases in traffic volumes do not result in appreciable increases in crash rate and may result in a slightly lower crash rates in some classifications.

The results of the analysis of posted speed and crash rate are, perhaps, the most dramatic results in the study. For all highway classifications, the relationship between posted speed and crash rate was shown to be inverse. As posted speed decreases, crash rates tend to increase on all highway types. This result appears counter-intuitive, particularly to the travelling public. If one considers the nature of posted speed limit, however, an explanation can be found. If speed limit is properly posted at 85th percentile then speed limit is, by its nature, a reflection of traffic behavior rather than a proactive enforcement technique. With this in mind, one can observe that traffic moves slowest where side friction from entering and exiting vehicles is greatest. This phenomenon of side friction also increases the turbulence of the traffic flow. These two things combine to increase crash rates. Conversely, highway sections with lower side friction and turbulence will sustain higher speeds with lower crash rates.

Intersection density and crash rate was the only analysis pair to show a direct relationship for all highway classifications. In all cases crash rates generally increase as intersection density increases. Though the correlation is not strong for some highway classifications, when one considers positive correlation of intersection density in combination with negative correlation of posted speed the relationship strengthens significantly. Side friction from entering and exiting vehicles and the turbulence in traffic flow from those entering and exiting vehicles is highest where intersection density is greatest.

It was also noted that entering volumes might effect the level of correlation observed in the analysis of intersection density. The level of correlation increased with increasing proportion of commercial and public street intersections and decreased with increasing proportion of agricultural and residential intersections. An analysis of estimated trip ends against crash rate did not prove useful, however, and more careful analysis will be required to establish what, if any, relationship may exist.

Conclusions

It is this study's conclusion that intersection density, and thus management of intersections, has a direct bearing on the safety of the travelling public. Intersection density must be managed in order to keep side friction and turbulence of traffic flow in check and allow highways to serve the purpose intended of their functional classification. It is also the conclusion of this study that lowering speed limits under the guise of enhancing safety will likely not have the intended effect and may have the opposite effect. The inverse relationship between posted speed and crash rate and the direct

relationship between intersection density and crash rate both support these conclusions. Further research will be required to determine what, if any, relationship exists between entering volumes and crash rate.

List of Tables and Figures

Table 1: Miles Sampled and Sample Rates by Highway Classification

Figure 1a-c: Correlation Graphs for 2-Lane Rural Highways

Figure 2a-c: Correlation Graphs for 2-Lane Urban Highways

Figure 3a-c: Correlation Graphs for 4-Lane Undivided Rural Highways

Figure 4a-c: Correlation Graphs for 4-Lane Undivided Urban Highways

Figure 5a-c: Correlation Graphs for 4-Lane Divided Rural Highways

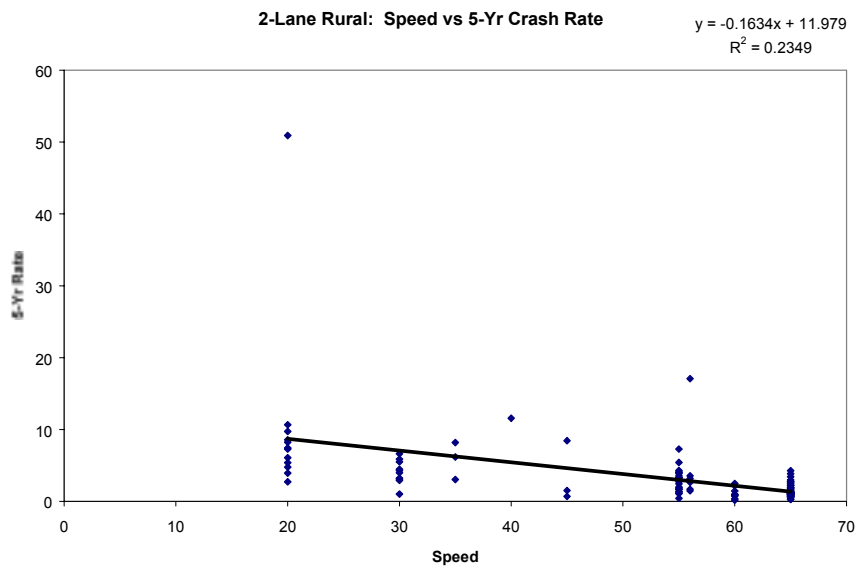
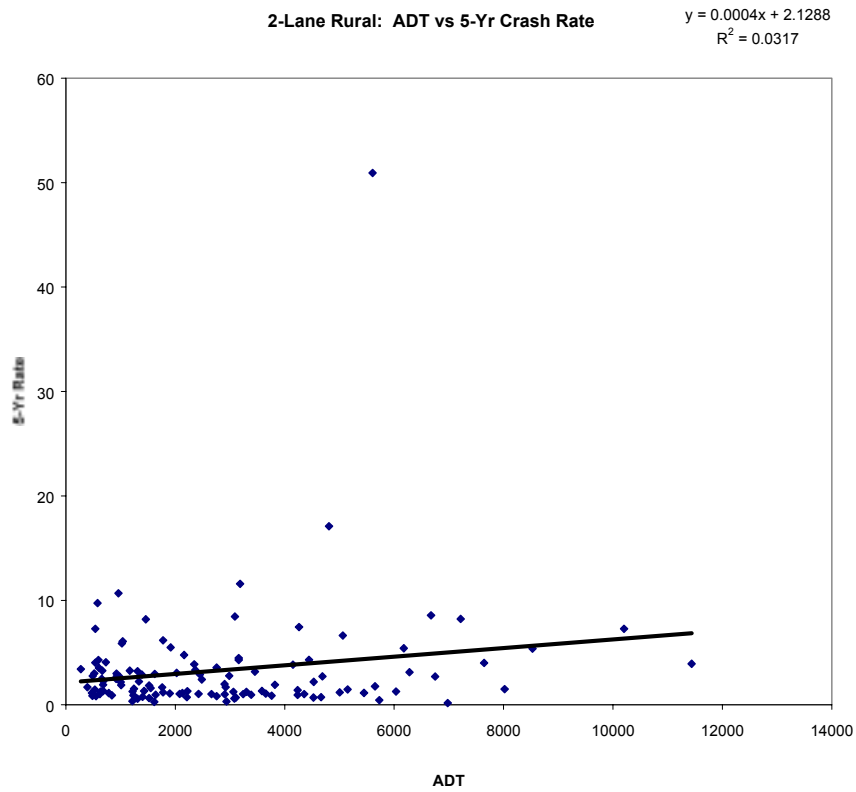
Figure 6a-c: Correlation Graphs for 4-Lane Divided Urban Highways

Figure 7a-c: Correlation Graphs for 5-Lane Urban Highways

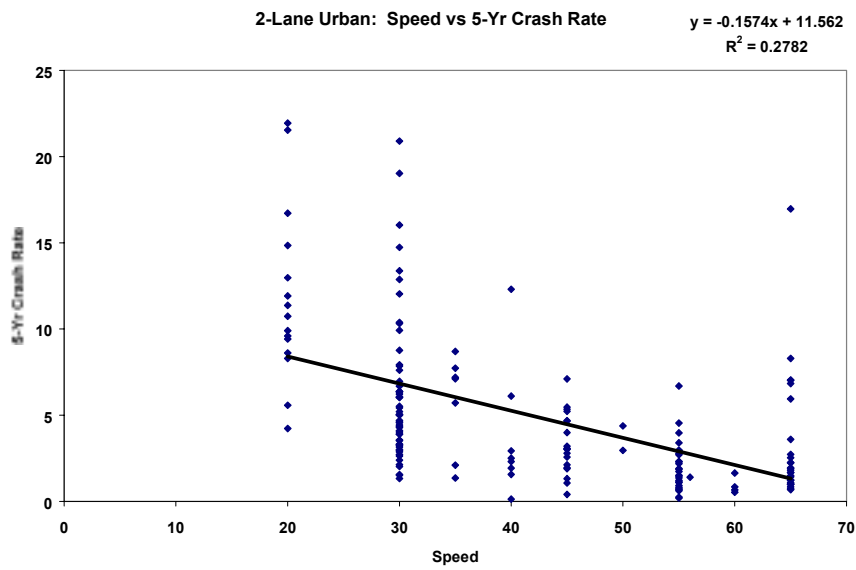
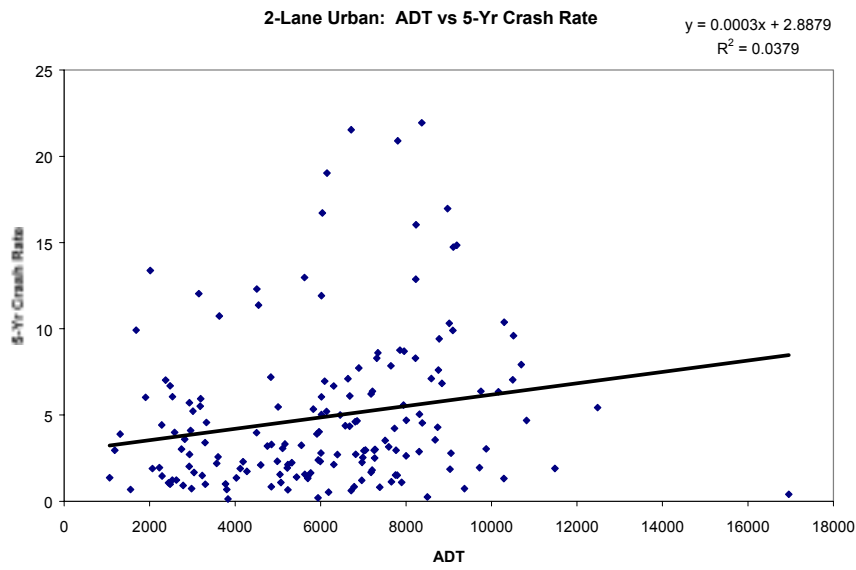
Table 1

Highway Classification	Miles Sampled	System Miles	Sample Rate
2-Lane Rural	418	8613	5%
2-Lane Urban	92	141	65%
4-Lane Undivided Rural	100	100	100%
4-Lane Undivided Urban	102	106	96%
4-Lane Divided Rural	243	269	90%
4-Lane Divided Urban	88	117	75%
5-Lane Urban	30	31	97%

Figures 1a-c

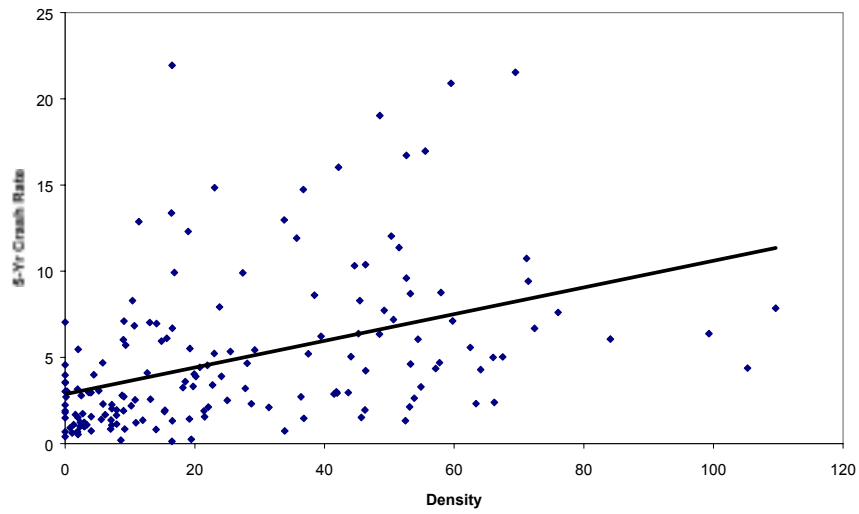


Figures 2a-c

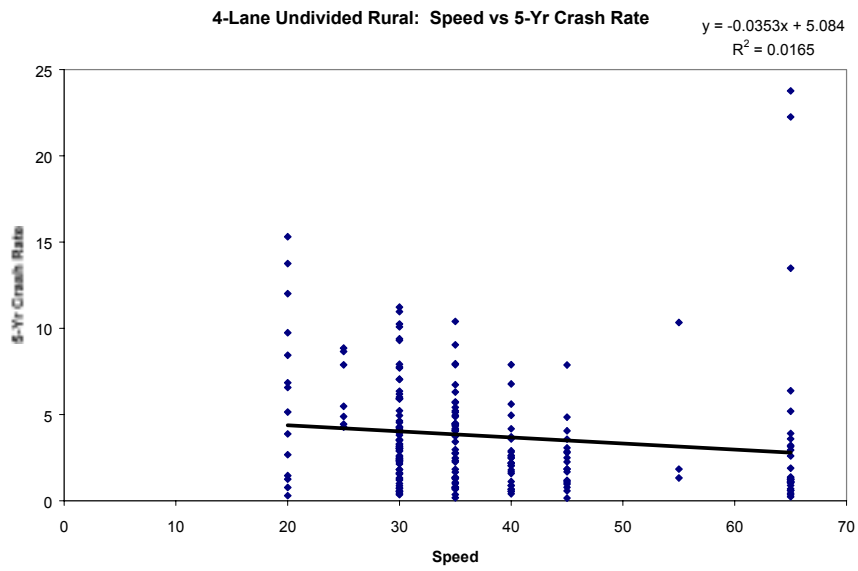
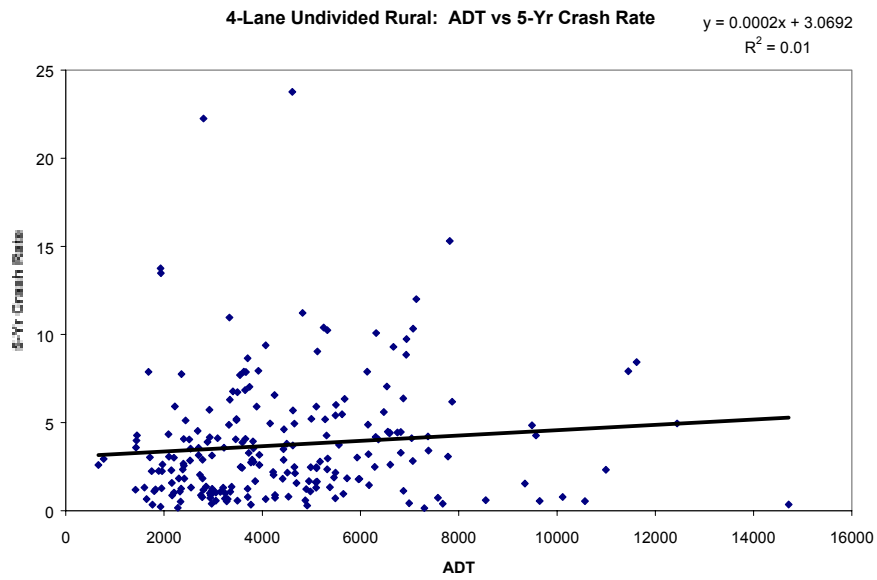


2-Lane Urban: Density vs 5-Yr Crash Rate

$$y = 0.0774x + 2.8718$$
$$R^2 = 0.1801$$



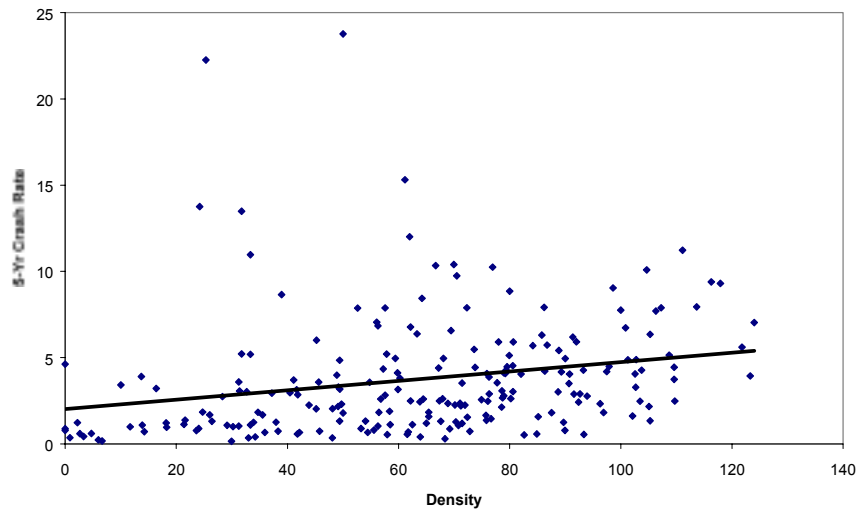
Figures 3a-c



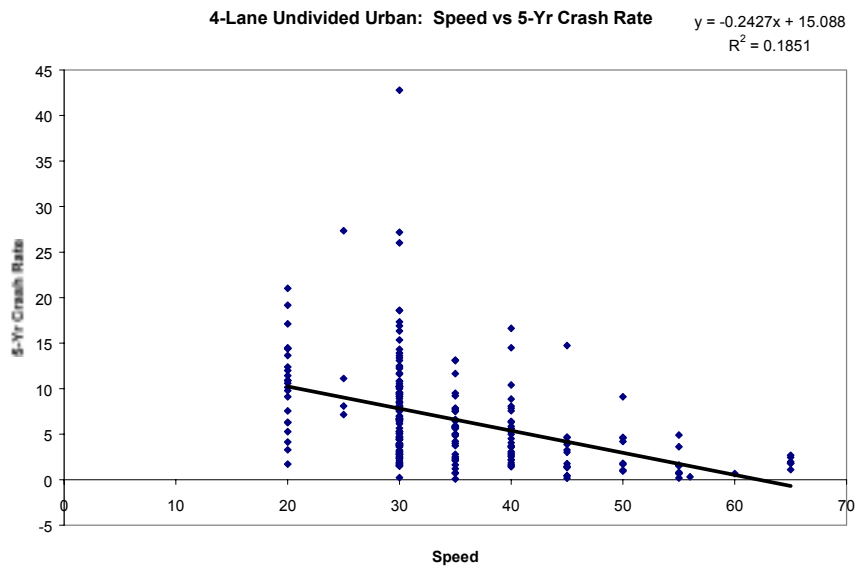
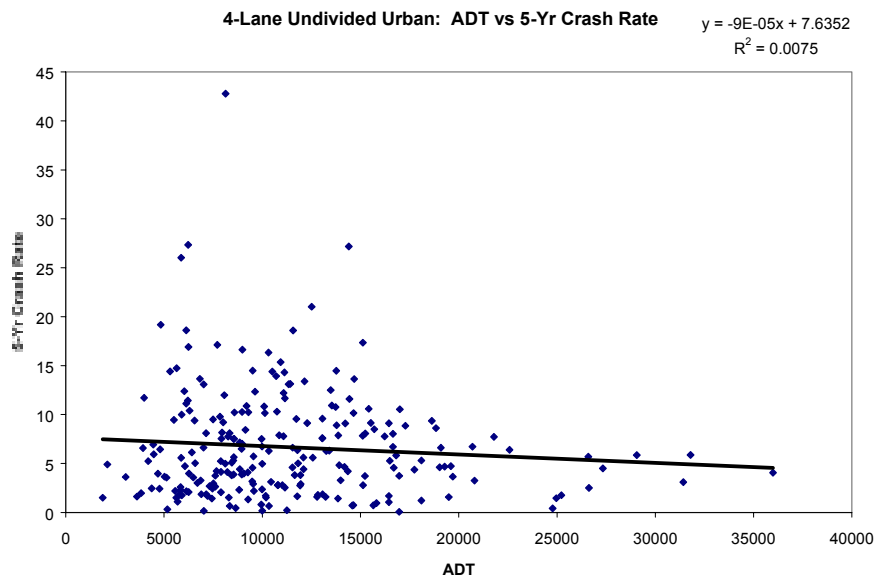
4-Lane Undivided Rural: Density vs 5-Yr Crash Rate

$$y = 0.0272x + 2.0247$$

$$R^2 = 0.053$$



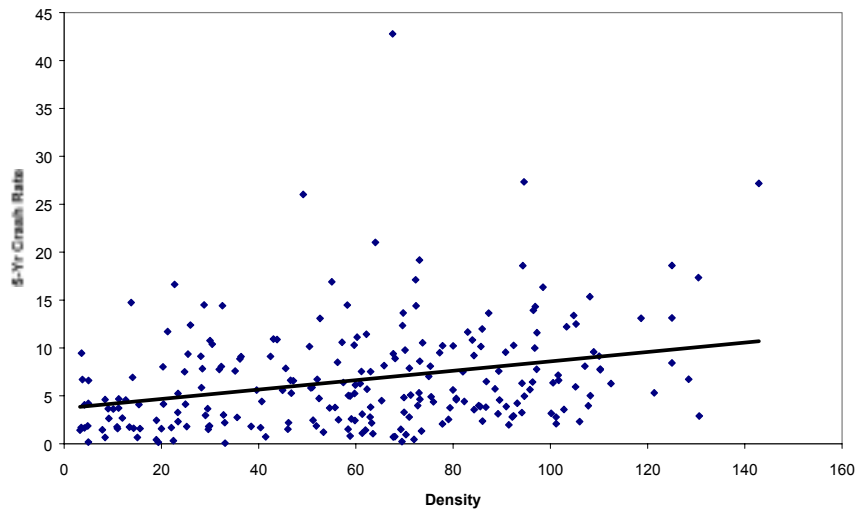
Figures 4a-c



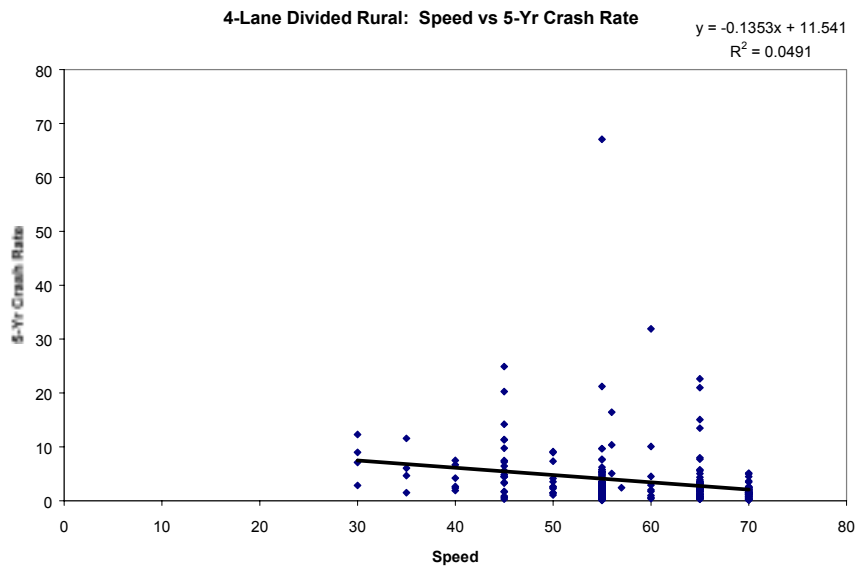
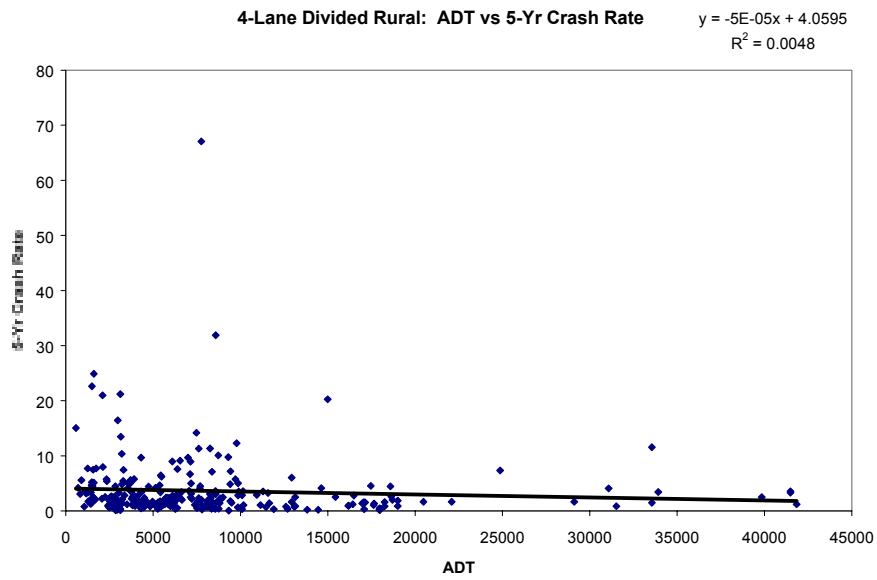
4-Lane Undivided Urban: Density vs 5-Yr Crash Rate

$$y = 0.0491x + 3.69$$

$$R^2 = 0.0859$$

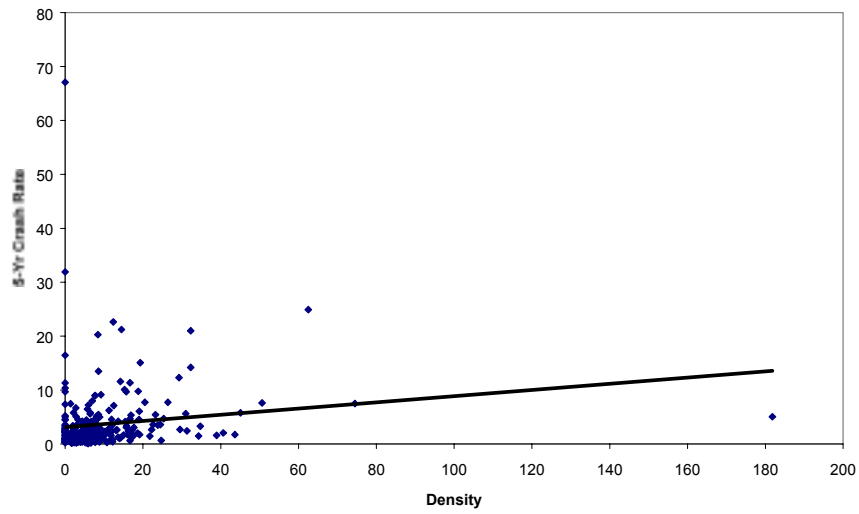


Figures 5a-c

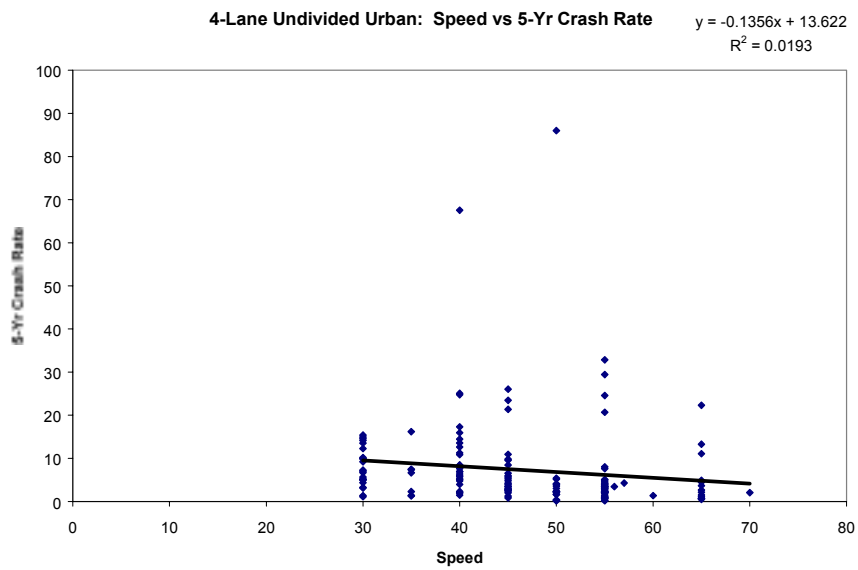
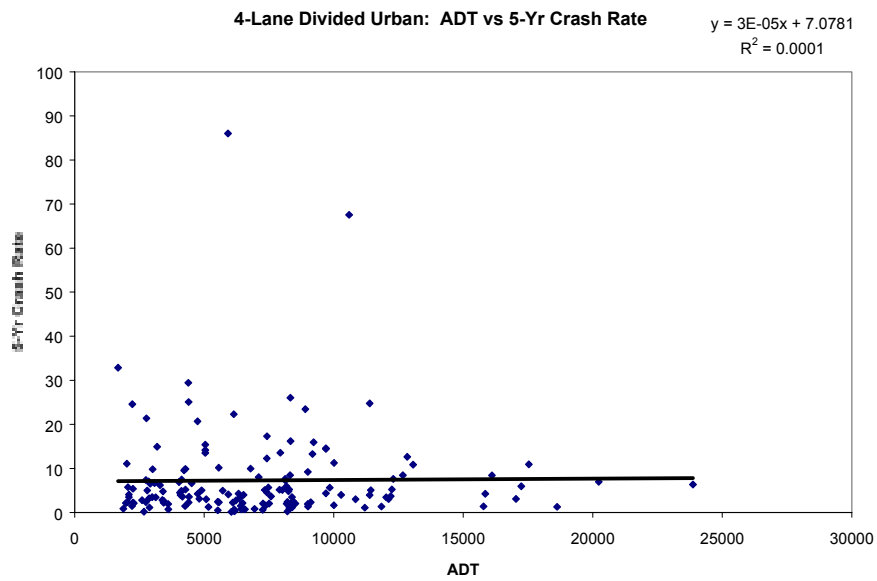


4-Lane Divided Rural: Density vs 5-Yr Crash Rate

$$y = 0.0575x + 3.1071$$
$$R^2 = 0.0223$$



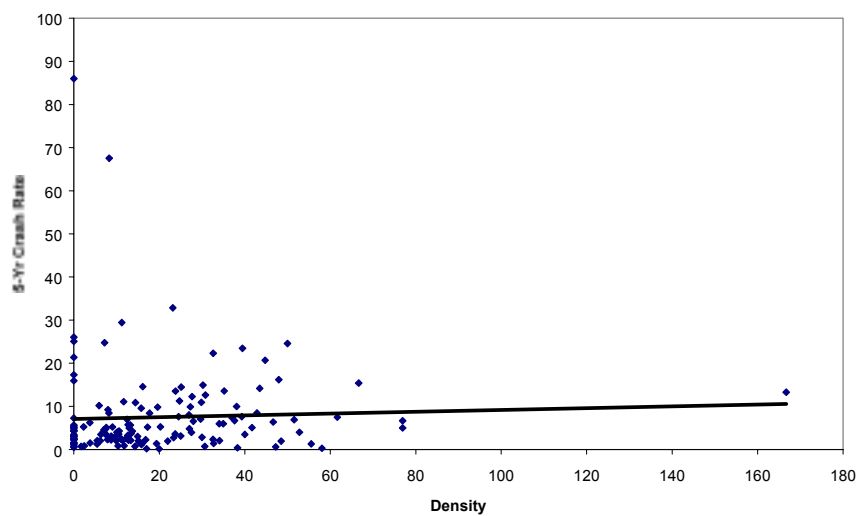
Figures 6a-c



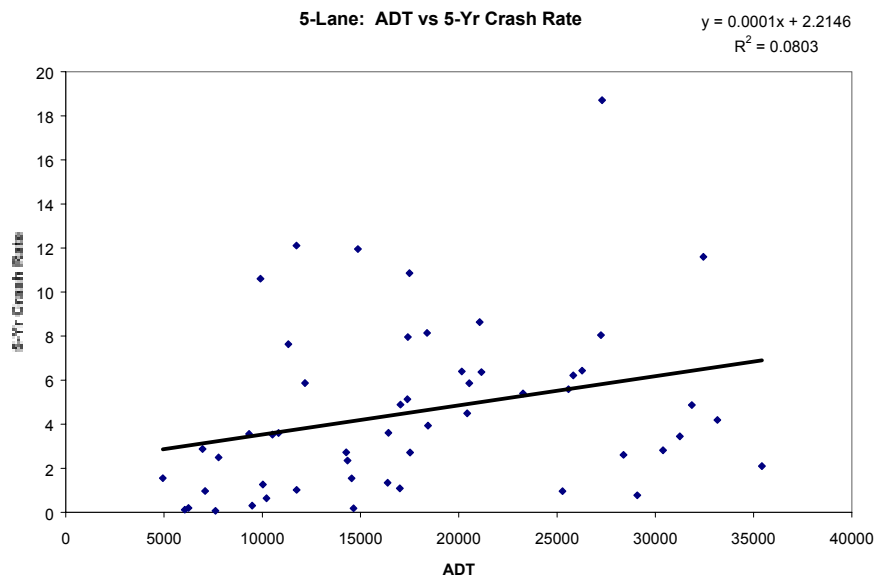
4-Lane Divided Urban: Density vs 5-Yr Crash Rate

$$y = 0.021x + 7.0755$$

$$R^2 = 0.0018$$



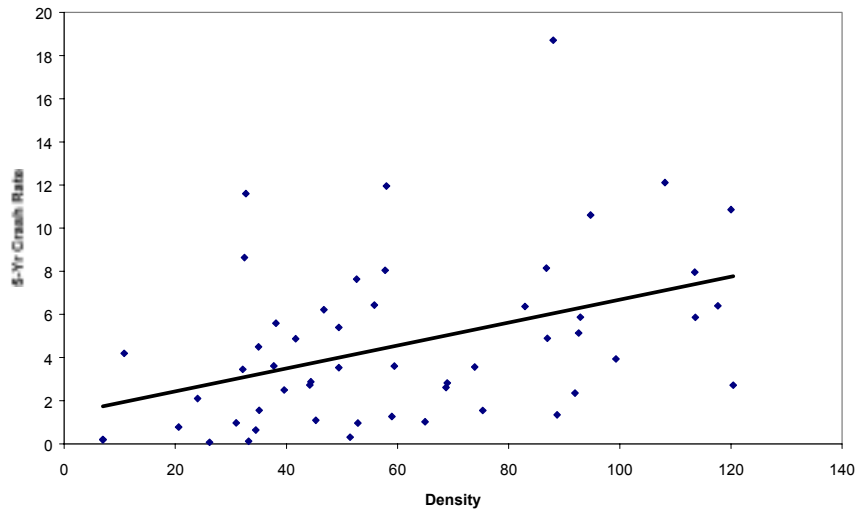
Figures 7a-c



5-Lane: Density vs 5-Yr Crash Rate

$$y = 0.0532x + 1.3694$$

$$R^2 = 0.1816$$



CHAPTER 1: PROJECT OVERVIEW AND OBJECTIVES

1.1 Introduction

AASHTO's Green Book bills frontage roads as "the ultimate in access control" (1995, p.528). And, until recently, frontage roads have been Texas' primary design solution to the issue of access along freeways. A policy of building frontage roads avoids the purchase of access rights when upgrading existing highways to freeway standards and generally supplements local street networks. Such a policy may also impact corridor operations, land values, and development patterns. This research investigated frontage roads as an element of limited-access highway design with an objective of providing a comprehensive evaluation of frontage-road design policies and the legal, financial, land-development, and operational issues associated with such policies. This paper summarizes the research effort by reviewing legal statutes affecting public access to roadways, summarizing access policies and practices across states, comparing land development and operations of corridors with and without frontage roads, summarizing studies on access-rights valuation, and evaluating construction cost distinctions.

Optimal frontage-road policy is likely to be highly site specific, depending on present land uses alongside freeway corridors, local zoning designations, expectations of future development, public sentiment, and design constraints (such as topography and network connections). The results of this work will enable the Texas Department of Transportation (TxDOT) to objectively weigh the costs and benefits of frontage roads and modify practices so that the best projects for the state and its communities result. The general questions motivating this 2-year research project are the following: When should TxDOT build frontage roads? When should TxDOT avoid the construction of frontage roads? What alternatives exist to constructing frontage roads? And what design practices, legal issues, and operational aspects should TxDOT consider under either scenario?

In the first year of this 2-year project, an extensive literature review was conducted in order to ascertain the current legal attitudes and operational strategies involving frontage roads. This information is presented here to place this work in its proper context. Subsequent sections detail results of investigations into design policies, corridor land

development, frontage-road safety, corridor operations, and comprehensive construction costs. The report concludes with an overall assessment of the competing factors and recommendations for future design policies. Owing to space constraints, only key results are presented here; for additional information, readers may care to consult the previous work by Kockelman et al. (2000), Overman (2000), Madi (2001), and Peterman (2000).

7.7 Results

Results of the cost analysis are shown in Table 7.6. The analysis clearly indicates that in the case of long-run, full build-out scenarios, facilities without frontage roads are far cheaper than those facilities with frontage roads. This is largely a result of the assumption that in such cases access would not need to be purchased because none existed previously (i.e., there was no previous facility). The additional cost associated with constructing frontage roads is largely a result of the cost of additional construction and of the added right-of-way requirements that may result from the provision of frontage roads.

When frontage roads may be intended to provide additional capacity to the facility for local traffic (as in Type C), the costs are closer. In fact, in rural settings the cost ratios between Type A and Type C are nearly one to one and in some instances the costs for non-frontage-road facilities (Type A) exceed their counterparts with frontage roads. This clearly would indicate that in rural and ex-urban areas with considerable local traffic, the lower cost of frontage-road construction might make the construction of such lanes beneficial, though it is difficult to imagine a situation in which such levels of local rural traffic would exist.

In the facility upgrade/expansion scenarios, a different method of comparison was used as previously was described. The access-cost thresholds vary considerably between the low and high cost situations, and as has been previously stated, access costs themselves vary considerably. However, it is possible to draw some conclusions from these figures. First, as in the full build-out comparisons, it frequently may be the case that frontage roads may be cheaper alternatives to mainlanes in rural settings as a means to provide additional capacity to the facility. Second, it can be concluded that in urban settings the provision of frontage roads may not necessarily be less expensive than would be the purchase of access from abutting landowners. However, in areas such as central Austin where land values are frequently astronomical, the cost of purchasing access may often render it economically beneficial to provide frontage roads.

7.8 Conclusions

Access costs, along with safety and level of service, are an important factor in the decision to include or exclude frontage-road configurations in the construction of new freeways as well as the expansion of existing freeways. As part of this investigation, the

levels of access costs that would make the inclusion of frontage roads more cost-effective than their exclusion were estimated.

The project found that where frontage roads were not constructed to provide additional capacity, but merely to provide access to abutting properties, the provision of access might be economical in areas with extremely high land values. However, the thresholds of access costs were near, or even well above, the mean costs of access, indicating that over a long stretch of road the cost of purchasing access would likely not exceed the foregone cost of frontage-road construction. In rural locations this threshold was—in some cases—many times greater than the expected land values in those areas, meaning that the costs associated with constructing frontage roads would exceed the cost of purchasing access.

If one assumes that frontage roads provide additional capacity to the facility, then such comparisons would be unfair. Therefore, a second set of comparisons was made between configurations with and without frontage roads. In these comparisons, facilities that include frontage roads fared better than they fared in the previous comparisons. In particular, large urban facilities might benefit from the construction of frontage roads to provide capacity. However, where frontage roads are intended to provide additional capacity, it is quite possible that local governments will build less arterial capacity on parallel roadways. Therefore, it is not possible to say with certainty whether frontage roads add capacity or merely shift some expense related to providing capacity from the local government to the department of transportation.

The obvious benefit of not having to pay access costs is compounded in this scenario by the relatively lower cost per usable lane mile of frontage roads in comparison to mainlanes. This comparison test also found that frontage roads intended to provide capacity relief in rural areas almost always would be cheaper than those facilities intended to provide relief in rural areas without frontage roads. However, it is difficult to imagine a situation in which enough local traffic would exist in a rural environment to make the use of frontage roads as a means to provide capacity truly worthwhile. Perhaps such a situation might exist in an ex-urban or suburban location with extremely high land values where little residual value would remain after the right of access was removed.

To make such comparisons in the case of new facilities (the full build-out comparisons) would be difficult due to the fact that presumably no access would be purchased. In such cases, even if one assumes that part of the role of the frontage-road facility is that of added capacity, frontage-road scenarios were as expensive as, if not more expensive than, those facilities that did not include frontage roads. This was largely a result of the added right-of-way purchase necessary to house the frontage-road facility.

Finally, it should be noted that this study of costs was only a study of direct financial costs associated with construction. The study did not take into account the potential economic costs of traffic accidents, the possible economic benefits of intense commercial development along frontage-road corridors, or the potential user-cost savings associated with frontage road use during freeway incident management.



Access Management and Corridor Plans

Moderator

Chris Huffman, PE.

Corridor Management Administrator

Kansas Department of Transportation

 **Paper**

 **Slides**

11A. Establishing a Local Corridor Preservation Program: Insights From Florida

Jeff Kramer, AICP

Research Associate

Center for Urban Transportation Research

Kristine M. Williams, AICP

 **Paper**

 **Slides**

11B. A Case Study of Maryland's Access Management Program

Dan Scheib

Project Manager Transportation Planner/Corridor Preservation

Maryland Department of Transportation

 **Paper**

 **Slides**

11C. Access Management and Corridor Plans

Robert Kleinburd

Environmental Program Manager

Federal Highway Administration

**ACCOMPLISHING ACCESS MANAGEMENT ON THE FLORIDA
INTRASTATE HIGHWAY SYSTEM:
THE US 19 HIGHWAY CORRIDOR EXPERIENCE**

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Kristine M. Williams, AICP

For the:

5th National Access Management Conference
Austin, Texas
June 23-26, 2002

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INTRODUCTION

US Highway 19 is a major north-south highway of statewide importance that runs along the west coast of Florida. The Florida Department of Transportation (FDOT) has designated all of US 19 as part of the Florida Intrastate Highway System (FIHS)-the network of roadways essential to the state's economy, hurricane preparedness, and overall transportation mobility. With this designation, the Florida Department of Transportation has placed additional controls to accommodate both high-speed and high-volume traffic while providing access to abutting land.

Land use along the corridor ranges from strip commercial along segments in Pinellas and Pasco Counties to large expanses of agricultural and undeveloped land in central and northern Florida. Commercial development within the urban counties has largely occurred without adequate access management, and has resulted in numerous curb cuts, entry signs, and median openings that have adversely affected the safety, efficiency, and character of this important highway.

US 19 also serves as the primary artery for commercial activity in some smaller cities and rural counties in west central Florida. The corridor remains largely rural in Levy County although development pressures are occurring, particularly along the 10-mile segment of US 19 that runs within and between the Cities of Chiefland and Fanning Springs. It was the desire of these communities to establish a proactive and mutually acceptable roadway access management strategy for this segment of US 19 in order to avoid the mistakes made in Pasco and Pinellas Counties. The communities wanted to support the development potential of the corridor, while avoiding a proliferation of curb cuts that would adversely impact the corridor and the character of the area.

The Center for Urban Transportation (CUTR) assisted Levy County in developing a conceptual access management plan for the section of US 19 between Chiefland and Fanning Springs. This paper summarizes that effort.

BACKGROUND

The study corridor serves the primary commercial area of Levy County and also serves as a connection for thousands of motorists traveling between northern and southern Florida. The roadway is also a heavily traveled route for tourists visiting the region's recreational areas and natural springs. In recent years, there has been an increase in the number of residential and commercial developments abutting the corridor, including the construction of a major discount retail store in Chiefland that attracts traffic from surrounding counties. A difficult problem on the corridor is the presence of antiquated plats containing numerous deep lots with only 50 feet of frontage. The combination of poorly designed plats and development potential makes the corridor ripe for future access problems if corridor access management policies are not adopted and implemented.

CURRENT ACCESS MANAGEMENT REQUIREMENTS FOR US 19

The FDOT has a 7-tier classification system established in the Administrative Rules of the Department of Transportation, State Highway System Access Management Classification System and Standards (Rule 14-97) that is assigned to state highways. The classifications establish the access management standards for a segment of the state highway system relative to spacing standards for driveways, median openings, and signals. Access Class 1 is reserved for limited access freeways, whereas Access Class 7 is assigned to lower priority state highways in areas that are already highly urbanized. The standards for each classification are provided in Table 1.

Table 1: FDOT Access Classification System & Standards

Access Class	Medians*	Connection Spacing (feet)		Median Opening Spacing		Signal Spacing
		>45 mph**	≤45 mph**	Directional	Full	
2 (FIHS)	Restrictive w/ Service Roads	1320	660	1320	2640	2640
3 (FIHS)	Restrictive	660	440	1320	2640	2640
4	Non-Restrictive	660	440			2640
5	Restrictive	440	245	660	2640/1320	2640/1320
6	Non-Restrictive	440	245			1320
7	Both Median Types	125		330	660	1320

*: A "Restrictive" median physically prevents vehicle crossing. A "Non-Restrictive" median allows turns across any point.

** : Posted speed limit

Currently, US 19 is designated as an Access Class 3 facility between the Cities of Chiefland and Fanning Springs in Levy County. Several segments of US 19 in the Cities of Chiefland and Fanning Springs are designated as Class 5 or 6 facilities. Serious effort must be made to achieve the highest possible access classification along the entire corridor to preserve and enhance its viability as a major trade and tourist route. This effort will result in significant economic benefit to the region in the US 19 Corridor, quite probably outweighing the negative impact of some driveway and median closures.

All developments accessing the State Highway System must obtain a permit in accordance with Rule 14-96, Administrative Rules of the Department of Transportation, (Rule 14-96) which governs access permitting. The FDOT may stipulate conditions or additional requirements that must be met by the applicant/property owner before an access permit is issued.

ASSESSMENT OF CURRENT PRACTICE

The Cities of Fanning Springs and Chiefland, along with Levy County, have individual plans and policies that govern land development and access controls along the US 19 corridor. A detailed review of the Comprehensive Plan and Land Development Regulations for each jurisdiction was conducted to identify local access management policies and practices. This review was supplemented by staff interviews.

Although each of the communities have some access management policies relative to US 19, CUTR found that their respective land development regulations did not contain adequate measures to assure effective access management on the corridor. Table 2 summarizes the current practices as they relate to access management in each community.

Table 2: Current Access Management Practices

Technique	Levy County	City of Fanning Springs	City of Chiefland
Joint Access	YES	NO	NO
Driveway Design	PARTLY	--	PARTLY
Corridor Overlay	NO	NO	NO
PUD Zoning	YES	PARTLY	YES
Continuation of Streets	YES	YES	YES
Minor Subdivision Regulations	NO	YES	NO
Reverse Frontage	YES	YES	YES
Access Classification (State)	PARTLY*	YES	PARTLY*
Access Classification (Local)	PARTLY*	NO	PARTLY*
Driveway Spacing Standards	PARTLY*	NO	YES
Limits on Driveways	NO	YES	NO
Outparcel Regulations	NO	NO	NO
Flag Lot Standards	NO	NO	NO
Corner Clearance	NO	NO	NO
Minimum Lot Frontage**	YES	YES	PARTLY
Lot Width to Depth	YES	NO	NO
Retrofit Requirements	NO	NO	NO

*: The issue is addressed in the Comprehensive Plan, but not in the Land Development Regulations.

****:** In Levy County, minimum lot frontages range between 100 and 300 feet for commercial uses. The minimum lot frontage for all commercial land uses in the City of Fanning Springs is 20 feet. There are no minimum lot frontages for commercial land uses in the City of Chiefland.

In addition to the review described above, a group of corridor stakeholders were brought together in a workshop environment to learn about access management and to discuss approaches to improve access management on the US 19 corridor between Chiefland and Fanning Springs. Among others, participants included staff and public officials from the Cities of Chiefland and Fanning Springs, Levy County, the FDOT's District 2 Office, and the Withlacoochee and North Central Florida Regional Planning Councils.

Each of the participants was asked to identify access management concerns on the US 19 corridor between Chiefland and Fanning Springs. Participants were then divided into four groups and asked to list potential strategies that could be used to manage access in this area. Many of the strategies involved coordinating between both local and state agencies, whether through a coordinating committee, a community redevelopment agency, or standardizing regulations within an overlay zone. Finally, individuals were asked to write down at least one strategy that would improve coordination in access management efforts among the agencies with jurisdiction along the corridor. The specific responses are summarized below.

Access Management Concerns

- Lack of standardized development regulations between neighboring jurisdictions,
- Protection of the nature trail to the west of the US 19 corridor,
- Parking within the state right-of-way,
- Need for appropriate set backs from the state right-of-way,
- Acceptable development within the state right-of-way,
- Old plats containing narrow lots abutting the US 19 corridor, and
- Difficulty in maintaining agreements made with local governments due to turnover on the elected governing boards.

Suggested Access Management Strategies

- Establish a corridor coordination committee through an intergovernmental agreement that includes the cities of Chiefland and Fanning Springs, Levy County and the FDOT,
- Create a community redevelopment area to facilitate the reassembly of the small platted lots and the provision of additional off-street parking,
- Increase coordination between the FDOT and the local governments on access permitting and development permitting,
- Amend the existing land development regulations to: 1) increase minimum lot widths, 2) increase setback requirements, 3) increase landscaping requirements, 4)

- require shared driveways for adjacent properties where applicable, and 5) strengthen the sign regulation along the corridor,
- Improve the existing raised medians and add additional left-turn lanes along the corridor,
 - Develop new land development regulations to: 1) preserve the existing nature trail to the west of the US 19 corridor by maintaining the limited number of access points that currently exist, 2) preserve and improve the scenic character of the corridor in general, and 3) improve pedestrian facilities throughout the corridor,
 - Consider revising existing zoning to encourage the location of offices and other “destination” uses off of the corridor and into other areas of Chiefland and Fanning Springs where office development is desired.
 - Require overflow parking at the rear of properties and shared parking with adjacent properties along the US 19 corridor,
 - Increase public involvement (business owners, property owners, etc.) on access issues along the corridor,
 - Develop standard access management policies for each of the local governments (perhaps through an overlay district or joint planning district), but maintain flexibility with regard to implementation,
 - Develop redevelopment regulations that require site improvements to meet access management standards.

Suggested Coordination Strategies

- Cooperatively develop a multi-jurisdictional access management plan containing agreed upon broad standards and principles,
- Establish a special taxing and review district through an interlocal agreement to oversee development in the corridor and establish a funding stream to implement access management strategies,
- Establish a consensus building process, incorporating networking and public involvement activities, for setting access management standards and strategies,
- Promote the benefits of access management to the business community and property owners,
- Establish a joint monitoring process,
- Establish an ongoing corridor access management team, similar to groups established for the I-4 and I-75 corridors, with the purpose of promoting coordination and intergovernmental dialogue on access management issues, and
- Involve the regional planning council as a coordinator of a corridor access management planning process.

Based on the review of local Comprehensive Plans and Land Development Regulations and the information learned from the stakeholder workshop, CUTR developed a list of key findings of current access management practice. The key findings are as follows:

1. Portions of the corridor have been subdivided into long narrow lots that have the potential to create significant access problems on the corridor as they are developed. Commercial zoning of these properties has further exacerbated the problem and greatly increases the potential for strip commercial development with closely spaced driveways.
2. Because much of the frontage on US 19 has already been subdivided into narrow lots, preventing access problems will be challenging. However, improvements can be accomplished through a combination of policy and regulatory changes, intergovernmental coordination, and property owner cooperation. In addition, opportunities to address the problems have not yet been foreclosed, as many of the plats are not developed (e.g. Suwannee Heights). Some of the easements provided for roads have been vacated, but others remain (e.g., “Alabama Street” easement) and could be constructed.
3. The review of local comprehensive plans and land development regulations indicates that each of the communities on the corridor has incorporated some policies relative to access management in their comprehensive plans, but current regulatory measures are inadequate to manage access along the US 19 corridor. This will, in time, reduce the safety and carrying capacity of the facility, as well as the aesthetic character of the overall corridor.
4. The presence of a parallel and continuous County roadway and intersecting local roads offers an opportunity for providing alternate access to corridor properties. Old Fanning Road is a paved roadway with 80 feet of ROW that runs parallel to US 19. One mile was unpaved but is programmed to be paved by the County. It will be important that any supporting road network be developed in a manner that minimizes disruption of the nature trail to the west of the US 19 corridor.
5. All of the communities are interested in economic development of the corridor, although individual jurisdictions have varying objectives. Chiefland was described as the retail hub for the area and the recent Walmart has created additional growth potential on the northern edge of the City along US 19. Chiefland hopes to expand its retail area on the corridor, and to revitalize southern portions of the corridor outside of the study area that are experiencing decline. Fanning Springs was described as a bedroom community and is seeking to create a city center while capitalizing on its recreational and environmental resources to position itself as an eco-tourism destination. The County hopes to attract additional light industry into the corridor that would take advantage of area natural resources and bring additional employment into the area.

6. There is interest in preserving and enhancing the aesthetic character of the corridor, as well as implementing gateway treatments to enhance the image of area communities. There is some interest in pursuing a scenic byway designation in the future, which would further support corridor management objectives.
7. The segment of US 19 under study is within the jurisdiction of three local governments: Levy County, the City of Chiefland, and the City of Fanning Springs. Staff from each community noted that a set of uniform standards would assist their efforts to promote access management from a corridor-wide perspective. Effective implementation of the plan will also require active coordination with the FDOT on access permitting in accordance with the plan. It was also the desire of officials from each of the three local governments that the broader community be actively engaged in the process of refining the access management plan prior to adoption.

CONCEPTUAL ACCESS MANAGEMENT PLAN

Based upon the assessment of current practice and workshop results, a conceptual access management plan was developed for the US 19 corridor. The plan outlined steps that should be taken to improve access management in the US 19 corridor. These are summarized below.

1. The City of Fanning Springs, City of Chiefland, and Levy County should cooperatively adopt FDOT access management requirements for US Highway 19 and reinforce these through broad policies and guidelines that support access management on US 19. Some suggested policies and guidelines are as follows:
 - Establish minimum corner clearance requirements for US 19 and crossroad intersections with US 19 that conform with FDOT corner clearance requirements.
 - Establish that new lots may not be created on US 19 unless they meet the access spacing standards.
 - Establish that existing lots unable to meet the access spacing standards for US 19 must obtain access from platted side streets, parallel streets, service roads, joint and cross access, or the provision of easements.
 - Allow temporary access where necessary until such time that alternative access can be obtained. Exceptions should not be granted unless the property owner provides for shared access by easement. Require properties to obtain side street access as an alternative to direct highway access where it is available.
 - Establish that lots in residential subdivisions must obtain access from internal subdivision streets, and shall not be permitted access to US 19.
 - Require properties under the same ownership or those consolidated for development to provide a unified access and circulation plan. Such

properties and any outparcels should be required to obtain access from the unified access and circulation system.

- Establish redevelopment or retrofit requirements for nonconforming access situations. Existing access is allowed to continue, but must be upgraded in accordance with the access management plan when there is a change in use, expansion or reconstruction of the site.
 - Reduce reliance on US 19 for access by providing alternatives, including parallel roadways, interparcel connections, and side streets for local circulation.
 - Increase building setbacks outside municipal boundaries to preserve area for open space, landscaped buffers and/or trees, pedestrian ways, and on-site circulation systems along the highway. Increased setbacks help to preserve public safety, maintain development flexibility, and minimize property damage if the highway is widened in the future.
 - Update driveway and intersection design requirements to assure that they provide adequate geometrics for turning vehicles and do not result in traffic conflicts at the entrance. These may be based upon the new requirements currently being prepared by the Florida Department of Transportation.
2. From this plan, the communities should collectively develop standard access management requirements as part of an overlay district for the corridor that can be adopted by each local jurisdiction and which are consistent with those of the Florida Department of Transportation. The City of Fanning Springs, City of Chiefland, Levy County, and the Florida Department of Transportation should solidify their commitment to implementing the access management plan for the US 19 corridor through an intergovernmental agreement.
 3. Establish a process for coordination of FDOT access permitting with local development permitting through a concurrent state/local review procedure. Each local government and the FDOT should coordinate when reviewing proposed plats and development applications along the US 19 corridor to prevent access problems before they are created and assure conformance with the US 19 access management plan. This process should be formally established in each local government's land development code.
 4. Consider establishing a corridor management team made up of representatives of each local government, the FDOT, the Suwannee River Water Management District, and selected community leaders. The responsibilities of the team would be to assure continued coordination and commitment in the implementation of the access management plan. Other responsibilities could include scenic byways designation, economic development, or other areas of interest on the corridor.

NEXT STEPS

Upon completing the US 19 Conceptual Access Management Plan, efforts to implement the components of the plan began. Each jurisdiction approved a joint resolution supporting the CUTR findings as a basis for implementing coordinated access management decision-making in the corridor. The joint resolution also committed each jurisdiction to moving forward with efforts to standardize access requirements in the corridor and to establish a US 19 Access Management Committee.

The role of the US 19 Access Management Committee was to determine the most effective means to establish standardized access regulations in the US 19 corridor and to coordinate access management decision-making. The committee was comprised of representatives from each of the three corridor jurisdictions, the FDOT and the North Central Florida Regional Planning Commission (the regional planning agency).

After deliberation, the committee unanimously agreed to pursue the development of a US 19 Overlay District as the most effective mechanism for coordinating access management in the corridor. In December 2001, after several months of negotiation, the committee approved a draft US 19 Overlay District for consideration by the elected boards of each jurisdiction.

The adopted US 19 Overlay District will place additional access related requirements on properties that contain frontage on US 19 or has frontage on any road intersecting US 19 for a distance of 660 feet from the intersection and extends from the City of Chiefland through unincorporated Levy County to and including the City of Fanning Springs. The regulations in the US 19 Overlay District address such access management related areas as lot frontage requirements, connection spacing, corner clearance, joint and cross access, access to residential lots, unified access and circulation, local access roads, driveway location and design, bicycle and pedestrian access. The US 19 Overlay District also includes setback and landscaping requirements in order to establish an aesthetic continuity along the corridor.

The regulations of the US 19 Overlay District will not apply to existing permitted access connections. Properties with access connections that do not meet the requirements of the US 19 Overlay District shall be brought into compliance when modifications to the roadway are made or when there is a significant change in use of the property. The specific change in use criteria are outlined in the US 19 Overlay District.

The US 19 Overlay District also establishes a new committee called the US 19 Access Management Review Committee. The purpose of this committee will be to oversee implementation of the US 19 Overlay District and to promote consistency in review of requests for deviation from standards. The committee will be comprised of staff representing Levy County and the Cities of Fanning Springs and Chiefland. The committee will also establish procedures governing the review of requests for major

deviation from connection spacing corner clearance requirements of the US 19 Overlay District.

During the winter and spring of 2002, a public education effort will be carried out in the US 19 corridor area. The effort will include presentations to local groups such as Rotary clubs, Chambers of Commerce, and other civic and business organizations. The presentations will focus on the benefits of access management in general and the expected benefits of the US 19 Overlay District in specific. Information will also be made available to the local media in an effort to reach a broader audience. CUTR and the FDOT will be involved in this effort, as will the members of the US 19 Access Management Committee.

If approved, the US 19 Overlay District will represent a dramatic step forward in access management on the FIHS. It will serve as a model for the management of access on other FIHS facilities. The unprecedented cooperation and coordination between several local jurisdictions and the FDOT already serves as a model for what is possible in other FIHS facilities in the state. Even if the US 19 Overlay District is not adopted, the benefits of the planning effort and cooperation will long be felt in the US 19 corridor and the state.

A Case Study of Maryland's Access Management Program

by

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The purpose of this paper is to outline the process and procedures of how the State of Maryland's Access Management and Corridor Preservation programs have evolved to become one of the most unique in the country. The US 301 corridor is an example of some collaborative and innovative strategies that are currently being used.

Corridor preservation is the process of protecting rights-of-way along significant existing and proposed transportation corridors to keep transportation options open while permitting land use changes to occur in accordance with local plans. It is essential to achieve a balance between protecting the private property rights of landowners and the public's need to protect future transportation corridors. State Highway Administration (SHA) recognizes its importance as it promotes efficient land use patterns, lessens the amount of taxpayer dollars expended on future rights-of-way and prevents costly relocations that disrupt residences and businesses. It also promotes orderly development by integrating planning for land use and transportation facilities. When development occurs within a potential transportation corridor, construction of transportation facilities may become more complex and costly to the taxpayer. Many of the benefits of utilizing corridor preservation, include: improved safety and traffic-carrying capability of existing transportation facilities; promotion of orderly land-use patterns related to the existing and future transportation network since transportation and development projects will be/are coordinated by local and state planning, public works and transportation offices; reduced property impacts and fewer residential and business relocations; property owners can prepare development plans with knowledge of planned transportation improvements; less uncertainty about where transportation improvements may be located; stable communities and property values and the compatibility of development with transportation facilities and more efficient use of transportation funds (taxpayer dollars).

Access management is the process of balancing access for land development while preserving safe operation and mobility along the highway system as it can maintain or improve traffic capacity and safety. It is very important because access controls (limiting/restricting access points to highways) and traffic engineering techniques may be applied retroactively to a highway while providing sufficient accessibility for economic development. In many cases, eliminating vehicular conflicts often enhance the overall economic development potential of the corridor being served. Access management is currently used to preserve and enhance many non-controlled corridors on the Maryland Primary Highway System. Protecting these corridors is a high priority of SHA and the Maryland Department of Transportation (MDOT).

Corridor Preservation and Access Management

The SHA Access Management Program formally began in 1987 for the state's Primary Highway System. The goal of the program is to maintain and improve safety on designated primary roadways throughout the state. The team was designed to be cross-functional in its approach by including various departments and was formed to review access issues in selected corridors. Team members include the:

- Engineering Access Permits Division (EAPD) as they are responsible for submitting access permits, site plans and building permits to the team for review and comment and also serves as a liaison with the local jurisdictions;
- Office of Counsel (OOC) provides advice on legal issues;
- Office of Planning and Preliminary Engineering (OPPE) coordinates the team effort and monitors expenditures for the purchase of frontage and properties;
- Office of Real Estate (ORE) is responsible for the purchase of properties and frontage and

- Office of Traffic and Safety (OOT&S) provides advice on traffic related issues. As a part of local planning and permit processes, this team evaluates access proposals for new developments as well as redeveloping properties.

Most access improvements for subdivision plans, site plans, building permits and access permit applications are reviewed during the monthly meetings. Based on the dialogue at the monthly meetings, the team will develop and/or evaluate options regarding access for each plan and formulate recommendations for access. These recommendations are forwarded to the local jurisdictions for acceptance and in most instances, implementation. The team reviews all requests to determine if the property has alternate access to the highway and if not, can alternate access be provided. If it is determined that the property has an alternate means of access, i.e. another public road, the team will try to obtain access controls along the part of the property that has frontage on the highway. The team then makes a recommendation to the local jurisdiction that the site use the alternate means of access. In another instance, if alternate access will be via a future service road, the team again tries to obtain access controls along the part of the property that has frontage and issues a "temporary" access permit. These are issued until the service road is constructed and then the direct access point will be closed. Finally, all access to and from that property will be via the service road. In some cases, property and control of access may be required.

Some other guidelines that the team examines includes limiting/closing crossovers to provide adequate merge distances; providing full movement intersections at arterial and collector roads, most other public roads will be limited to right-in/right-out; in rural areas the desired objective is ¼ mile spacing for public road intersections and parcels with alternative access and redirect their future access to the alternate access. Additionally, OPPE has developed access management concepts for most of the corridors under their purview. These concepts are developed in coordination with the local jurisdictions and are used to guide the development and re-development of corridors. They are also used to monitor purchases and access management decisions such as the location of public road access points and where temporary access permits are issued. These plans are flexible and are intended for implementation through the local jurisdiction's development process. All of the strategies mentioned above are used in separate, monthly meetings conducted with the counties to continue the dialogue on access management and corridor preservation.

In 1990, the team realized that working through the local development process was one tool to have access restricted via site plan notation. However, the team believed that an increased level of access control was needed and requested that SHA Senior Management create a funding mechanism for the purchase of access controls. This money was initially targeted for the purchase of agricultural controls in the US 50 corridor. This corridor is a thruway service to the Maryland/Delaware Peninsula and ocean resort area. The travel corridor is over 90 miles in length and serves regional summer beach traffic from Washington, DC and Baltimore, MD as well as local/commuter traffic. This technique has been successfully applied in rural areas where agricultural frontage is fairly inexpensive, in comparison to the commercial and residential frontage costs in urban areas. The SHA leaves breaks in the frontage for future development of the parcels. These breaks are allocated for the use of public roads only. As noted above, the establishment of a funding source for all access management corridors has been a key factor to the program and more importantly shows commitment from the State of Maryland in supporting access management techniques.

Lessons Learned

Successful access management and corridor preservation involves and depends on the cooperation and coordination of several levels of government, property owners seeking to develop their land, adjacent property owners, and other transportation corridor residents of the surrounding community. Two of the primary issues that must be determined to protect and preserve right-of-way are the timeframes required to identify the corridors and the planning of where future transportation facilities may be located. Some of the delays are a result of proposed transportation improvements that can be associated with the National Environmental Policy Act (NEPA) of 1969 and State project planning processes that identify environmental concerns associated with specific proposed projects and then avoid and/or minimize and mitigate environmental impacts. Some examples include:

- Funding is not readily available to purchase future right-of-way without a selected alignment causing MDOT to be hesitant about budgeting monies in the absence of clearly identified transportation corridors. Many project corridors travel through more than one jurisdiction requiring an abundance of coordination and cooperation from them;
- Lack of property owner knowledge regarding participation in the planning for the development of their land as it may be affected by proposed transportation improvements and
- Changes in policy, elected and appointed officials can sometimes create an environment that alters the direction by local and State agencies based on attaining balance between individual property rights and the public interest.

Obtain Controls through the Local Development Process

The team works through the local development process. At the time the site plan is initiated, the team reviews and recommends a limit on the number of access points for a site or they may redirect the access to the lesser-traveled roadway. The team may also request the donation of access controls at the time of review. The SHA team is in the process of developing a prototype deed that can be used to obtain the access controls in the name of "State Highway Administration."

If the county agrees with the recommendation, they put a notation on the site plan indicating the access denial except where approved by SHA. The team considers this technique as restricting access via the local development process. The property owner normally accepts the conditions of the site plan approval. The frontage is considered restricted because the controls are not deeded to the SHA.

Examples

MD 2/MD 4

The MD 2/MD 4 corridor in Calvert County Maryland exemplifies access management through the development process. Presently, the corridor has 188,900' (35 miles) of frontage and SHA has secured 940' of controls via the access permit process. The county has restricted access to 22,000' of frontage on MD 2/4 for a total of 13% (23,000'-4.3 miles) of restricted frontage.

US 301 Corridor

Maryland SHA is conducting a study on approximately a 50-mile portion of the US 301 corridor. The study purpose is to develop transportation solutions that integrate existing and proposed land use and growth management, local community issues, and environmental protection. Transportation options are needed to provide for local commuter and the through movement of people in a safe, efficient, environmentally sensitive, cost-efficient manner. The ultimate goal of the study is to receive Location

Approval for a selected alternative that can be constructed once funding becomes available. Currently, the US 301 study is hold but access management and corridor preservation activities are on going.

SHA made the decision to apply Corridor Preservation and Access Management strategies to the US 301 Corridor because rapid development is reducing the options for major, future transportation improvements in the area. The project need stems from the significant amount of growth within the region, as US 301 is one of the most important roadways in both Prince George's and Charles Counties. This roadway spans 50 miles across the region and serves as one of the two region's primary commuting and shipping route, and is the "Main Street" for many of the area's business districts. Many new bedroom communities are situated along US 301, as they are primarily suburban in nature but have the ease of access to Washington, D.C. Many of these patterns of growth and development have contributed to increased travel demand and congestion, and this trend is expected to continue. Also, the job/housing imbalance in the area is another reason for the current and projected traffic congestion.

What We've Learned So Far

Moreover, the Corridor Preservation and Access Management program has proved that coordination between various governmental entities is the key to its success. For example, instead of always purchasing impacted properties along project alignments, dedication and reservation policies have been developed for both Prince George's and Charles Counties.

In Prince George's County, dedication is the provision of land for use as a public right-of-way and is generally required when there is a direct benefit from the planned roadway facility development proposed. Their reservation policy delays permitted development for a limited timeframe (a three year period, unless agreed to by the property owner) to allow for government acquisition of the land. Reservation is generally established when the land needed for right-of-way and does not have a direct benefit to the development proposed. Properties in reservation are exempt from all State, County and local taxes during the designated reservation period. At the end of the reservation period, the land may be purchased by a public agency, remain in reservation for another established period of time by mutual consent between the landowner and the government agency and may be developed by the landowner. Charles County is in the process of implementing a three-year reservation process similar to Prince George's County but they have initiated their first Memorandum of Understanding for a parcel.

Two types of continuous coordination are involved in Maryland. The SHA Access Management Team meets monthly to get updates and make decisions/requests on a variety of projects as mentioned above. A second set of meetings is held separately with representatives from the counties. At these meetings, the team discusses all of the existing and proposed projects in addition to any problems or issues related to the affiliated corridors. Some of the options that may be discussed include purchasing land for future right-of-way when transportation options may be foreclosed by development. The early purchase of right-of-way reduces acquisition costs and saves future relocation costs while allowing transportation options to remain open. The option to purchase land or development rights is spread out over an extended period of time. This enables governmental agencies to protect more land for future right-of-way use by locking in future purchases at current rates and buying with a lease back option (via purchasing a parcel or portions of a parcel of land needed for transportation purposes and then leasing it back to the prior property owner) enables property owners to use the property until it is actually needed. These strategies do not predetermine alignments because if the property is not needed, it is sold at a later date. Finally, dedication or reservation generally is determined at the time of preliminary plat subdivision submittal. A reservation request can be initiated upon denial of a building permit within a master-planned right-of-way.

Next Steps

Overall, all parties associated with the Corridor Preservation and Access Management program are pleased with the outcome of the project and are looking for ways to improve the existing program. Some of the new tools that are being coordinated are the implementation of a “Smart Map” and long-range access management plans for the corridor. Combined, these techniques will help manage access along corridors.

Smart Map

The smart map concept was designed to give all team members a graphical illustration of all property owners that are impacted by the proposed alignments of the US 301 project. Since its original inception, the map has developed a variety of uses from various team members. The purpose of the Smart Map is twofold - present SHA staff with a map of properties located within the US 301 Corridor as well as helps identify the parcels that are impacted by the proposed alignments. Parcels are color-coded by the current property status – purchase (protective, hardship or willing), in-negotiations, in active, reservation or owner refused offer. By virtue of the smart maps’ purpose, it has helped identify and track access management and corridor preservation techniques along the corridor. The base of the mapping is from “Maryland Property View,” an existing map and database of tax information compiled by the Maryland Department of Planning. Also included as part of the project, is a specific database that of property owners and statistics that have been developed. The database fields include items that are related specifically to the properties such as: county, map number, parcel number, area in acres, owner name and address, zoning, year built, location description, purchasing information, notes, date and status of SHA negotiations, existing right-of-way, county setback line and any dedications. By utilizing this mapping and database combination, the team will have as much information as possible regarding parcels recorded.

Long Range Access Management Plans

Long-range access plans are used to guide both development and redevelopment of property to determine where future access can be located. These plans are being developed corridor wide in partnership with the local governments. Long-range access management plans have been developed for the MD 2/4, US 50 and US 301 corridors. For example three options, all with varying levels of disruption to existing US 301 have been shared with Charles County.

The key to success of Maryland’s access management program is the continued coordination of operations between local jurisdictions and SHA along existing highways in order to protect and enhance existing transportation facilities. Access management balances the provision of access to accommodate land development, while achieving safe traffic operations along the existing highway system. Safety is closely linked to the number of access points along a highway and accident rates are significantly higher on highways without access control. Overall, all of the steps mentioned throughout this paper have allowed the State of Maryland to achieve an initial level of satisfaction in terms of access management techniques. The team will continue planning for the future of the region through the use of these applications.

DELAWARE EXISTING CORRIDOR CAPACITY PROGRAM

BACKGROUND

It had long been recognized that there would be an ever increasing level of traffic heading up and down the SR 1 corridor, from south of Dover, to the resort and beach community in the vicinity of Rehoboth Beach. Around 1990, it was determined that the most appropriate and cost effective method of dealing with this situation, would be to embark on a project to maintain SR 1 roadway capacity, and avoid having to eventually build a new alignment project. As part of an FHWA pilot project, the Delaware Department of Transportation (DelDOT) initiated its Corridor Capacity Preservation Program (CCPP) along the 35-mile stretch of roadway from just south of Dover, to the north end of the Rehoboth Beach area (known as Five Points).

The primary goals of the CCPP were to:

- ✓ Maintain or improve vehicular capacity of the existing roadway;
- ✓ Preserve long-term improvement capability;
- ✓ Continue to accommodate adjacent economic development; and
- ✓ Eliminate the need to build a roadway on new alignment in the future.

The tools established to accomplish the CCPP goals included;

- ✓ Apply local government land use controls;
- ✓ Restrict property entrances under DelDOT's police power;
- ✓ Acquire property interests;
- ✓ Provide engineering services to developers to ensure that proposed development was compatible with transportation needs;
- ✓ Negotiate agreements with developers to provide access, and to preserve land adjacent to the highway for future construction needs; and
- ✓ Plan for infrastructure improvements.

After several years of experience with the SR 1 Corridor Preservation Capacity Program, DelDOT determined that a similar approach should be taken with the two other primary North/South roadways in Southern Delaware. Accordingly, in 1997 the portions of Routes 13 and 113, south of Dover, were formally incorporated into the Corridor Capacity Preservation Program. With the blessing of the State legislature, and the Sussex and Kent County governments, DelDOT embarked on a large-scale program to make the general public aware of the goals and objectives of corridor capacity preservation adjacent to SR 1, US 13, and US 113.

In the southern half of Delaware, the three arterial highways that carry regional traffic serve a critical function for the State in moving people and products. Historically, because developers want to feed off the regional traffic, these arterial highways have been a magnet for development. The long-term effect has been to create areas of congestion that result from the confluence of the regional traffic and local trips. These areas degrade the highway's ability to perform its intended function, and also create safety problems. The primary goal of the CCPP is

to preserve the ability of these roads to perform their intended function, while allowing development to occur within defined growth areas, yet not necessarily with direct access for each property. Through the creation of a local road network, DelDOT intends to separate local traffic from regional traffic on the highway. Therefore, local residents will not be reliant on the arterial road to access everyday services.

Although the goals and objectives of the CCPP are the same, a slightly different approach was taken on each of the three primary corridors. Since the 35 miles of SR 1 pass through mostly agricultural and rural residential areas, the preservation goals are to restrict virtually all new access points onto the roadway. In those few areas where light commercial development is already in place, the goal is to try to eliminate some of the existing access points by providing alternative access via service roads.

Much of the existing land use adjacent to US 13 in the 46-mile segment from south of Dover to the Maryland State line is already zoned commercial, and the goal of current corridor preservation is to confine future commercial development to the designated growth areas. Those areas outside of the defined growth areas are to be treated with a similar philosophy as exists for SR 1. Agreements are being reached with local officials as to just where the growth and development boundaries exist.

The US 113 corridor program extends for about 33 miles, from south of Milford to the Maryland State line. This corridor is being treated similar to the US 13 corridor, with the understanding that US 113 is currently much less commercially developed than US 13. Accordingly, the US 113 corridor falls in-between SR 1 and US 13 in terms of level of intensity of preservation actions.

In furthering the goals of corridor capacity preservation, DelDOT has prepared various brochures and policy statements, which set out the philosophy and goals of the CCPP. Numerous public meetings have been held throughout the region, and separate meetings have also been held with County and local government officials. In general, there appears to be only minor opposition to the overall direction of the CCPP, and both Kent and Sussex County officials have agreed in principle, not to approve any zoning changes, which would allow for more intense development with direct roadside access, outside of the recognized development areas.

METHODOLOGY

In all areas outside of the designated development zones, DelDOT's goal is to not allow any new or expanded direct access onto the roadway, and to eliminate existing access points, if possible. Any time a property owner, in conjunction with existing zoning, desires to either add a new access point, or expand an existing access point, application must be made through the appropriate County. Representatives of both Kent and Sussex Counties have agreed that any such applications must be sent to DelDOT for access and driveway approval. For the most part, the CCPP focus is to wait for property owner development action or activity, and can be considered more of a reactive, than proactive, mechanism.

Upon receipt of a property owner proposal to either add a new, or improve an existing driveway

access, the DelDOT Subdivisions Section will first review the proposal to assure that the proposal is in keeping with existing zoning. After it has been determined that the development proposal is lawful, a review will be done to see what alternatives are available to the property, which will allow for the development, but will reduce any impact to the primary highway. The best example of a reasonable alternative would be where a property has access rights to both the primary, and also to a secondary highway. In this situation, DelDOT would insist that the property only be allowed access from the secondary highway. When no secondary access point is available to a particular property, DelDOT would look to either combining access points with other properties, or any other solution that could achieve the CCPP goals. It is one of the basic understandings of the CCPP, that DelDOT will pay appropriate compensation to any property owner who suffers a taking due to diminished highest and best use of property rights.

DelDOT also takes into account the fact that future development would best be accommodated by the construction of local service roads in some areas, and has made tentative determinations of where those service roads would be. When a property owner in one of these service road locations requests approval to proceed with development, DelDOT will require sufficient setbacks, in order to allow for the construction of future roads. DelDOT has also made tentative plans for future intersection grade separations at specific locations, where it appears to be appropriate. This grade separation plan has been completed regarding SR 1, and is currently underway with regard to US 13. As a general policy, DelDOT is not permitting the installation of new traffic signals within the guidelines of the CCPP, and the hope is that future roadway grade separations will enable the elimination of some existing traffic signals.

Throughout the access review process, DelDOT officials include the property owner in deliberations as to how best allow for legitimate property development, while achieving the CCPP goals of no diminished roadway capacity. If a particular property owner does not have alternate access other than directly onto the primary highway, a partnering approach is sometimes achievable. It is often possible for one owner to purchase access rights across the property of a neighbor, thereby providing an acceptable access situation. DelDOT officials may facilitate communications in these situations, and pay the reasonable costs to effect a compatible solution.

CONFLICTS AND ACQUISITIONS

Whenever a property cannot be developed to its lawfully zoned highest and best use due to CCPP restrictions, consideration must be given to purchasing those development rights in some manner. Prior to 1996, DelDOT officials did not believe that they had the authority to condemn for access actions under the CCPP, and therefore relied on either a friendly condemnation to determine value, or else forced the affected property owner to initiate an adverse possession lawsuit. In 1996, the State of Delaware enacted legislation in conjunction with the CCPP, which gave DelDOT the right of condemnation.

Under its condemnation authority, DelDOT has a variety of tools available to meet the objectives of the CCPP. Depending upon the particular circumstances of each situation, DelDOT could possibly acquire full or limited access rights, acquire development rights to the parcel of land, or

acquire the property in full fee title. Any particular decision would take into account the economics of the situation, along with the wishes and desires of the property owner. It is important to know that all DelDOT actions are undertaken in hopes of having a cooperative arrangement with the property owner. All involved, understand that this CCPP is being undertaken as a joint effort to maintain existing roadway capacity and to improve the overall quality of life for those living in the immediate area. The CCPP would certainly be doomed to failure, if antagonism became widespread and the CCPP was widely viewed with distrust.

Whenever DelDOT determines that a fee title acquisition is the most appropriate method of eliminating access conflicts under the CCPP, that particular acquisition must obtain the approval of a State Legislative Committee. Additionally, if the fee acquisition is to involve over five acres of land or \$250,000, there must be a public notice of the proposed action. Acquisitions of either access or development rights, are currently exempt from these oversight rules.

CURRENT SITUATION

The CCPP, which began with one 35-mile length of roadway in 1990, has now expanded to three separate roadways totaling over 100 miles in length. Within these over 100 miles, there are several segments of roadway inside municipal boundaries and County growth areas, which are designated as transportation investment areas. As both involved County governments are acting in cooperation with the CCPP, any lawful new access proposals are forwarded to DelDOT for consideration and approval. Due to extensive public outreach, many property owners are fully aware of the CCPP goals and objectives, and may contact DelDOT directly to discuss their development proposals.

Since the CCPP began in 1990, 32 individual property actions have been resolved and completed, utilizing a wide variety of approaches. A total of \$7,144,165 has been spent in order to effect the CCPP goals, and there has been only one condemnation action that occurred in an unfriendly atmosphere. At the present time, there are 21 open actions in some stage of the appraisal process, where an additional 2.5 million dollars is expected to be spent. The Delaware legislature has committed 33 million dollars towards funding the CCPP through FY 2006, and it is expected that adequate funding levels will continue to be maintained beyond that point. In addition to this particular Corridor Capacity Preservation Program, DelDOT has undertaken an effort to develop an overall Statewide access management program, which will set policy for roadway access on all State roads and include the CCPP.

ISSUES OF CONCERN

Although there are numerous controversial issues in this innovative Corridor Capacity Preservation Program, it appears that most of these issues can be summarized under four basic headings; consistency of treatment, Program acceptance, cost considerations, and development areas.

1. Consistency of Treatment -

After several years of managing the CCPP, it has become evident that how each of the various situations is handled, is a major concern. The problem is that while many situations may be quite

similar in nature, there are always a variety of subtle differences, which can make resolution of the matter appear to be inconsistent. An example would be where a particular property only has direct access to a primary highway, which DelDOT will not allow to be expanded due to CCPP considerations. If that property owner is on good terms with a cooperative neighbor, it may be possible to purchase alternate access to a secondary road, across the neighbor=s land, thereby allowing for the original property to be developed, while paying a comparatively nominal cost for the access rights. In a similar situation down the road, the original property owner may not be able to purchase any alternate access due to the lack of cooperation from neighbors, and DelDOT could then be forced to purchase the development rights to the entire parcel, at a much higher total cost. In reviewing these two similar situations, someone not familiar with the CCPP would certainly have to question whether this inconsistent treatment can be justified. In general, DelDOT will evaluate all potential options and seek to purchase the least property interest necessary to accomplish the CCPP goals.

Over the past several years of CCPP enforcement activity, there have been numerous situations where relationships with neighbors (including neighboring family members), have played significantly with acquisition options. The fact of the matter is, that no matter how similar property situations may appear to be, a wide variety of outside factors can drastically alter the approach that DelDOT needs to take to accomplish CCPP goals. The timing and conditions of past zoning actions may also play a significant role with regard to the legal land use rights of individual parcels of land. Once again, two similar looking properties may have quite different legal land use entitlements which drastically impact DelDOT=s legal obligations.

2. Program Acceptance -

There is no question that the CCPP relies on the continued support of Statewide legislators, local politicians, and the general public. County support is necessary in order to prevent any further degradation of access onto the primary roadways. Through its zoning authority and use of police power, authorities within the two Counties can assure that no new actions lead to the creating of additional access points. Anytime any property would be granted more intense land use options that rely on primary roadway access, the ultimate cost of the CCPP goes up.

The key to CCPP acceptance in an endeavor such as this, is to try to assure that no particular individual or group comes to feel that they are encountering a disproportionate loss or impact. Since this is an innovative and costly program, any particular complaints of unfair treatment would likely receive some amount of attention. The cooperation of the local communities adjacent to the various corridors is integral to the success of the overall CCPP, and although traffic movement is very important, the economic well being of their community will always be the greatest concern. In this regard, it is of utmost importance that the various communities feel that their economic growth needs are being considered in the way the CCPP is constituted.

3. Cost -

In order to advance the project goals, it is often necessary to purchase and extinguish the existing legitimate access rights of property ownership. It is impossible to accurately estimate the eventual total cost of the CCPP, due to a multitude of unknown variables. To date DelDOT has

completed acquisition actions on 30 properties at a cost of about 6.8 million dollars. Nineteen additional property actions are in the pipeline, with new actions being initiated all the time. The ultimate cost of the CCPP is highly dependent upon the manner in which all the remaining property rights matters are handled. Some of the many other factors which will impact CCPP costs include; property value rate of inflation, availability of alternate access (via either service roads or secondary roads), and cooperation and acceptance of the CCPP.

4. Development Areas -

In order to accommodate economic development in conjunction with the CCPP goals, DelDOT officials have met with a variety of County and local officials to set out guidelines for roadside economic development. As a result of these meetings, a general agreement has been reached whereby a series of transportation investment development zones have been identified adjacent to US 13 and US 113. Within these development zones, temporary entrances to the corridor will be permitted, along with the acceptance that some degree of roadway capacity may be compromised. The areas outside of the development zones are known as rural areas, and this is where no new direct access to the corridor is permitted.

SUMMARY

In order for the CCPP to ultimately be successful, it needs to be carried out to the point whereby outside development pressures will be unable to undo the effectiveness of the in-place controls. The eventual success or failure of the CCPP is highly dependent on a continuation of high levels of funding, and the perseverance to carry the CCPP forward for many years to completion. Although it is difficult to provide any accurate estimate, there is little doubt that the CCPP will exceed an additional ten years of activity, at an additional cost of well over 50 million dollars.

The real risk is that the CCPP will be canceled or significantly altered at some point before it reaches a critically effective stage. There are over 100 miles of regionally important roadway that require access development protection under the CCPP, and to date only a small percentage of this protection has been secured. At the present rate of activity, we are still many years away from being able to declare any measure of true success. It is safe to say, that if the CCPP were to be terminated at any time in the near future, most of the millions of dollars already expended would have contributed to a substantially diminished return on investment.

The two most dangerous potential threats to the CCPP future would seem to be the loss of adequate funding, or loss of local support. At its present pace, the cost of acquisition rights seems to be about two million dollars per year, and this figure could rise significantly depending upon the pace of development and the rising land values. One inadvertent impact of the CCPP, is that as the CCPP tends to eliminate development with direct roadside access on a parcel-by-parcel basis, the remaining parcels also tend to become more valuable due to limited availability. As the CCPP advances and becomes more costly, the State administration will have to continue to maintain adequate funding. If at any future point, DelDOT is financially unable to compensate for access restrictions, the entire CCPP could collapse within a very brief period of time.

Just as important as adequate funding, is the long-term local support for the CCPP. Local

authorities are responsible for zoning actions, which can ultimately make or break the CCPP. As long as the local authorities maintain a policy of limiting future direct access growth to the designated growth areas, the CCPP should be able to function under controlled conditions. If any exceptions are made, there will be the opportunity for wide-scale skepticism to begin destroying the CCPP. Although local authorities may certainly believe in the ideals of the CCPP, the economic well being of their individual communities is still of utmost concern. If these authorities should get the feeling that their particular community is suffering any disproportionate impact as compared to other communities, DelDOT could lose the cooperation, which is absolutely necessary for CCPP success.



Access Management Techniques at Interchanges

Moderator:

Douglas Landry, AICP

Associate/Senior Project Manager

Vanasse Hangen Brustlin

 **Slides**

12A. Access Management at a High-Volume Interchange

Jerry Gluck PE., P.T.O.E.

Senior Vice President

UrbiTran Associates

 **Paper**

12B. Comparison Of Operational Characteristics Of Single Point And Tight Diamond Interchanges Using Computer Simulation And Modeling

Joe Bared, Ph.D., P.E.

Research Engineer

Federal Highway Administration

 **Slides**

 **Slides**

12C. INTERCHANGES FDOT Approval Process And Access Management Techniques

Joe Santos, E.I.T.

Transportation Engineer/Planner

Florida Department of Transportation

Access Management at a High-Volume Interchange

Jerry Gluck, PE, PTOE
Urbitran Associates, Inc.

5th National Conference on Access Management
June 2002

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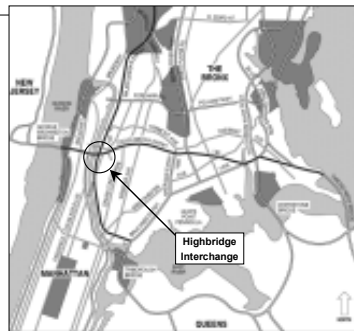
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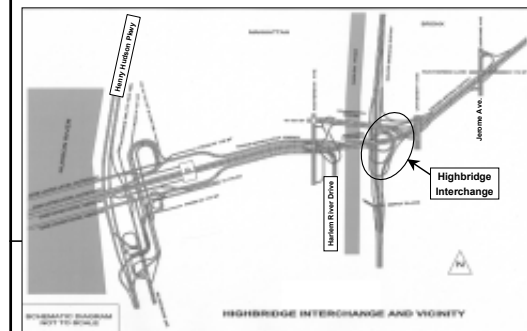


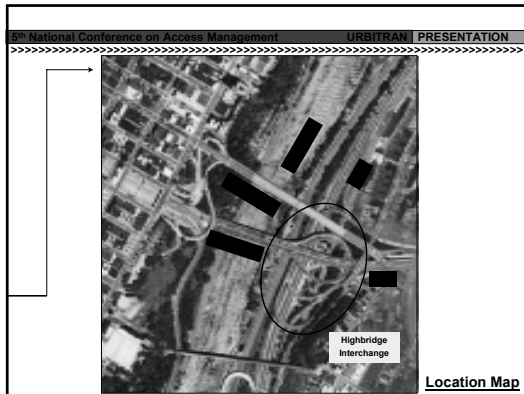
Basic Principles of Access Management

- Limit the Number of Conflict Points
- Separate Conflict Points
- Separate Turning Volumes from Through Movements
- Maintain a Hierarchy of Roads by Function
- Limit Direct Access on Higher Speed Roads
- Locate Traffic Signals to Facilitate Traffic Movement



Area Map





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**Ramp Peak-Hour Volumes:
from Cross Bronx Expwy**

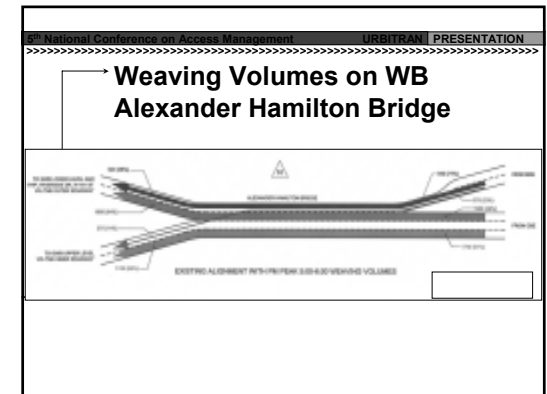
From	To	
	NB MDE	SB MDE
EB CBE	1370	990
WB CBE	645	435

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**Ramp Peak-Hour Volumes:
from Major Deegan Expwy**

From	To	
	EB CBE	WB CBE
NB MDE	425	595
SB MDE	510	620

- 5th National Conference on Access Management URBITRAN | PRESENTATION
- Problems**
- Traffic Congestion and Queues
 - Weaving Problems on EB and WB Alexander Hamilton Bridge
 - High Number of Accidents Identified on Major Deegan and Cross Bronx Expwys
 - Nonstandard Geometry on Helix Ramps – Especially a Problem for Trucks





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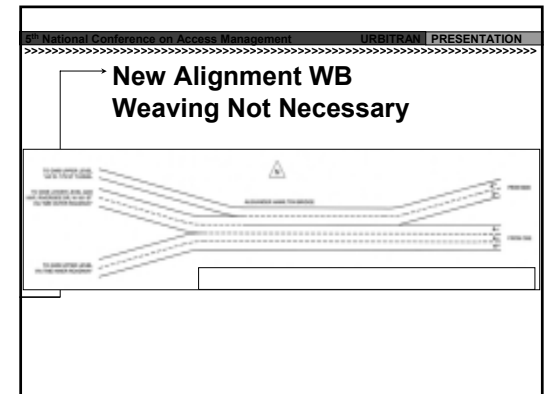
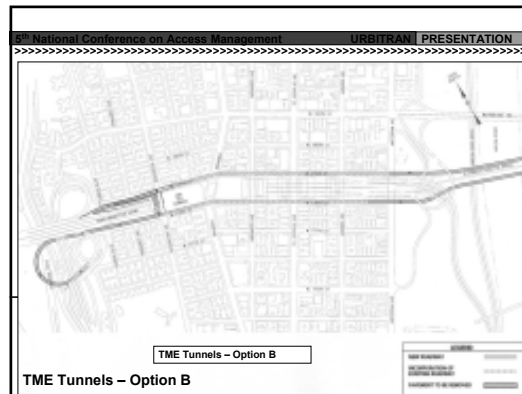
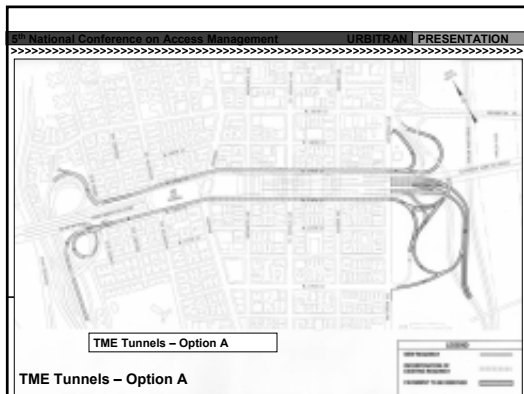
→ **Screening of Potential Alternatives**

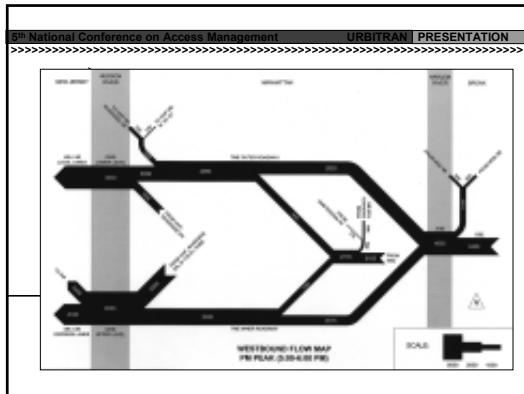
- ♦ Major Flaw Analysis
- ♦ Steering Committee and Working Group Feedback
- ♦ Implementation Potential
- ♦ Consistency with Study Issues and Goals

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→ **Improvement Options**

- ♦ Provide Additional Storage on NB and SB Major Deegan Expwy Exits
- ♦ Restore Trans-Manhattan Expwy Tunnels at W. 178th and W. 179th Streets
- ♦ Construct New Bridge Across the Harlem River for WB Movement from the Major Deegan Expwy
- ♦ Construct Cross Bronx Connector Road

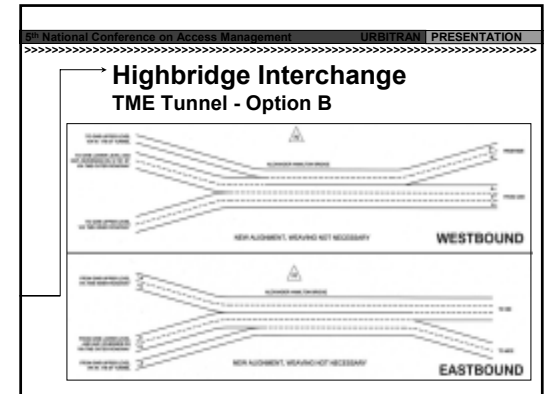




Highbridge Interchange

General Information

- Under the Jurisdiction of the New York State Department of Transportation (NYSDOT)
- Located in the Bronx but also Influences Upper Manhattan Traffic
- A Set of Multi-Level Helix Ramps, Completed in 1963
- Processes Approximately 6,000 Vehicles per Hour During Peak Periods
- Interstate Connection between the Major Deegan Expressway (I-87) and Cross Bronx Expressway (I-95), Both are Regional Truck Facilities



COMPARISON OF OPERATIONAL CHARACTERISTICS OF SINGLE POINT AND TIGHT DIAMOND INTERCHANGES USING COMPUTER SIMULATION AND MODELING

Joe Bared, FHWA

Alvin Powell, Howard University,

Evangelos Kaisar, University of Maryland

ABSTRACT

Although the single point interchange (SPI) has been around for approximately three decades, users do not yet have a simplified procedure to evaluate its traffic performance with its closest configuration, the tight diamond interchange (TDI). Several studies have derived ambivalent results that are general in nature without decisive conclusions, or without tools to assist the users in the selection process. This study uses simulation modeling to compare operational traffic performances of the SPI and the TDI. Modeling was conducted on prototype geometries that are similar and representing a wide distribution of traffic flow conditions. The 101 scenarios were run for each of the SPIs and TDIs to derive control delay, stop time and percent stops from CORSIM. The multivariate statistical comparison of all three variables combined showed a significant difference between the two interchange types favoring the SPI. The TDI created more delay, stop time and percent stops when the left-turn off-ramp flows are high. Regression models were derived to estimate the three measures for each of the SPI and the TDI. The models are robust and are functions of the flows on the cross-street and off-ramps. These models are tools to help planners in the evaluation and selection process of interchanges.

INTRODUCTION

Some studies have examined the operations of single point interchanges (SPI) and tight diamond interchanges (TDI). These two interchange types share many similar characteristics, but each has its own distinguishing features. Much of the literature comparing the two interchange forms examined different parameters (e.g. discharge headway and startup lost time) of each interchange type as traffic volumes vary. The literature seemed ambivalent in recommendations regarding the application of the SPIs and TDIs. Selinger, et. al. (2000) used microscopic computer simulation modeling and showed the SPI consistently outperforming the TDI. However, his conclusions are based solely on three traffic scenarios. Fowler (1993) conducted a comparison between SPI and TDI using 12 scenarios of balanced and unbalanced flows. The TRANSYT-7F analysis tool used favored the SPI in terms of lower v/c ratios when using constant cycle lengths of 120 seconds for both the SPI and TDI. Hook, et. al. (1992) examined operational parameters of Diamond and Single Point Interchanges located in metropolitan Phoenix and except for clearance time for left turn movements on ramps and through movements find no significant difference in the operational parameters examined. Hook however, suggests that his results may be location dependent. Garber, et. al. (1996) revealed no significant difference in the overall average delay between SPI and diamond interchanges (DI) using traffic simulation modeling. They noted a higher increase in delay for the DI at higher volumes. In a subsequent report Garber, et al. (1999) concluded that the SPI operated at level of service (LOS) D or better at total entering volumes 5,500 vph or less,

while the DI operated at the same LOS D for total entering volumes 4,500 vph or less. Fifty different scenarios of traffic flows were analyzed in CORSIM. Despite its strength, Dixon (1997) identified a limitation within CORSIM relevant to this research. Discharge headway and startup lost time are assigned at the link level instead of being movement specific. Sources indicate discharge headways and startup lost times often vary significantly between movement types. Because this model does not allow movement-specific entries with regard to headways and lost times, it probably loses some resolution with respect to movement-specific measures of effectiveness (MOE's). Hook (1992) provides parameters for calibrating discharge headway and startup lost time for both the single point and the diamond interchange. Dixon, however, provides parameters only for calibrating the single point interchange. The values of discharge headway and the startup lost time provided by Hook and Dixon vary in both magnitude and characterization.

Finally, Bonneson, et al. (2002) have devised a deterministic procedure to compare interchange types by establishing a relationship between interchange delay and sum-of-critical-flow-ratios. The procedure combines the effect of signal phase sequence, traffic volumes, number of lanes and saturation flow rate. The results have revealed that a 4-phase SPI yields less delay than either a 3- or 4-phase TDI. A larger ramp separation distance greatly reduces further delays for the TDIs.

This research has two main objectives: 1) to conduct a traffic analysis comparison of the TDI and SPI, and 2) to create simple planning models for estimating operational parameters of two interchange types the 3-phase SPI with 3-phase TDI. Unlike the Bonneson study, the 3-phase SPI does not accommodate neither a frontage road nor through movements from the off-ramps to the on-ramps.

CHARACTERISTICS OF THE SPI AND TDI

The Single Point Interchange (SPI) illustrated in Figure 1 is also known as the Single Point Urban Interchange (SPUI). It is similar to the Diamond Interchange except that the ramp terminals are joined into one crossing with one signal. It is characterized by the ability to allow concurrent off-ramp left-turns.

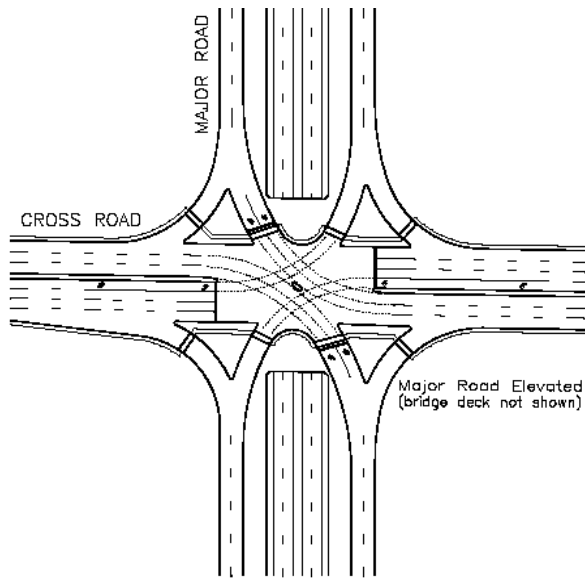


Figure 1. SPI Interchange (Messer et. al. 1992)

The Tight Diamond Interchange (TDI) illustrated in Figure 2 is characterized by two closely spaced intersections where the ramps terminate at the cross street. Generally, these ramps are perpendicular to the cross street. Two coordinated traffic signals are used one at each intersection.

Diamond interchanges are the most common types of design, while SPIs are still gaining popularity. Tight diamond interchanges with off-ramp terminal offsets ranging from 200 to 400 ft are an alternative to the SPI with reduced construction cost and limited right-of-way requirements

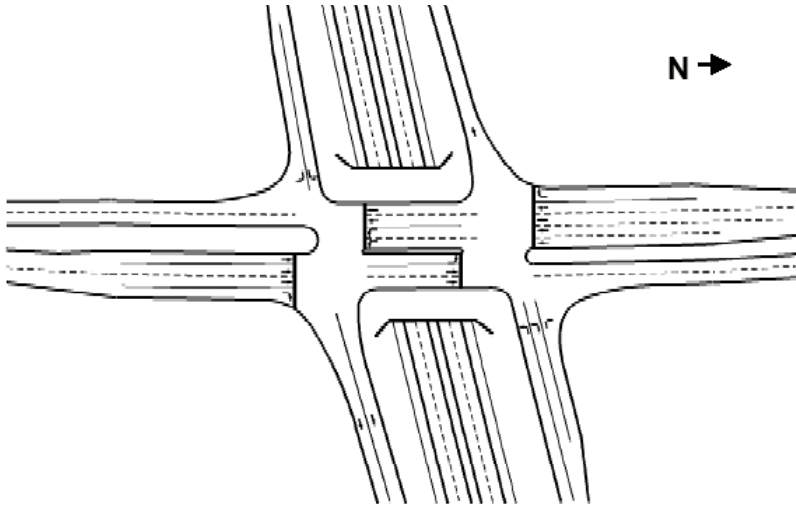


Figure 2. Tight Urban Diamond Interchange (Selinger 2000)

ANALYSIS METHODOLOGY

The traffic analysis procedure relies fully on traffic simulation modeling using CORSIM. The steps of the analysis procedure are illustrated in Figure 3. Volumes and geometric data were entered into TRAFED (a graphical user interface for CORSIM) and the appropriate traffic signal optimization packages. The optimized timing, offsets and phasing were extracted from the signal optimization packages and entered into TRAFED. The TRAFED representation of each interchange was translated into a CORSIM model using the built-in translator. The simulation was run and the results were examined using the built in graphical viewer TRAFVU. The simulation data was extracted from the CORSIM output file, analyzed and predictive mathematical models formulated.

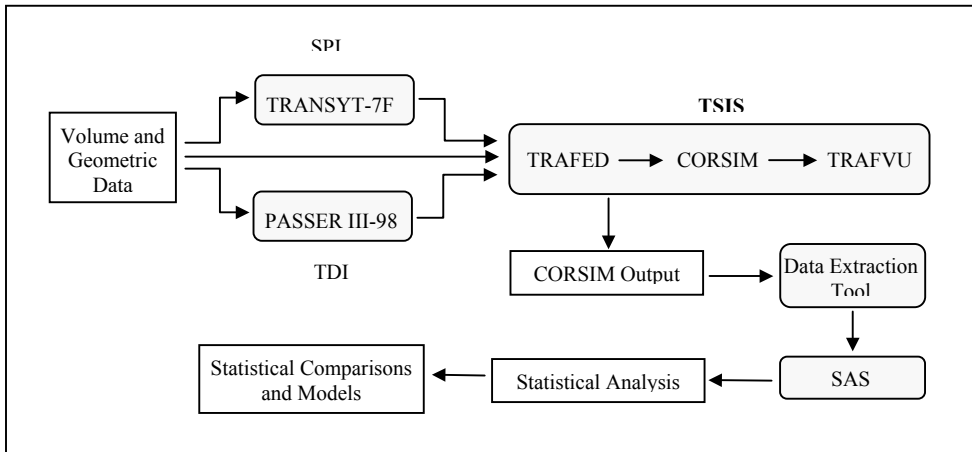


Figure 3. Overview of Modeling Process

Prototype Geometry

Two typical configurations were modeled: one for single point interchange and one for tight diamond interchange whose CORSIM diagrams are shown in Figures 4 and 5 respectively. Each SPI and TDI included two major geometric features for four and six through lanes on the cross road, equally divided by direction. Comparable geometric characteristics for both SPI and TDI are as follows:

- Double left-turn lanes on the cross road in both directions, 450 ft (137 m) long,
- Double left-turn lanes (and through for the TDI) on both off-ramp terminals 450 ft (137 m) long,
- Channelized right-turn lanes for the SPI and TDI on the cross road 350 ft (107 m) long, and the off-ramps 150 ft (46 m) long, with corresponding acceleration lanes 350 ft (107 m) long,
- Offset distance between the two intersections of the TDI is 300 ft (91 m) from stop bar to stop bar.

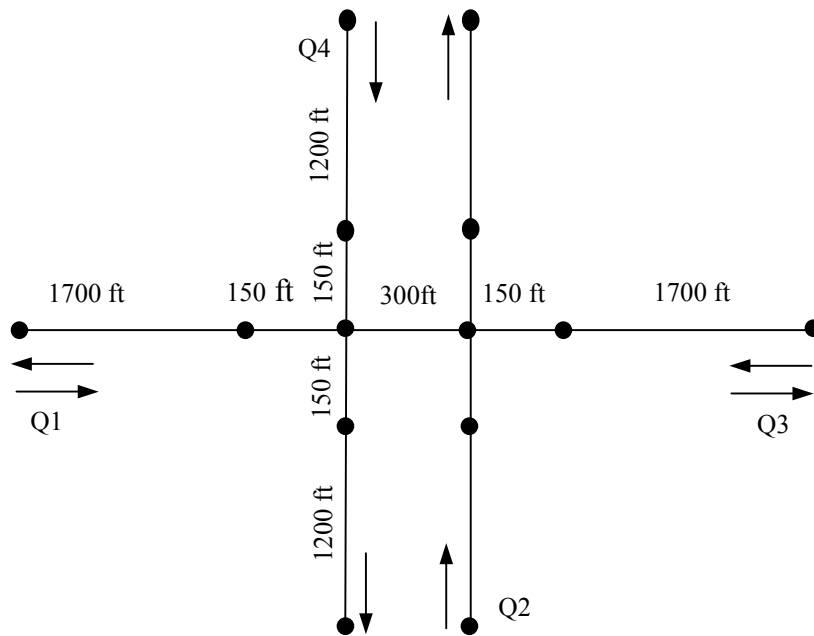


Figure 4. Tight Urban Diamond Interchange

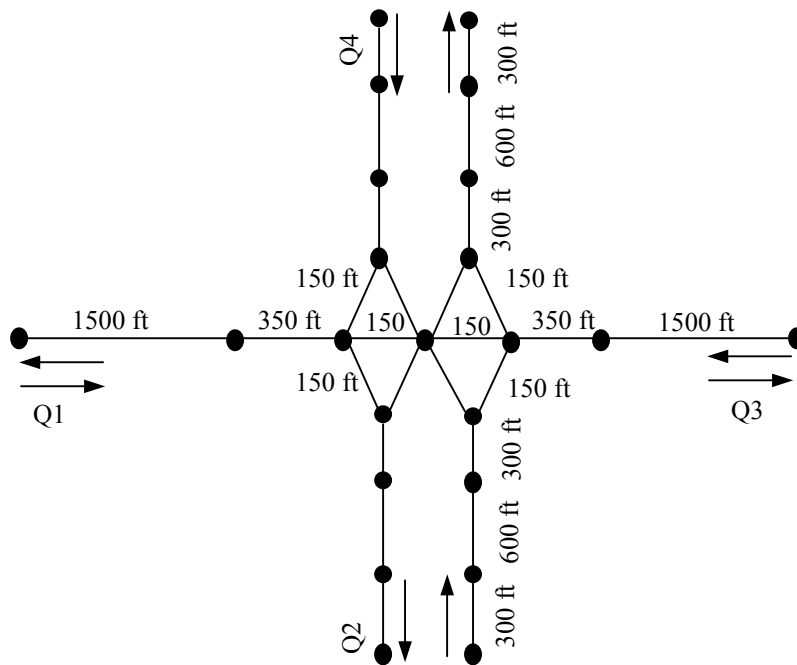


Figure 5. Single Point Urban Interchange

CORSIM Model Calibration and selection of scenarios

Dixon, et. al. (1997), and Hook et, al. (1992) provided different values for calibrating the startup lost time. Dixon provided values for the single point interchange while Hook's values were for both the single point and the diamond interchanges. We decided to adopt the values proposed by Dixon for the SPI and to use CORSIM's default values for the TDI (tables 1 and 2). The decision to adopt Dixon's values was influenced by two factors: i) Dixon's values were more recent, and ii) they were characterized specifically to allow direct entry into CORSIM.

Table 1. Startup Lost Time

Interchange Type	Start-up Lost Time (sec)
Cross-street Left-turn and Through Movements	
- Single Point	1.7
- Diamond	2.0
Off-ramp Left Turn	
- Single Point	1.9
- Diamond	2.0

Table 2. Saturation Headway

Interchange Type	Saturation Headway
All Cross-street Turning Movements	
- Single Point	1.9
- Diamond	1.8
Off-ramp Left Turn Movements	
- Single Point	2.0
- Diamond	1.8

Six traffic patterns were chosen. The proportions constituting each pattern are illustrated in Table 3 below. These proportions were applied to both the four and six through lane cross road configurations of each interchange type.

Table 3. Volume proportions for the six traffic patterns

Traffic Pattern	X-Street West RT %	X-Street West TH %	X-Street West LT %	X-Street East RT %	X-Street East TH %	X-Street East LT %	Ramp North RT %	Ramp North LT %	Ramp South RT %	Ramp South LT %
Balanced	4.4	23.5	8.8	4.4	23.5	8.8	4.4	8.8	4.4	8.8
Unbalanced EW	9.6	11.9	3.5	10.2	21.6	9.6	3.5	8.7	10.7	10.9
Unbalanced NS	4.0	21.0	7.9	4.0	21.0	7.9	4.0	4.0	13.2	13.2
Unbalanced EL/WL	4.5	22.7	2.3	5.7	22.7	11.4	3.2	7.9	9.7	10.0
Unbalanced ET/WL	2.0	19.7	10.5	2.0	39.4	4.0	2.0	9.2	2.0	9.2
Unbalanced ALL	2.9	13.5	1.9	2.9	38.4	15.4	2.9	2.9	9.6	9.6

Specific volumes were chosen in increments of 500 vehicles, and ranging from 2000 to 9000 total entering vehicles per hour (vph). A maximum of 7000 vph was applied to the four through lane models and 9000 vph to the six through lane models. These volumes included a 2 percent value of heavy vehicles. In total, we have decided to use 101 flow scenarios: 45 of four through lane crossroads and 56 of six through lane crossroads, for each of the SPIs and TDIs.

Signal Optimization

The traffic signal for each model was optimized using one of two traffic signal optimization software packages. Signal optimization for the SPI was conducted using Transyt-7F Release 9.3 and for the TDI Passer III-98. For both interchange types, the signals were optimized as pre-timed with multi-phase operation having cycle lengths from 80 to 150 seconds. Typical phasing sequences for the SPI and TDI are shown in Figures 6 and 7. At medium to high flows optimum cycle length were shorter for the TDI and longer for the SPI.

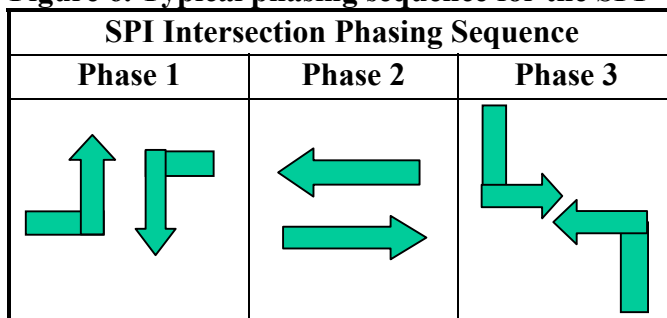
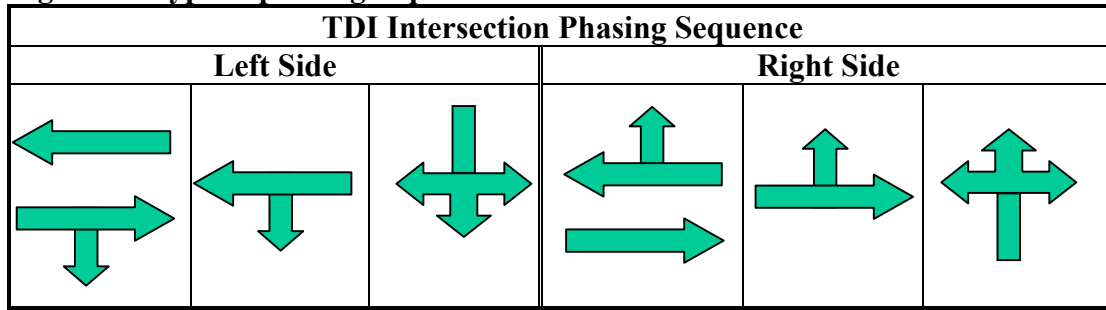
Figure 6. Typical phasing sequence for the SPI

Figure 7. Typical phasing sequence for the TDI



A specialized algorithm was formulated and coded and a data extraction tool developed. This program allowed specified parameters to be extracted from each of the output files generated by CORSIM.

A list of all the models to be analyzed was prepared and the simulation was run using the multiple case option of CORSIM. The list of files used as input for CORSIM was also used as input for the data extraction tool. The program processed each output file generated by CORSIM and returned a list with each of the following parameters for each model listed:

- Total entry volume
- Cycle length
- Total time
- Delay time
- Control delay
- Queue delay
- Stop time
- Percent stops

These output parameters formed the basis of the statistical analysis conducted and subsequent models developed in this paper.

TRAFFIC OPERATIONS COMPARISON AND PREDICTION

An initial comparison is conducted with multivariate analysis of variance to compare the two prototype interchange configurations (SPI and TDI) using three variables: control delay, stop time, and percent stops, derived from CORSIM for 101 flow scenarios. With the assumption of normality, results from the SAS MANOVA procedure are shown in Table 4. Individually, control delay, and stop time are not significantly different for the SPI and the TDI. Control delay, and stop time are higher for the TDI at high left-turn flows from off-ramps. The percent stops are significantly higher for the TDI. Therefore, an overall comparison is to reject the hypothesis of equality between the TDI and the SPI. According to CORSIM stop time is counted when the speed of a vehicle is less than or equal to 3 ft/s (1 second per 1 second interval), and between 3 and 9 ft/s (1 second per 2 intervals of 1 second). In most traffic volumes scenarios, percent stops (i.e., stops per trip) are higher because more vehicles are slowing down at TDIs than SPIs without necessarily reaching a complete stop.

Table 4. Comparison of the two prototype interchanges, SPI and TDI

Variables	F Statistics	
Control delay	0.00	non-significant
Stop time	0.21	non-significant
Percent stops	207	Significant
Hotelling test for all variables	357	Significant

A general comparison is not adequate to assist planners and traffic engineers in selecting the proper interchange configuration for various flow conditions. Statistical models are developed to help estimate the three variables of interest. The models were developed using the non-linear regression technique readily available in the SAS software (Proc NLIN) to express an exponential form. After several trials and iterations of different variables and model forms, we have accepted the form given below for predicting control delay (CD_{spi}), stop time (ST_{spi}), and percent stops (PS_{spi}) for the SPI:

$$\begin{aligned}
 CD_{spi} &= EXPO [a_0 + a_1(X_{TH} + X_{NLT}) + a_2X_{LT} + a_3N_{THL}] \\
 ST_{spi} &= EXPO [b_0 + b_1(X_{TH} + X_{NLT}) + b_2X_{LT} + b_3N_{THL}] \\
 PS_{spi} &= EXPO [c_0 + c_1(X_{TH} + X_{NLT}) + c_2X_{LT} + c_3N_{THL}]
 \end{aligned}$$

Where, a, b, and c are regression coefficients given in Tables 5, 6, and 7,

X_{TH} = highest flow of the opposing through movements on the crossroad (vph),

X_{NLT} = highest flow of the opposing left-turn movements from the off-ramps (vph),

X_{LT} = highest flow of the opposing left-turn movements on the crossroad (vph),

N_{THL} = number of through lanes on the crossroad (0 for 4-lanes and 1 for 6-lanes).

EXPO (exponential) = $e = 2.716828$

The best models for predicting control delay (CD_{tdi}), stop time (ST_{tdi}), and percent stops (PS_{tdi}) for the TDI are as follows:

$$\begin{aligned}
 CD_{tdi} &= EXPO [a_0 + a_1(X_{TH} + X_{LT}) + a_2X_{NLT} + a_3N_{THL}] \\
 ST_{tdi} &= EXPO [b_0 + b_1(X_{TH} + X_{LT}) + b_2X_{NLT} + b_3N_{THL}] \\
 PS_{tdi} &= EXPO [c_0 + c_1(X_{TH} + X_{LT}) + c_2X_{NLT} + c_3N_{THL}]
 \end{aligned}$$

Estimated variable coefficients are given in tables 5 and 6 with corresponding measures of significance, and model goodness of fit.

Table 5. Model statistics for control delay

Variable	SPI coefficients (t, standard error)	TDI coefficients (t, standard error)
Intercept	-1.9154 (-32.51; 0.05)	-2.1317 (-21.20; 0.10)
X_{TH}+X_{NLT}	5.3745 (15.70; 0.34)	
X_{LT}	3.7063 (3.28; 1.12)	
N_{THL}	-0.3507 (-9.47; 0.03)	-0.2684 (-4.73; 0.05)
X_{TH}+X_{LT}		4.2429 (13.83; 0.30)
X_{NLT}		10.065 (12.27; 0.82)
R²	0.89	0.81
F	959	398

Table 6. Model statistics for stop time

Variables	SPI	TDI
Intercept	-2.0375 (-33.30; 0.06)	-2.3504 (-20.37; 0.11)
X_{TH}+X_{NLT}	5.4103 (15.16; 0.36)	
X_{LT}	3.215 (2.71; 1.18)	
N_{THL}	-0.339 (-8.77; 0.03)	-0.2683 (-4.15; 0.06)
X_{TH}+X_{LT}		4.4782 (12.93; 0.34)
X_{NLT}		9.807 (10.44; 0.93)
R²	0.87	0.77
F	877	311

Table7. Model statistics for percent stops

Variables	SPI	TDI
Intercept	3.7558 (111.069; 0.03)	4.2908 (140.30; 0.03)
X_{TH}+X_{NLT}	2.0238 (6.97; 0.29)	
X_{LT}	3.4635 (3.47; 0.99)	
N_{THL}	-0.160 (-6.48; 0.02)	-0.0618 (-2.839; 0.02)
X_{TH}+X_{LT}		0.6887 (5.09; 0.14)
X_{NLT}		5.2697 (13.05; 0.40)
R²	0.80	0.76
F	1839	2275

Control delay has the strongest models for both the SPI and the TDI. Generally, the four coefficients are better estimated for the SPI than the TDI. All variables are significant beyond the 95% confidence level. Goodness-of-fit is also very significant for all models and it is also expressed in terms of the conventional R-squared. Kvalseth (1985) suggests that for non-linear models, the R-squared statistic should only be used when there are few outliers as is the case in this application.

The average error interval and maximum variations are provided in Table 8 for the models' response variables (i.e., CD, ST, and PS). The maximum variations occur primarily at higher traffic flows for either the four or six through lane scenarios.

Table 8 Error intervals

Variables	SPI		TDI	
	Average error interval	Maximum error interval	Average error interval	Maximum error interval
CD (min/vehicle)	-0.06 to +0.08	-0.26 to +0.45	-0.10 to +0.10	-0.26 to +0.53
ST (min/vehicle)	-0.05 to +0.07	-0.20 to +0.39	-0.09 to +0.08	-0.22 to +0.58
PS (% stopped)	-6.9 to +7.2	-17.6 to +30.4	-8.7 to +8.5	-23.3 to +38.5

CONCLUSIONS AND RECOMMENDATION

Derived conclusions are based on the CORSIM analysis and on the specified geometries for the SPI and TDI. The signals are based on fixed optimum settings, with a coordinated signal controller for the TDI. For the SPI, no through traffic from the off-ramps to the on-ramps are allowed.

- When considering SPI and TDI configurations the six models that estimate control delay, stop time, and percent stops will help the users in the selection process at a planning level of analysis.
- At moderate left-turn flows on the off-ramps, estimated delay and stop times are not significantly different for the TDI and SPI. Conversely, when off-ramp left-turn flows are high, estimated delay and stop times are higher for the TDI.
- Significantly higher percent stops are estimated for TDIs because vehicles are more likely to slow down or stop (as defined by CORSIM) at both signalized intersections of the TDI than at the single crossing of an SPI.

Future recommendations are as follows:

- To recalibrate the models with a larger sample size.
- To conduct safety comparisons between the two configurations, SPI and TDI.

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Hook, D.J.P; Upchurch, J. *Comparison Of Operational Parameters For Conventional And Single-Point Diamond Interchanges*. Transportation Research Record No. 1356. pp 47-55. (1992).

Kvalseth, T. O. *Cautionary Note About R^2* . The American Statistician Vol. 39 No 4 (Pt. 1) (1985). American Statistical Association.

Messer, C. J. et. al. *Single Point Urban Interchange Design and Operations Analysis*. National Cooperative Highway Research Program Report 345. Transportation Research Board. (1991).

Poppe, M. J., Radwan, A. E., Matthias, J. S. *Some Traffic Parameters For The Evaluation Of The Single-Point Diamond Interchange*. Transportation Research Record No. 1303. pp 113-124. (1991).

Selinger, M. J.; Sharp, W. H. *Comparison Of SPUI And TUDI Interchange Alternatives With Computer Simulation Modeling*. ITE 2000 Annual Meeting and Exhibit, Nashville, Tennessee.



Florida Department of Transportation

INTERCHANGES

FDOT Approval Process And Access Management Techniques

Joseph Santos, FDOT



Presentation Outline

- Introduction to The Interchange Handbook and the IJR/IMR Process
- FDOT/CUTR Outreach Program on "Managing Interchange Area Access"
 - Access issues that are unique to Interchange Areas
 - Good and Bad examples



Federal Policy for Interchanges

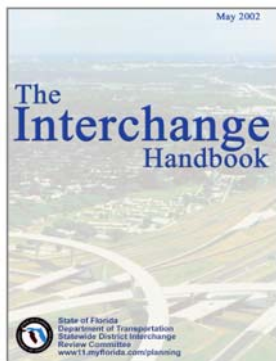
- Applies to Interchanges on Interstate Highway System
- New Access to be Minimized
- Interchange Concept (IJR) and NEPA Approval Required
- Eight criteria to be met

State Policy for Interchanges

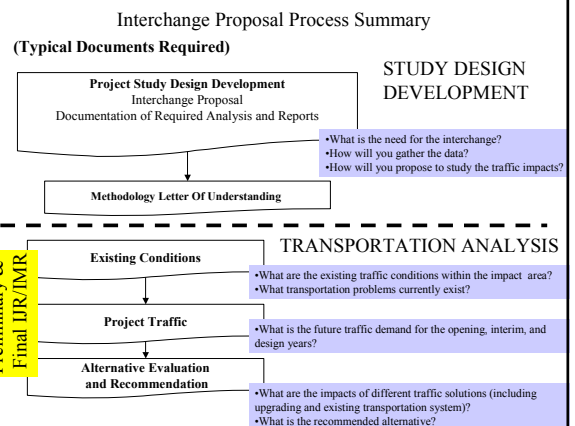
- Minimize addition of new access points
- Maximize operation and safety of interstate and intrastate transportation movements
- Advance important state land planning goals and policies
- Approve new / modified access points based on
 - Spacing
 - Operations
 - Safety
 - Land Use policy

Florida Interchange Review/Approval Process

- Decentralized to 8 districts
- District Interchange Review Committee (DIRC) is primary point of contact / review / processing
- Process guided by Interchange Procedure and Handbook



... to provide guidance on the required state and federal process, technical standards and analysis techniques, and reporting requirements to be used for developing and making an approval decision on Interchange Proposals for new or modified access with existing Florida Intrastate Highway System (FIHS) limited access (freeway) facilities.





Managing Interchange Area Access



Functions of Interchange Areas

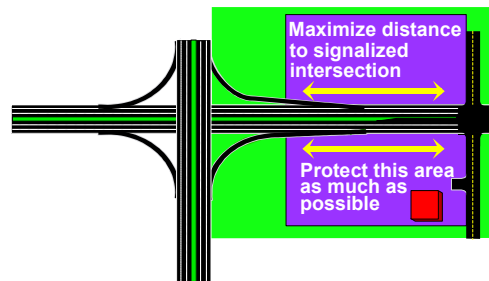
- Interface between freeways and surface streets
- Traveler service areas
- Truck stops and service areas
- Gateways to communities, tourist or recreational destinations, and employment centers
- Engines for real estate development and commerce



Traffic Considerations

- May handle very high traffic volumes during peak periods
- Ramp and arterial traffic is merging, diverging, and weaving
- A higher number of unfamiliar drivers
- Vehicles are queuing at signals - need for adequate storage space – traffic backup on mainline
- Need for signal coordination between the interchange and crossroads

Access Management Objectives

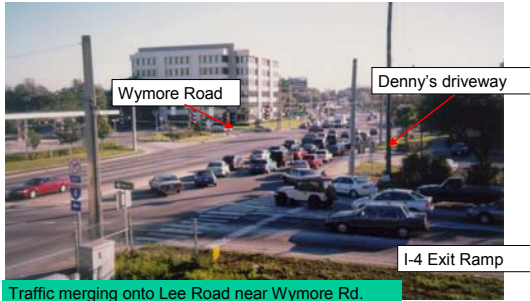


Case Example

Access Management Issues

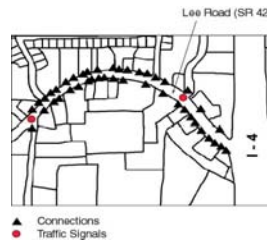
- Numerous/closely spaced access points and confusing signage
- Access points too close to interchange ramps
- Median openings too close to interchange ramps
- Lack of restrictive medians
- Signalized cross road intersections too close to interchange ramps

I-4 & Lee Road

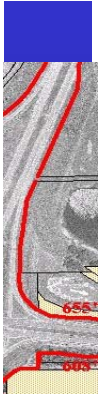


Traffic merging onto Lee Road near Wymore Rd. intersection frequently backs up onto the main line.

I-4 & Lee Road



- 43 connections within ½ mile of the interchange
- About 20 on each side
- Many sites have 2 driveways
- 3 driveways on the westbound diverge lane



Strategies for the Florida Department of Transportation

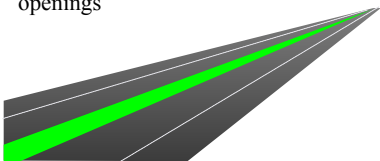
Acquire Limited Access Right-of-Way

- Acquire additional limited access ROW along crossroad near interchange
 - Standard practice is only 100'-300' feet



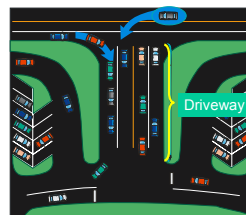
Use Medians

- Use medians to restrict turning movements in interchange area
- Extend existing medians and close median openings



Improved Driveway Design

- Assure adequate throat length, width and radius or flare at driveway connections.



Insufficient throat length can result in conflicts at the site entrance.

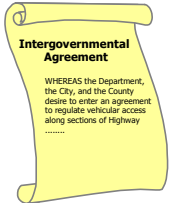
Construct Alternate Access



- Construct alternate access where cost-effective

Access Management Agreements

- Secure written agreements with applicants for access management as conditions of IJR/IMR approval.
 - Intergovernmental Agreements
 - Development Agreements & Conditions



References

NCHRP 420, Impacts of Access Management Techniques, 1999.
 NCHRP 348, Access Management Guidelines For Activity Centers, 1992.
 Land Development and Access Management Strategies for Florida Interchange Areas
 The Interchange Handbook, FDOT Systems Planning Office, May, 2002.

Links To The WEB

FDOT, Systems Planning

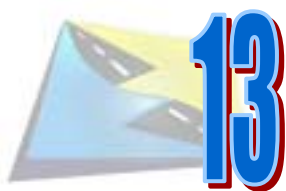
Interchange Justification <http://www11.myflorida.com/planning/systems/sm/intjus/default.htm>

Access Management <http://www11.myflorida.com/planning/systems/sm/aceman/>

Center Urban Transportation Research

Access Management Program http://www.cutr.eng.usf.edu/research/access_m/intro.htm

If we have the time...



Site Traffic Studies Top Pitfalls and Their Solutions Workshop



Slides

Site Traffic Studies Top Pitfalls and Their Solutions

Gary Sokolow

Senior Transportation Planner

Florida Department of Transportation

Site Traffic Studies

Top pitfalls and their solutions

Florida Department of Transportation
Office of the State Transportation Planner
Systems Planning Office - Access Management
Tallahassee, Florida



Major Areas of Concern

- ❑ Trip Generation
- ❑ Level of Service analysis
- ❑ Modeling



Major Areas of Concern

- ❑ Trip Generation
- ❑ Peaking Characteristics
- ❑ Level of Service analysis
- ❑ Modeling



Topics of Discussion

- ❑ ITE Trip Generation Report
 - ❑ Clarification of :
 - ❑ Land use descriptions, proper use of analysis period, trip distribution, best independent variables, and rates/equations.
 - ❑ Future year traffic analysis factors and peaking characteristics
 - ❑ Left turns and the appropriate analysis

Topics of Discussion

- ❑ Appropriate use and applications of models
- ❑ Need of permits and signal warrant studies

Trip Generation



and use of the ITE Trip Generation Report

ITE Trip Generation Report

□ Fifth Edition □ Sixth Edition

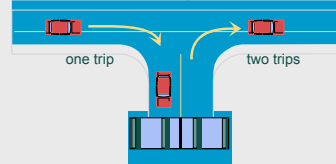
- 7.4 lbs.
- \$21.50/lb.
- 8.7 lbs.
- \$23.00/lb.
- **But:** you also need the "Handbook" at \$90 extra

Thanks to: David Muntean

What is a Trip End?

- Number of trips that come in or go out of a development

- (Volume at Driveways)



- A trip end is a single or one-direction vehicle movement with either the origin or destination (exiting or entering) inside the study site.

Trip Generation

Simple trip generation calculation needed even when the large scale models are used.



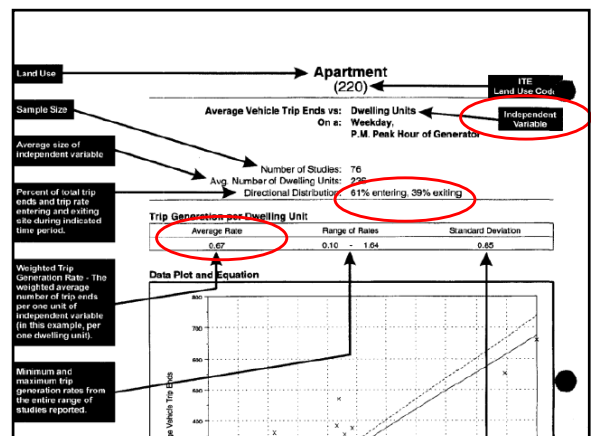
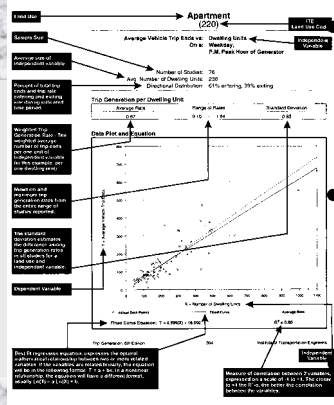
Large scale regional models are not intended for small areas.

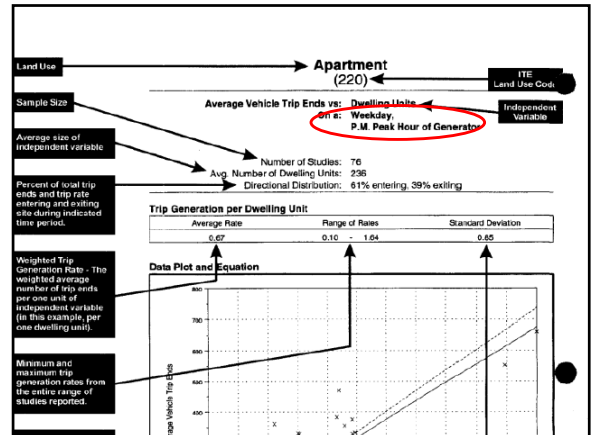
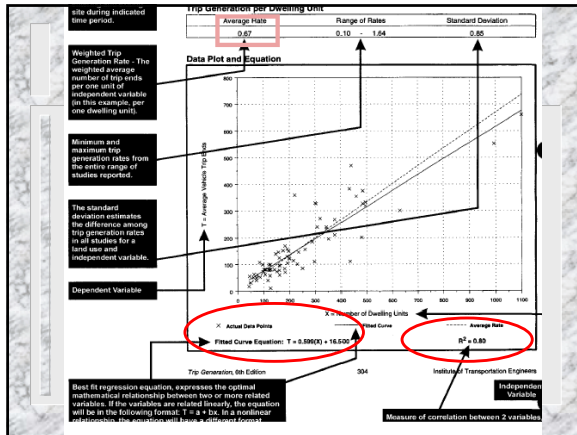
ITE Trip Generation Report *Not a Manual*

- **National data** – Florida, Arizona and California, played big role
- **Suburban** locations with little or no transit
- Some **small sample** sizes for new (though important) uses
 - Discount clubs (861)
 - Stand-alone drug stores (881)



Sample Page From ITE





What's Peak Hour?

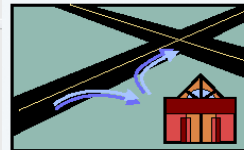
Peak Hour

- Any 4 consecutive 15-minute periods that equals the highest 1-hour volume.

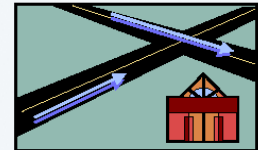


- Peak hour to be analyzed should be period with highest combined street and site generation traffic volumes.
- Peak hour of adjacent street traffic is one hour between 4 and 6 PM.

Generator Traffic vs. Adjacent Street Traffic



GENERATOR TRAFFIC



ADJACENT STREET TRAFFIC

- Usually the same PM peak for shopping, office and residential
- Hospitals, industrial and schools may be different due to different work shifts.
- Fast food restaurants have short trip durations and peak during mid-day peak periods.

Trip Generation Problem #1

- Someone is proposing an apartment complex with 100 dwelling units.
- Using the average trip rate, what are the estimated **daily trips**?

$$\begin{array}{rcccl} \text{Units} & \text{Rate} & & \text{Trips} & \\ 100 & \times & 6.63 & = & 663 \end{array}$$

What if there were 250 units?

$$\begin{array}{rcccl} \text{Units} & \text{Rate} & & \text{Trips} & \\ 250 & \times & 6.63 & = & 1,657.5 \end{array}$$

Let's just say 1,658

Trip Generation Problem #2

- Someone is proposing an apartment complex with 100 dwelling units. What would be the **peak hour directional** trips for the PM Peak Hour of adjacent street traffic?

$$\begin{array}{rcccl} \text{Units} & \text{Rate} & & \text{Trips} & \\ 100 & \times & .62 & = & 62 \end{array}$$

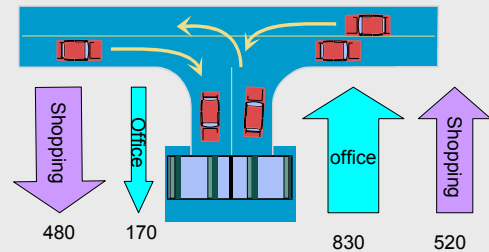
$$\begin{array}{rcccl} \text{Trips} & \text{Distribution} & & \text{Trips} & \\ 62 & \times & .67 & = & 41.5 \text{ enter} \end{array}$$

$$\begin{array}{rcccl} \text{Trips} & \text{Distribution} & & \text{Trips} & \\ 62 & \times & .33 & = & 20.5 \text{ exit} \end{array}$$

PM Peak Hour Trips Aren't Always Equal

- See peaking characteristics
- **Shopping Center (820)**
 - 202,400 sq.ft = **1,000** Peak Hour trips
 - 480 in
 - 520 out
- **General Office (710)**
 - 821,300 sq.ft = **1,000** Peak Hour trips
 - 170 in
 - 830 out

PM Peak Hour Trips Aren't Always Equal



Best Independent Variables



Gross Leaseable Area (GLA)



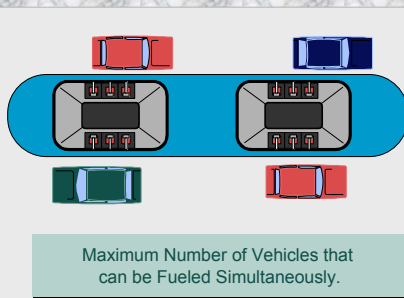
- GLA is only the area that can be used by shops
- Does not include parking area or common pedestrian areas

Gross Floor Area (GFA)



- GFA includes all enclosed area for each floor

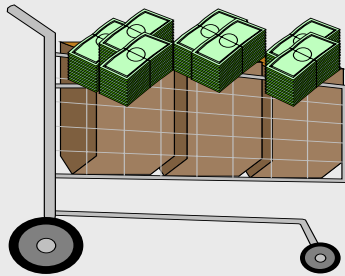
What's a Fueling Position?



Has the Analyst "Shopped" for the Trip Generation Rate?

- **Similar uses**
- Choice of Independent Variable
- Use rates or equations?

Has the Analyst “Shopped” for the Trip Generation Rate?



Specialty Retail vs. Shopping Center

- | | |
|--|--|
| <ul style="list-style-type: none"> Shopping Center (820) <ul style="list-style-type: none"> 401 studies 383,000 sq.ft. Gross Leasable average Rate in PM Peak = 3.74 | <ul style="list-style-type: none"> Specialty Retail Center (814) <ul style="list-style-type: none"> 3 studies 105,000 sq.ft. Gross Leasable average Rate in PM Peak = 2.59 |
|--|--|

Medical and General Office Trip Generation

- Using a different **Use**
- Medical Dental Office (720)**
 - 40 studies
 - 30,000 sq.ft. Gross Floor Area average
 - Rate in PM Peak = **3.66**
- General Office Building (710)**
 - 234 studies
 - 216,000 sq.ft. average
 - Rate in PM Peak = **1.49**



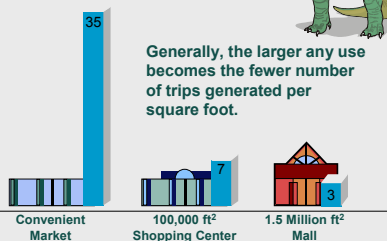
Office Use Using Different Independent Variable

- Business Park (770)**
- 28 acres average
- 379,000 sq.ft. Gross Floor Area average
 - average density = $379/28 = 14\text{K sq.ft. per acre}$
- An analyst could hide trips by using “acres” if the development was higher than the average

Size Does Matter



Trips per 1,000 ft² (PM Peak)

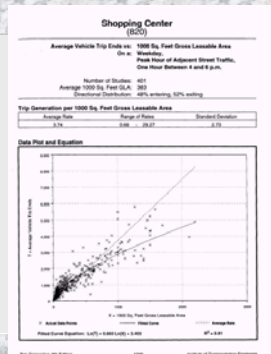


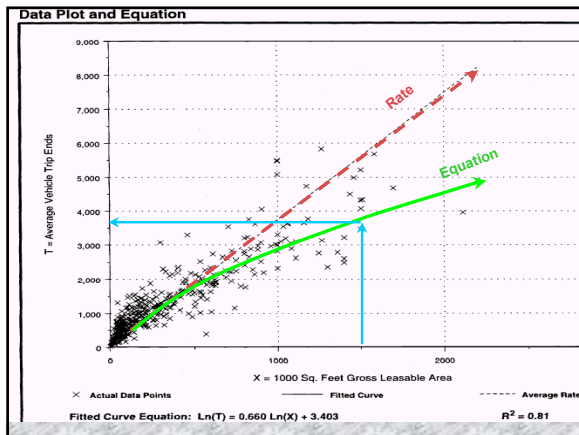
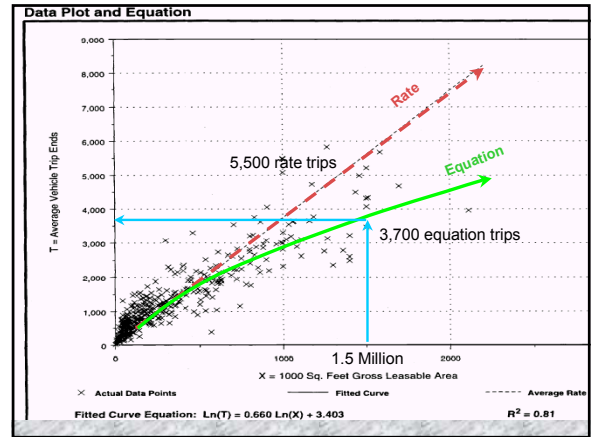
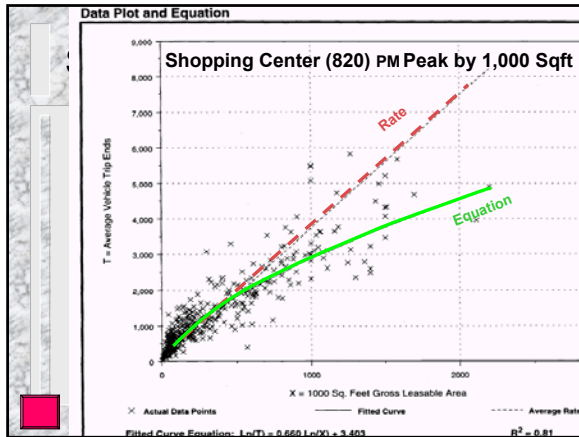
Generally, the larger any use becomes the fewer number of trips generated per square foot.



Rates or Equations ?

Shopping Center (820)





Trip Generation Example

- Someone is proposing a shopping center = 150,000 square feet
- What would be the projected PM Peak Hour of adjacent street traffic?

Use Average Rate:

$$\begin{array}{ccc} \text{Units} & \text{Rate} & \text{Trips} \\ 150 & \times 3.74 & = 561 \end{array}$$

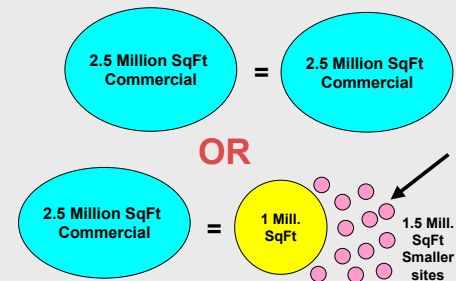
What if the mall were to be 1.5 million square feet?

$$\begin{array}{ccc} 1,500 & \times 3.74 & = 5,610 \text{ Avg. Rate} \\ 3,700 & & \text{Using Formula} \end{array}$$

Rates or Equations ?

- Compare trips - equation and rate
- ITE only provides equations for studies with enough data
- Look at data points on graph (number of studies)
- ITE Handbook has more guidance

What About "Bubble Maps" of Development?



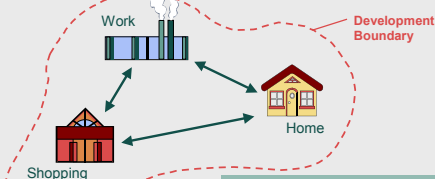
Trip Generation Considerations

- Read the descriptions
- Peaking characteristics are important
- Don't use "Acres" as a variable unless you know something about the density (last resort)
- Outdoor space counts (nurseries, restaurants, etc.)

Is Internal Capture Over Optimistic?

Is Internal Capture Optimistic?

Some Developments Are So Large and Diverse That Trips Are Served Internally



Studies Have Shown That Internal Capture Rates Have Not Been As High As Expected by Their Developers

Internal Capture New Procedure-ITE Handbook

- Match of **both ends** of internal trips
- During peak period



LAND USE A					LAND USE B				
ITE Code	Size	In	Out	Total	ITE Code	Size	In	Out	Total

LAND USE C					LAND USE D				
ITE Code	Size	In	Out	Total	ITE Code	Size	In	Out	Total

Internal Capture New Procedure-ITE Handbook

- Trip-matching analysis of **both ends** of internal trips
- During peak period



Example - ITE Handbook

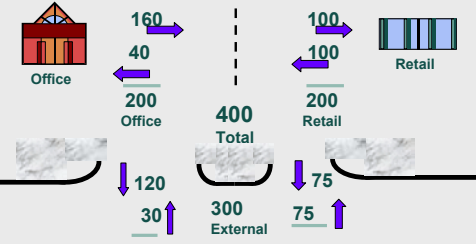
LAND USE A					LAND USE B				
ITE Code	Size	In	Out	Total	ITE Code	Size	In	Out	Total

LAND USE C					LAND USE D				
ITE Code	Size	In	Out	Total	ITE Code	Size	In	Out	Total

External Trips					
	LAND USE A	LAND USE B	LAND USE C	LAND USE D	TOTAL
In					
Out					
Total					

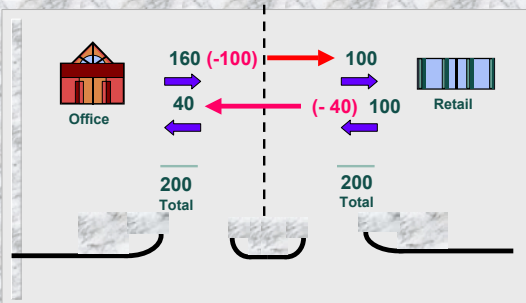
Reducing each flow by 25% Unacceptable Method

- Total Trips - Internal Capture = External Trips

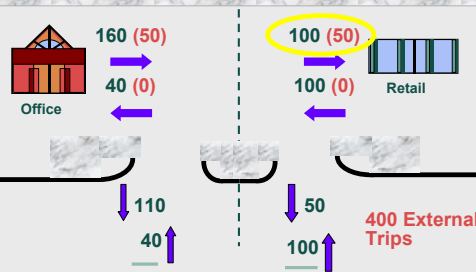


400 - 25% = 300 external trips 100 internal trips

Look at Potential Capture

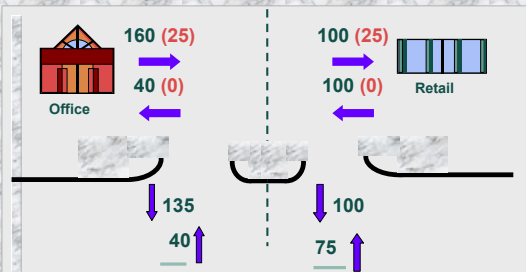


What's Reasonable?



Is this reasonable that 50% of the retail trips come from inside the development?

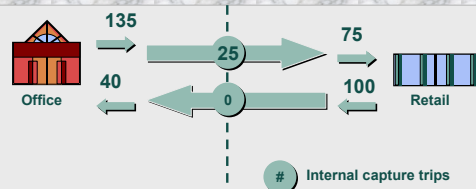
If we assume only 25% of retail trips come from inside?



375 External Trips

Final Reasonable Capture

if we assume no more than 25% of retail trips could be internal

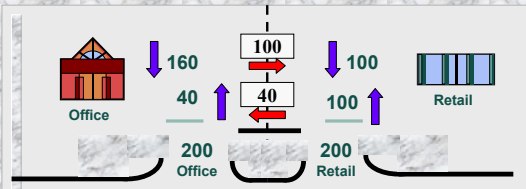


Final internal capture = 25 trips

375 external trips

25/400 = 6.25%

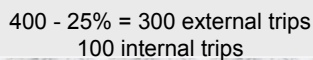
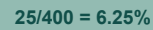
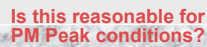
Potential Capture by Use for PM Peak



100 + 40 = 140 Internal Capture Trips

140/400 = 35 % Initial Potential Capture Rate

25% Initial Potential Capture Rate 25%





Trip Matrix.xls

Hour Trip Generation Analyses

Name of Development Big Big Development

Name of Applicant Gary Sokolow

Name of Analyst Sokolow

Date June 3, 2002

Development Phase Final Phase

Year 2010

North/South Road _____

Peak Hour _____

Volume _____

East/West Road _____

Peak Hour _____

Volume _____

Land Types	# Units	Unit Type	IC Rate	PM Peak Trip Rate Per Unit	Total # Trips	Directional Distribution		Trip Distribution	
						In	Out	In	Out
Single Family Detached	1,000	dwelling unit						0	0
General Office Building	1,500,000	SF Gross Floor Area						0	0
All Suites Hotel	250	room						0	0
								0	0
								0	0
								0	0
								0	0
								0	0
								0	0
								0	0

Instructions

IC Worksheet

Balance on In

Balance on Out

Data

The image shows a blank ledger page with a grid of columns and rows. The top row contains 16 empty cells, each with a header '0'. Below this, the grid is filled with repeating patterns of text and numbers, including 'Balance on In', 'Balance on Out', and 'Data'. The page is designed for accounting or record-keeping.

Are Pass-by Trips Over Estimated?

Are Pass-by Trips Over Predicted?

The smaller and more “convenience-oriented” a business is, the higher the proportion of trips generated that are already on the road.



Gasoline /Convenience Mkts ITE #845



45 - 80% (measured - but use caution)



Shopping Center ITE #820

8 - 80% (measured - but use caution)

Source: ITE Trip Generation, Handbook, Oct 1998

Florida's Site Impact Handbook Gives Help

- **Pass-by** based on **type** and **size** of retail space
- Generally, the number of pass-by trips should not exceed:
 - **10 percent of the adjacent street traffic** during peak hour **or**
 - **25 percent of project's external trip generation** *if it is a large scale development*

Pass-By Rules of Thumb

- **Pass-by** based on **type** and **size** of retail space
- Generally, the number of pass-by trips should not exceed:
 - **10 percent of the adjacent street traffic** during peak hour **or**
 - **25 percent of project's external trip generation** *if it is a large scale development*

Don't Count Twice, *It's not alright*

- If internal capture is considered:
 - Use internal capture first;
 - then apply pass-by percentages to **shopping external trips only**

$$\begin{aligned} &\text{Trip Generation} \\ &- \text{Internal Capture} \\ &= \text{External Trip Generation} \\ &- \text{Pass-By Trips (\% of External)} \\ &= \text{New External Trip Generation} \end{aligned}$$

Driveway Traffic

- Beware when analyzing driveways: **analysis must include pass-by trips in driveway volumes.**

Biggest Misses

- Trip Generation Report – information NOT a Manual
- Rates vs. Equations
- Pass-by applied wrong
- Occupied vs. unoccupied
- Peak Hour trick

Peaking Characteristics

Is Your Existing Traffic Right?

- **Typical Daily Traffic** is **not** Average Annual Daily Traffic (AADT)
- Peak-to-Daily Ratios **are not** the same as K factors

Average Annual Daily Traffic (AADT)

Not the same as “typical day”

One year's traffic
divided by 365 days

That's 8,760 hours



Usually estimated through nearby permanent count station
with weekly seasonal and axle correction factors.

K_{100} Peaking Factor

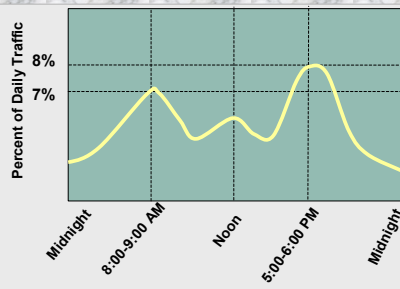
K_{100}

Planning Analysis Hour Factor

- The 100th-highest hourly volume of the year divided by the AADT
- **NOT a typical peak-to-daily ratio**

See: LOS Handbook Chapter 4.5

Peak To Daily Ratio is **not** K



K Factors for One Road One Year's Counts Sorted

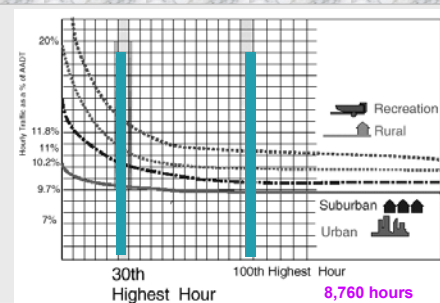


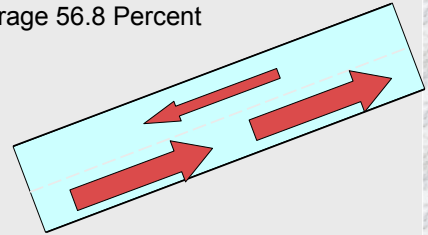
Table 3 - 4
MINIMUM ACCEPTABLE K_{100} s

	Urbanized	Transitioning/ Urban	Rural Developed	Rural Undeveloped
Freeways	8.5%	9.0%	9.0%	9.0%
Multilane Highways	9.0%	9.0%	9.0%	9.0%
Two-Lane Highways	9.0%	9.0%	9.0%	9.0%
Arterials	9.0%	9.0%	9.0%	N.A.

K_{30} is used by FDOT for design purposes. It is the proportion of the AADT occurring during the 30th highest hour of the design year and is commonly known as the Design Hour Factor.

Directional Distribution Factor - D

- Minimum 52.0 Percent
- Average 56.8 Percent



Directional Hourly Volumes

For Planning:

$$((AADT) \times K_{100} \times D_{100} = \text{Planning Directional Hourly Volume}$$

For Design:

$$((AADT) \times K_{30} \times D_{30} = \text{Design Directional Hourly Volume}$$

Level of Service Analysis

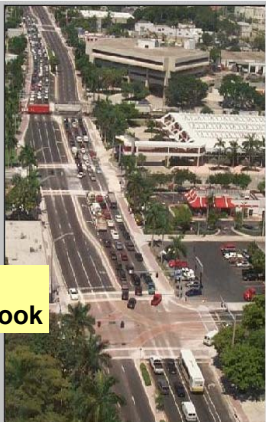
Quality/Level of Service
HANDBOOK

ARTPLAN 2002

Multimodal Arterial Level of Service

LOS Analysis
New Model and Handbook

Release Version
April 2002



ARTPLAN: Urbanized Area - [General Facility Data]

File Data Inputs View Utilities Help

untitled.xml

General Facility Data

Description

Road Name:

Peak Direction:

Study Period:

Roadway Variables

Area Type: # Thru Lanes (Both Directions):

Class: Median Type:

Posted Speed: Left Turn Lanes: ☒

File Information

Analyst:

Analysis Date:

Agency:

District:

User Notes:

Traffic Variables

AADT: PHF: Base Sat. Flow Rate:

K factor: % Turns: Local Adj. Factor:

D factor: % Heavy Vehicles: Adj. Sat. Flow Rate:

Control Variables

Control Type: Signals/Mile:

Arrival Type: Cycle Length: Through g/C:

Name of roadway: Acceptable Range:

ARTPLAN: Urbanized Area - [MultiModal Facility Data]

File Data Inputs View Utilities Help

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General Facility Data Multimodal Facility Data

Bus/Bicycle/Pedestrian

Paved Shoulder/Bicycle Lane ☐ Sidewalk/Roadway Protective Barrier ☐

Outside Lane Width Obstacle to Bus Stop ☐

Pavement Condition Bus Frequency (Buses/Hour)

Sidewalk ☒ Bus Span of Service (Hours/Day)

Sidewalk/Roadway Separation

Bike Lane Present? ☐ Acceptable Range:

Do certain developments really support multi-modal mobility?

- ☐ Do you see a commitment for:
 - ☐ Transit
 - ☐ Ridesharing
 - ☐ Parking policies
 - ☐ Pedestrian improvements

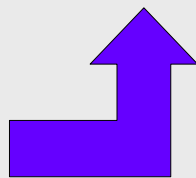
Are the LOS Studies Using Over Optimistic Factors?

- ☐ Check FDOT **LOS Handbook** for maximums
- ☐ Use the published LOS Tables to give a review of realistic factors
 - ☐ *they are on the back of tables*

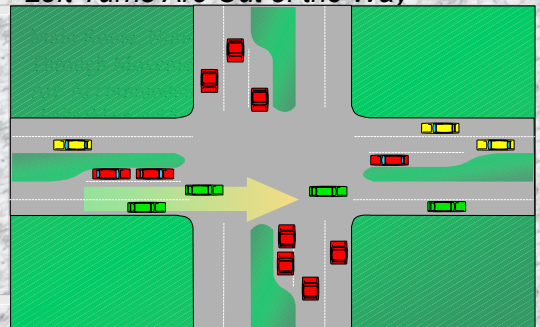
Hint: Published Assumptions on Back of Table

Sidewalk/roadway separation (a,t,w)				
Sidewalk/roadway protective barrier (n,y)				
Obstacle to bus stop (n,y)				
TRAFFIC CHARACTERISTICS				
Planning analysis hour factor (K)	0.095	0.095	0.095	0.095
Directional distribution factor (D)	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.925	0.925	0.925	0.925
Base saturation flow rate (pcphpl)	1900	1900	1900	1900
Heavy vehicle percent	2.0	2.0	2.0	2.0
Local adjustment factor	1.0	1.0	0.95	0.98
% turns from exclusive turn lanes	12	12	12	12
Bus span of service				
CONTROL CHARACTERISTICS				
Signalized intersections per mile	1.5	1.0	1.0	3.0
Arrival type (1-6)	3	3	3	4
Signal type (a,s,f)	a	a	a	s
Cycle length (C)	120	120	120	120
Effective green ratio (g/C)	0.44	0.44	0.44	0.44

Are There Too Many Left Turns to Use Our LOS Tables and Programs?



The Planning Assumption Left Turns Are Out of the Way

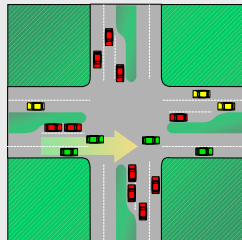


Left Turns Are Out of the Way The Planning Assumption

Don't be afraid to
use the full Highway
Capacity Software

Take into account
queues

Can be strung
together for arterial
analysis



Unsignalized Intersection LOS

- ❑ Use a big “grain of salt”
- ❑ Almost any side-street or driveway on a major highway will be unacceptable LOS
 - ❑ This is especially true where left turns out are allowed

Modeling Concerns

Have Trips Been Directly Projected From the Model?

- ❑ For site analysis even large scale models need adjustment based on ITE rates

Large Scale Models vs. ITE Trip Generation *Which is better for Site Impact Analysis?*

- ❑ Large Scale Models - Designed to estimate
 - ❑ **Daily metro area-wide travel**
- ❑ ITE Trip Generation Report
 - ❑ Designed to estimate trips from **specific uses**
 - ❑ Data for peak hours



Large Scale Models vs. ITE Trip Gen *Which is better for Site Impact Analysis?*

- ❑ **Large Scale Models**
 - ❑ Not “Trips” for employment sites. but “Attractions,”
 - ❑ Measure of **relative attractiveness**
 - ❑ Only 3 employment types used
 - ❑ (Industrial, Service, and Commercial)
- ❑ **ITE Trip Generation Report**
 - ❑ Calculates average number of **trips** generated by different land uses.
 - ❑ Hundreds of uses - updated frequently



Large Scale Models vs. ITE Trip Gen Which is better for Site Impact Analysis?

Large Scale Models

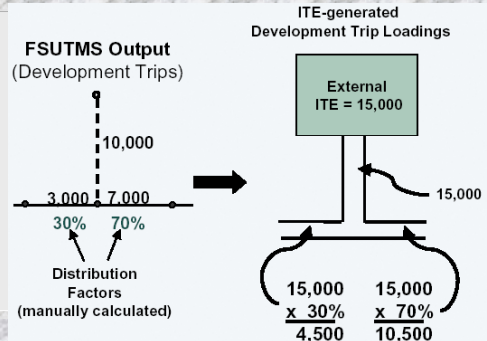
- Strength - distribution and assignment of traffic

ITE Trip Generation Report

- No distribution help



Link Distribution Percentage Method



Were Models Used to Determine Internal Capture?

Q. Are large scale models the best method for **internal trip estimates**?

A. Models are only a tool that may help in a manual determination of internal trips.

Caution: Size (land area) of TAZs and length of centroid connectors are the prime determinants of intrazonal trips in FSUTMS. (Longer centroid link = more intrazonal trips)

Has the study used the “With vs. Without” method?

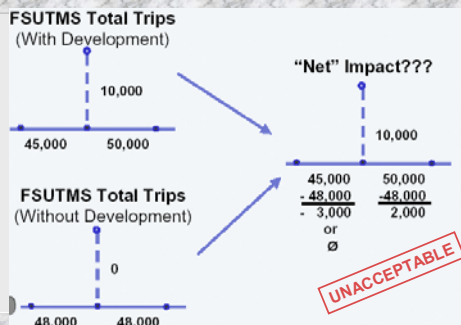
Selected Zone Analysis

- Single model run with two-purpose trip table
- Purpose 1 = Total Trips, Purpose 2 = DRI Trips

“With & Without” Methodology

- Two model runs, one with development in place, the other with DRI zonal data “zeroed” out
- Link volumes for “without” run subtracted from “with” run, yielding net impact of development

With and Without Method



“With & Without” Problem

- Equilibrium highway assessment capacity restraint equation diverts trips, often resulting in virtually no change in traffic volumes
- Developer: **So, what!** *Diversion occurs in the real world. We should only be required to mitigate for net impact of the development.*

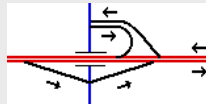
Permits and Related Approvals

Approved Study or Development Order (D.O.) Is Not a Permit

- ❑ Driveways and streets still need Permit
- ❑ Traffic signals still need warrant study
- ❑ Involve Permit staff early

Does the Development Order contain a new Interchange?

- ❑ New interchange in Development Order (D.O.) Is **not** a factor in approval
 - ❑ Let applicants know this *"up front"*
- ❑ D.O. should state what development is allowed, if the interchange is not approved
- ❑ Funding commitment may be more than called for in the D.O.

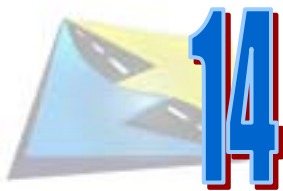


Some Critical Points

- ❑ Read descriptions in ITE Trip Generation Report
- ❑ Don't assume a "stock" internal capture
 - ❑ Look at both ends of the internal trip
- ❑ Don't take traffic numbers directly out of a model
- ❑ Typical **peak to daily ratio** is not **K**
- ❑ Use FDOT guides for reasonable traffic factors

Some Critical Points

- ❑ Read descriptions in ITE Trip Generation Report
- ❑ Don't assume a "stock" internal capture
 - ❑ Look at both ends of the internal trip
- ❑ Typical **peak to daily ratio** is not **K**
- ❑ **Use the right tool for the job**
- ❑ www11.myflorida.com/planning



SAM and AM



Slides

Simple American Misery and Access Management

Frank Broen

President

Teach America Corporation

SAM and AM Access Management

SAM and AM

Simple American Misery
and Access Management

I am AM.
AM I am.

By Frank Broen

SAM and AM Access Management

That damn AM!
That damn AM!
I do not like
that damn AM!

SAM and AM Access Management

Would you like to get there SAM?
It can help you to your house.
I can show you with my mouse

Reduces
Conflicts

SAM and AM Access Management

Do not bother with your
mouse.
I just want to be a grouse.
I want my driveway here and
there,
I want my driveways
where.

SAM and AM Access Management

You can safely drive your car.
You can drive from very far.
Medians can make life grand -
If you can only understand.

SAM and AM Access Management

I do not care if you agree,
I only want what pleases me,
I want them here so fast, fast, fast,
Why should I worry 'bout their cast?

SAM and AM **Access Management**

You will like AM, you'll see.
Not only will they pretty be,
good AM removes conflicts,
which reduces bumper nicks.



Category	Value
TOTAL ACCIDENTS	947
TOTAL INJURY ACCIDENTS	174



SAM and AM **Access Management**

To limit conflicts is the goal –
Reduce crash points to keep us whole.

- Limit the number of conflict points
- Separate the conflict points
- Remove turning vehicles and queues from through movements

Remove cars from the center lane, otherwise they are a pain




SAM and AM **Access Management**

Moving traffic is the key to functional integrity.
People flow from here to there and get to you from anywhere!





SAM and AM **Access Management**

AM,
If you will let me be,
I will try it. You will see.

The control and regulation of the spacing and design of:

- Driveways
- Medians
- Median Openings
- Traffic Signals
- Freeway Interchanges




SAM and AM **Access Management**

Say! I like this Access Management.
It helps me get to where I went!
Driveway spacing helps me more
by increasing traffic to my door!
Medians are safer, too
Especially when I see you.





SAM and AM **Access Management**

I cannot drive in anywhere
for that would cause more conflict's there
And less is more, or so they say
when crashes seem to go away.
I want to know more, please tell me
what's functional integrity?
I want more customers, oh gee –
you've increased the capacity!




SAM and AM

Access Management

Please take your mouse and show me more
I like this driveway shared next door
I do so like to get there fast and
I want to make sure it will last.

SAM and AM

Access Management

I want this Access Management.
I want to help you end the dents!
I want to know just what you meant!
I want to pay my monthly rent!
I want to stop my foolish vent!
and support this Access Management.

SAM and AM

Access Management

I do so like this great AM!
Thank you!
Thank you!
Sam and AM!

I can make it happen with your help.
Traffic Engineer

By Frank Broen Teach America Corporation



Access Management Programs at the State Level

Moderator:

Del Huntington

Access Management Program Manager

Oregon Department of Transportation

 **Paper**

 **Slides**

15A. Technical Issues Encountered in Developing a Comprehensive Access Management Program in the State of Texas

Grant Schultz

Graduate Research Assistant

Texas Transportation Institute

 **Slides**

15B. UTAH DEPARTMENT OF TRANSPORTATION ACCESS MANAGEMENT STUDY

Tim Boschert

Access Management Program Coordinator

Utah Department of Transportation

 **Paper**

 **Slides**

15C. Whose Road Is It Anyway?

Steve Munson

Senior Transportation Analyst

New York Department of Transportation

**TECHNICAL ISSUES ENCOUNTERED IN DEVELOPING A COMPREHENSIVE ACCESS
MANAGEMENT PROGRAM IN THE STATE OF TEXAS**

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5th National Conference on Access Management

June 23-26, 2002

Austin, TX

ABSTRACT

While preparing to develop and implement a comprehensive access management program, the Texas Department of Transportation (TxDOT) recently sponsored research through the Texas Transportation Institute (TTI) to provide recommendations for modifications to the Design Division *Roadway Design Manual*. The research also includes a provision to produce an *Access Management Guidebook for Texas* for use by planners and engineers when planning, designing, and reviewing highway projects and access requests.

This paper describes some of the technical issues that emerged in the research related to roadway access classification, unsignalized access spacing criteria, and median alternatives. Specifically, in terms of roadway access classification, considerations include what type of access classification system (if any) is necessary to develop a successful program. For unsignalized access spacing and median alternatives, technical questions were related to what unsignalized access (driveway) spacing criteria and median opening guidelines are most applicable for adoption in Texas and why.

This paper presents the results of these and other technical issues that have been encountered, describes some of the background on access management, outlines some of the alternatives used in existing access management programs in other states, and provides some of the pros and cons of each of these alternatives, as they relate to Texas. Finally, the paper provides the current status of the comprehensive access management program in Texas. The research and experiences that have emerged as a result of this project are expected to be useful to engineers and planners not only within Texas, but in other states that are developing or modifying comprehensive access management programs as well.

INTRODUCTION

Traffic volumes and congestion have increased in recent years, particularly on arterial streets. The primary purpose of arterial streets is the movement of vehicles, while providing appropriate access to residential and commercial developments. When unlimited access is provided directly from businesses and/or homes to arterial streets, average speeds decrease and arterial street capacities diminish. Frequent access also presents safety concerns by providing more locations for potential conflicts of vehicles' paths. Some solutions in the past have been to build relief routes to the arterials. It has been very common, however, for the same problems to eventually occur on the relief routes, leading to the construction of tertiary relief routes in some instances.

A better, more cost efficient solution to building relief routes is to incorporate access management techniques into the design of the arterials. This practice is most successful when incorporated into the initial design of the arterial, but it can also be applied through retrofit projects on existing roadways. Through the use of access management techniques such as raised medians, auxiliary lanes, median opening spacing, and driveway spacing, the public investment in the arterial is protected as its function of moving vehicles is preserved. Such design methods also provide a safer street for the motoring public by decreasing the potential number of conflict points that result from intersections, while increasing the mobility of users through system efficiency.

In a recent Texas Transportation Institute (TTI) research project, Department of Transportation (DOT) officials from several states were surveyed about access management (1). The findings of this research project indicated that consistent guidelines are necessary for an agency to provide fair implementation and enforcement of an access management program. The results of this research, combined with an increasing desire amongst the Texas Department of Transportation (TxDOT) staff to improve safety, increase mobility, and protect infrastructure investment through improved management of access on arterials led the Department to become increasingly interested and involved in access management. This interest led TxDOT to undertake additional research on access management, including project 0-4141 "Techniques for Managing Access on Arterials," and project 0-4221 "Benefits of Access Management." The first year report of the two-year 0-4141 project has now been published (2). This report documents the first-year efforts that provide recommendations for the use of access management techniques on state roadways in Texas. In this report, the research team focused on developing a matrix of guidelines for the application of different access management techniques for various roadway access classifications. The results of these and other projects have been used in developing an *Access Management Guidebook for Texas* (also referred to as the *Guidebook*), currently in draft form (3). The

results are also being used to update the TxDOT *Roadway Design Manual* to include access management guidelines.

Several issues have emerged during the development of these projects, particularly the development of the *Guidebook*. This paper addresses the research and experiences of project 0-4141 by first summarizing the background of access management research, second by summarizing the results of the research related to access management programs in other states, and then by identifying some of the lessons learned from the overall research, including discussion of such factor as district engineer support, implementation consistency, access classification, unsignalized access spacing, and median spacing alternatives. The paper concludes by discussing the current status of the Texas program and by identifying some of the future work in this area.

BACKGROUND

The United States Department of Transportation (U.S. DOT) Federal Highway Administration (FHWA) has conducted several research projects over the years to assess the impacts of access management on arterial streets. Azzeh, et al., and Glennon, et al. completed some of the first of these reports in the mid 1970s (4, 5, 6). This research was later followed up by work completed by Flora (7) in June 1982. Several additional studies were also completed during this time, including work by Stover, Koepke, Levinson, and others. The information presented in these early reports has been continually expanded upon as new concepts have unfolded and more data has been made available for access management related issues. Although the guidelines have changed slightly, the benefits of access management on the transportation system have followed three basic themes; the preservation of highway capacity, improved safety, and the protection of infrastructure investment.

Several different efforts have successfully identified the need for access management, while providing guidelines for implementing access management principles. Resources used in developing proposed Texas guidelines included the following reports:

Access Management Guidelines for Activity Centers (*NCHRP Report 348*)

In the late 1980s and early 1990s, the National Cooperative Highway Research Program (NCHRP) began to look in depth at different access management techniques and their applications in various settings. One of the first of these projects was Koepke and Levinson's work in *NCHRP Report 348*, "Access Management Guidelines for Activity Centers." This project's objective was "...to provide reasonable methods to coordinate transportation in relation to land development by (a) developing access management guidelines and procedures, (b) outlining design and operational techniques, and (c) recommending legislative options and enforcement techniques" (8). This report provides a comprehensive guideline to use for access management from design and application perspectives. TTI

used this report when determining access classifications, access management techniques, design criteria, and technique thresholds for use in the state of Texas.

Capacity and Operational Effects of Midblock Left-Turn Lanes (*NCHRP Report 395*)

Raised median openings have always been a hot topic for traffic engineers due to the constraints that they place on accessibility. Such concerns are offset by the freedom that raised medians provide for mobility along arterial corridors. In response to the need to provide better recommendations for median openings along arterial streets, and to help determine the type of median to apply for given conditions, Bonneson and McCoy completed *NCHRP Report 395*, “Capacity and Operational Effects of Midblock Left-Turn Lanes.” The approach in this research was to “develop a comprehensive midblock left-turn treatment evaluation methodology, collect field data to calibrate this methodology, and use the calibrated methodology to develop treatment selection guidelines” (9). This report was beneficial in choosing the best alternative for median installation and is referred to for use in Texas.

Access Management, Location, and Design (*NHI Course 15255*)

In 1998, the National Highway Institute (NHI) compiled research findings into an access management short course. *NHI Course No. 15255*, “Access Management, Location, and Design” provided reference materials on access management concepts and benefits, access design principles, access management techniques, information on retrofit projects, site planning, and access management policies and practices. This course also included sections on implementing access management principles and procedures, evaluating potential improvements, and applying access management practices and procedures (10). *NHI Course No. 15255* has been updated over the years to incorporate new research in access management. The most recent version (2001) of the course material is published as *NHI Course No. 133078*, “Access Management, Location, and Design” (11). This course provides a wealth of knowledge and information that was referred to on several occasions in preparing guidelines for access management techniques in the state of Texas.

Impacts of Access Management Techniques (*NCHRP Report 420*)

Although many early studies contain information that is still applicable, subsequent studies and reports identified new and evolving access management techniques and offered guidance on their application. Through *NCHRP Project 3-52*, Urbitrans Associates and their subcontractors listed and classified more than 100 access management techniques. After an initial screening process, twelve techniques were selected for further study and were consolidated into eight categories (traffic signal spacing, unsignalized access spacing, corner clearance criteria, median alternatives, left-turn lanes, U-turns as alternatives to direct left-turns, access separation at interchanges, and frontage roads). The result of this research effort

has been compiled into *NCHRP Report 420* “Impacts of Access Management Techniques,” which describes the research approach and discusses each of the selected techniques (12). The Transportation Research Board (TRB) Access Management Committee has used *NCHRP Report 420* as the basis for access management techniques because it includes the state-of-the-practice for access management in the United States. The techniques identified in this report are referenced throughout the recommended guidelines for the state of Texas.

Summary of Access Management Programs and Practices in the United States (*TxDOT Project No. 0-1847*)

The “Summary of Access Management Programs and Practices in the United States” project was conducted by TTI over a two-year timeframe. In the first year, researchers identified states that had successful access management programs or practices in place, as well as some who were developing their programs. Researchers selected five states (Colorado, New Jersey, Wisconsin, Michigan, and Montana) for in-person interviews. The results of the state DOT surveys identified several different methods for developing an access management program. In general, the states that had the most success with access management were those that had comprehensive programs and legislation to support the programs. The research team also identified physical treatments that state DOTs use to implement their access management programs and plans. Finally, the research team identified lessons learned from the experiences of state DOTs that had already developed and implemented access management programs or practices, as well as those that were in the process of establishing such programs (1).

In the second year of the project, a survey of TxDOT district staff was administered to determine knowledge levels among employees. Seventy staff members from 22 of the 25 district offices responded to the survey, providing valuable insight to their perspectives and understandings of access management (1). The information obtained through this project has been used in the framework for the access management program in the state of Texas and continues to be referred to throughout the stakeholder meetings, research, and implementation process.

A Methodology for Determining Economic Impacts of Raised Medians (*TxDOT Project No. 7-3904*)

The “Methodology for Determining Economic Impacts of Raised Medians” project was a four-year research effort at TTI. The objective of the research effort was to develop and test a methodology to estimate the economic impacts of median design on businesses and properties. This effort yielded several key results quantifying the economic impacts of raised medians on adjacent business owners in Texas. Some of the main conclusions of this project were first of all that prior perceptions appear to be harsher than the impacts indicated by business owners and managers after construction of raised median projects. Business owners present before, during, and after the raised median project indicated that property values

increased after the project, even though they had perceived a decrease in property values. The research did point out that the construction phase appears to have the most detrimental impacts on business. Some suggestions to help alleviate these impacts include; 1) ensuring adequate and highly visible access to businesses during construction, 2) reducing construction time, and 3) performing the construction in smaller roadway segments (phases) (13).

TxDOT staff is able to use the results of this research to explain experiences on corridors with raised median projects. This information allows TxDOT staff to discuss these issues with the public using appropriate research data, instead of having to say that they are unsure of what to expect. These results also assist other planners, engineers, and researchers investigating these issues, or involved in similar median projects (13).

STATE EXPERIENCES

Several state DOTs around the country have established comprehensive access management programs that provide legislation or policy governing access within their respective states. Other states have prepared access management plans that provide more general guidelines to “plan” for implementing access management techniques. Colorado, Florida, New Jersey, and Oregon have become very well known for their successful access management programs. A summary of these states’ experiences and the strengths and lessons learned from each of these programs as they relate to the state of Texas is included in the following sections.

Colorado

The Colorado *State Highway Access Code*, Volume 2, Code of Colorado Regulations 601-1 was adopted by the Transportation Commission of Colorado effective August 31, 1998 (14). Prior access regulations had been in place since the 1950s, while the first comprehensive program designed to improve public safety and preserve the functional integrity of the system was established in 1981. The current 1998 Colorado Code is an update of the 1981 document that includes guidelines for administration and access standards, as well as design standards and specifications.

The Colorado Code includes eight basic access category classifications based on the functionality of the roadway, reality, and long-range plans. Under each of the access category classifications, guidelines have been established for sight distance criteria, access spacing, access width, access radii, access surfacing, speed change lanes, and other design elements. One of the basic criteria for the access management guidelines is the sight distance requirement established by the American Association of State Highway and Transportation Officials (AASHTO). The desirable sight distance criteria established in the 1994 *A Policy on Geometric Design of Highways and Streets* (AASHTO Green Book) (15) are the

primary source for guidance in the Colorado Code based on the relationship between AASHTO design criteria and basic human factors.

Some of the strengths identified with the Colorado Code are the consistency that is provided in the access approval process as well as the ability of the Code to address the political will to reduce accidents and preserve the highway system. Some of the lessons to be learned from Colorado are the importance of enforcement of the bandwidth criteria as part of the signalized intersection spacing criteria and the need to train the DOT in access management so that they can help make access management successful statewide.

Florida

The Florida *Rules of the Department of Transportation Chapter 14-97 State Highway System Access Management Classification System and Standards* was adopted in 1990 and has led the way for access management in the state since that time (16). Chapter 14-97 is "...intended to protect public safety and general welfare, provide for the mobility of people and goods, and preserve the functional integrity of the State Highway System" (16). In addition to Chapter 14-97, the state of Florida has also recently (June 24, 1999) updated and adopted *Chapter 14-96 State Highway System Connection Permits, Administrative Process* (17). This document outlines the permitting process for access along the states' highways.

The basic outline of the Florida comprehensive program includes a seven level classification system. The access classifications vary depending on the level of development planned for the area and the need to provide non-traversable or traversable medians. The program was originally set up with interim standards (based on posted speed) while the classification of the roadway network was completed. The classification was completed in 1993; however, the interim measures are still being utilized to provide standards where roadways are transferred to the state by local governments. Today Florida is in a "maintenance" mode and has been emphasizing the reclassification of transfers from counties, rather than "building" new roadways.

Some of the strengths identified in the Florida comprehensive program are the median opening criteria (18, 19), and its success statewide, the consistency that has been established through the access management committees in each region, and the ability of the DOT to spread the word about access management through a public informational CD. The informational CD outlines not only the basics of access management and access management standards throughout the state of Florida, but also includes references and documentation from national sources and from other states. Some of the lessons to be learned from the Florida program include identification of the time necessary to implement an access classification system and the potential for inconsistency that can occur as a result of the decentralization of the program.

New Jersey

The New Jersey Chapter 47 *State Highway Access Management Code* has been in effect since 1992. The most recent version of the *New Jersey Code* is dated January 1998 and represents the current access management program in New Jersey. The *New Jersey Code* is a comprehensive document that contains definitions, access classifications, access standards, and permitting requirements (20).

One of the more unique concepts included in the *New Jersey Code* is a provision for providing access to “non-conforming” lots. Non-conforming lots do not have enough frontage to meet the driveway spacing requirements. In the case of a non-conforming lot, a conformance test is done using the frontages of the lot and the lots on either side of the parcel in question. The analysis results in several relationships and incentives. First, non-conforming lots have limitations on the amount of traffic that they can generate. This leads to fewer traffic conflicts when driveways are provided close together. Second, one non-conforming lot cannot exist alone. At a minimum, there is a pair of non-conforming lots. There is an incentive in the *New Jersey Code* to allow two non-conforming lots that share a driveway to generate more traffic than the sum of the limited trips for the two individual lots.

There are several strengths that can be identified in the *New Jersey Code*. First of all, it is comprehensive. Additionally, traffic impact study requirements have been adopted and proven very successful, as have the permitting requirements for all applications, particularly non-conforming lots. Some of the lessons to be learned from the *New Jersey Code* are the importance of enforcing the spacing and bandwidth requirements for the traffic signal spacing criteria. Driveway geometry standards that have limited the width of driveways and forced driveways to be divided to comply with the standards have been identified as an area that may require additional attention.

Oregon

Oregon completed their comprehensive access management program as part of the 1999 *Oregon Highway Plan*. Goal 3: “Access Management” in the *Oregon Highway Plan* is to “...employ access management strategies to ensure safe and efficient highways consistent with their determined function, ensure the statewide movement of goods and services, enhance community livability, and support planned development patterns while recognizing the needs of motor vehicles, transit, pedestrians, and bicyclists” (21). The 1999 *Oregon Highway Plan* was adopted by the Oregon Transportation Commission on March 18, 1999 and serves as the basis for access management within the state.

One of the themes throughout the comprehensive program is the importance of access rights. Oregon’s program is designed such that approaches can only be approved where the property owner has the right of access. ODOT has indicated that in most cases property owners have a “common law right to access” a highway if their property abuts the highway. However, there are cases where this is not true.

By statute, if a highway is constructed on a new alignment after 1951, the abutting property owners do not have a right of access. Additionally, ODOT may acquire the rights of access (access control) by purchase, donation, condemnation, or by law.

Some of the strengths identified in the Oregon comprehensive program include the focus on access rights and the documentation that is provided in the decision-making process for approach request approvals and denials. The program also provides more predictability in the application of access management standards and better clarity regarding how access management standards apply to projects. Some of the lessons that can be learned from the Oregon program are the importance of assigning an access classification system that is simple and easy to apply.

LESSONS LEARNED

The state-of-the-practice literature review, including review of information from other states provided the research team with information and resources used to develop the basis of the Texas comprehensive access management program. In addition to the technical information that this process provided, practical knowledge and information was also gained from the process. Some of the important factors that are recommended for consideration in preparing the Texas access management comprehensive program are included in the following sections.

The first two sections address the overall application of a successful access management comprehensive program and include discussion on two key findings; the need for Department support, and the importance of implementation consistency. The remaining three sections discuss several technical issues that emerged from the research with respect to access management techniques, application of these techniques, and most importantly, which techniques are best suited for use in the state of Texas. The three topics that received considerable attention in this process included access classification; unsignalized intersection spacing; and median opening criteria.

Department Support

The literature review, particularly the review of other state comprehensive access management programs, indicated the need for support within the Department to make an access management program successful. Several states indicated the need to provide a statewide coordinator to oversee access management within the Department. The states that have demonstrated the most success with their access management programs are those states in which a DOT employee led the access management efforts and was on-hand during the implementation, organization, and initial set-up of the program. In most cases, this individual is still involved with the program and continues to ensure its success. In addition to this statewide access management coordinator, several states have also implemented district or region access management coordinators or committees as well. These local access management coordinators have taken the

responsibility of ensuring that access management practices are followed within their jurisdictions and have also been a key to the success of the program.

The recommendations outlined in the *Guidebook* identify the district engineer as the primary member in establishing the Department link and creating a successful program. The district engineer may appoint a local access management committee to assist in the evaluation of access management classifications and to aid in approval of access management plans. If needed, the local access management committee is recommended to include local district staff members, local area engineers, local Metropolitan Planning Organization (MPO) representatives (where applicable), and local city/county representatives (where applicable). If desired, the district engineer may also consult the proposed statewide access management coordinator for guidance in the classification process to ensure consistency. It is anticipated that by placing the district engineer at the forefront of access management, decisions will be made in accordance with the recommended guidelines, thus leading to the success of this program.

Implementation Consistency

Another common theme identified in the literature review, and particularly in speaking with DOT access management coordinators, is the importance of implementation consistency and the realization that success will not happen overnight. Access management requires a great deal of investment before the results of its implementation will begin to be noticed throughout the state. For instance, Florida has indicated that after more than 10 years of monitoring and enforcing their access management comprehensive program, they are now beginning to fully reap the benefits of the program. These results did not come easily, enforcement had to be consistent, and a great effort was made to train both DOT personnel and the public as well. Some of the benefits that are now being enjoyed include increased access management implementation and consistency statewide, as well as better understanding of the program, as well as general compliance by property owners and developers. Incremental benefits that occur every year of the program lead to full benefits down the road.

Access Classification

Access management techniques and classification systems have been evolving over the last 25 years. The early classification systems were based on techniques relating to highways and driveways (12). This system was expanded in 1993 to include management elements. In contrast, a 1982 FHWA report on access management classified techniques by functional objective. *NCHRP Report 348* in 1992 described various policy and design approaches, but did not develop a specific classification system (12).

All roads provide some degree of both vehicular movement and property access, depending on the function that they are intended to serve. These roadway functions vary from a focus on the movement of vehicles attained through complete access control, to primarily access to properties provided through

unlimited driveway and street intersections. The relationship between access and movement is shown in Figure 1, which illustrates the range of unrestricted access to that of complete access control. The management of both access and movement as illustrated in this graphic is the practice of “access management.”

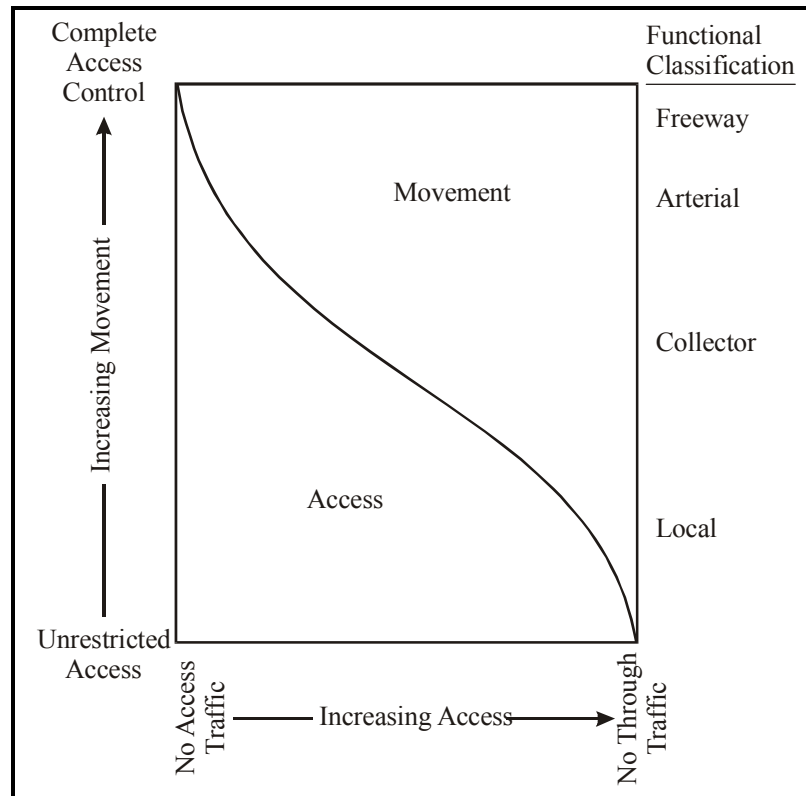


FIGURE 1 Relationship between functional classification, access, and mobility (8)

Just as the functional classification system provides the basis for roadway implementation and design, the access classification (AC) system forms the basis of access management implementation. It defines where and how often access can be allowed between proposed developments and public highways; where access should be denied or discouraged; where access should be limited to through non-traversable medians; and where provisions should be made for auxiliary lanes for both acceleration and deceleration purposes. Safe and efficient operation of streets and highways has always required that facilities be classified and designed to meet the purpose they are intended to perform. The entire roadway system is classified according to the functional classification system and is based on the function of the given roadway. In keeping with this theme, the first and sometimes most logical method for providing access classification is to follow the FHWA functional classification as access classification. This was considered for the state of Texas in an effort to keep consistency within the roadway system. As this was

considered, however, it was determined that functional classification did not provide the necessary information for use in access classification. In some cases, for instance, roads may have one FHWA functional classification, but may actually be serving the purpose of another functional classification. For example, there are some roads carrying in excess of 10,000 vehicles per day (vpd) that are classified as local streets. While traffic volume is not a basis for functional classification, local streets typically carry volumes of less than 2,500 vpd. Such misclassifications occur for a variety of reasons and begin to illustrate the need for a separate AC system so that the appropriate access management treatments may be considered.

To accurately control and manage access, it was determined that the AC system should be set up to consider such factors as: roadway purpose (access versus vehicle movement), land use, system continuity, design features, location (urban versus rural), and safety (crash rates and type). Of these factors, the most important ones to consider in designing the AC system was to aid in improving safety, increasing mobility, and protecting infrastructure investment. In contrast with functional classification, which considers existing roadway operations, it was determined that the proposed AC should consider future (20+ year horizon) proposed land use, future proposed lane configuration, and ultimately the projected build-out conditions of the roadway.

In reviewing alternatives for access classification, including the FHWA classification alternative outlined previously, classification systems outlined in *NCHRP Report 348*, and those currently utilized by other states, the research team concluded that a classification system similar to that used in the state of Florida was most applicable for application in Texas (16). In keeping with the goals of access management (improve safety, increase mobility, and protect infrastructure investment), the AC classifications were defined to preserve access through land use planning and a vision of the future. The proposed access classification system recommended for Texas provides an opportunity to determine the extent to which access should be “preserved” along a corridor, and therefore, the definitions are based on this vision of future access preservation. One of the main distinguishing features of the access classifications is the non-traversable median. Such medians can have the greatest impact on minimizing vehicles conflict points on arterial streets. Non-traversable medians are typically good replacements for two-way-left-turn-lanes when traffic volumes on the street exceed 20,000 ADT. These impacts are due to the decrease in the opportunities for vehicles to make left-turns at intersections with streets and driveways. In addition to the access classification and overall access management program for these roadways, local land use planning, zoning, and subdivision regulations should be written to the extent possible to support the restrictive spacing of these designations.

The AC system proposed for Texas includes six levels of access classified as AC 1 through AC 6. The following definitions describe the access provided for each classification:

AC 1: Highways in this class are generally multilane with non-traversable medians and are designed to provide for safe and efficient high-speed and high-volume traffic movements. AC 1 roadways are generally categorized as interstate, interregional, and intercity roadways and include all interstate highways as well as most freeways. Roadways classified as AC 1 do not provide direct property access.

AC 2: AC 2 roadways have the ability to serve high-speed and high volume traffic over long distances safely and efficiently. This classification is designed according to a highly controlled and limited number of access connections, median openings, and infrequent traffic signals. Roadways classified as AC 2 are multilane highly controlled access facilities with non-traversable medians.

AC 3: Roadways classified as AC 3 are facilities where the direct access to adjacent properties is controlled to maximize movement of traffic. This classification should be used where existing land use and roadway sections are undeveloped or partially undeveloped or where the probability of significant land use change in the near future is high in order to maximize efficiency through the control of access as development occurs. AC 3 highways include existing or planned non-traversable medians, as well as optimal signalized and unsignalized access spacing criteria. Local land use planning, zoning, and subdivision regulations should be written to the extent possible to support the restrictive spacing of this designation.

AC 4: Roadways classified as AC 4 are facilities where the direct access to adjacent properties is controlled in order to maximize movement of traffic. This classification should be used where existing land use and roadway sections are undeveloped or partially undeveloped or where the probability of significant land use change in the near future is high in order to maximize efficiency through the control of access as development occurs. AC 4 highways will include existing or planned traversable medians, while still providing optimal signalized and unsignalized access spacing criteria.

AC 5: This classification of access will be used where existing land use and roadway sections are more developed than those classified as AC 3. In this classification, the probability of major land use change is not as high as those classified AC 3. Also, existing access management criteria and spacing does not currently meet, or expect to meet, the criteria outlined under AC 3. These highways will be distinguished by existing or planned non-traversable medians.

AC 6: This classification of access will be used where existing land use and roadway sections are more developed than those classified as AC 4. In this classification, the probability of major land use change is not as high as those classified AC 4. Also, existing access management criteria and spacing does not currently meet, or expect to meet, the criteria outlined under AC 4. These highways will be distinguished by existing or planned traversable medians.

The next important step in completing access classification is to determine how best to assign the roadways to meet these classifications. Several states determined as they developed their comprehensive program that the first step in implementation of this plan would be a classification of the entire roadway network. Florida, for instance, began their program by classifying their roadway network, while operating under a system of “interim” standards for access management. This classification took Florida nearly two years to complete.

For Texas, the final determination for assigning access classifications is recommended under the direction of the district engineer and recorded through the proposed statewide access management coordinator or appropriate division to support planning and design activities. Further, the district engineer may appoint a local access management committee to assist in the evaluation of access management classification based on varying local operations conditions of roadway segments. As indicated previously, if needed, the local access management committee is recommended to include local district staff members, local area engineers, local Metropolitan Planning Organization (MPO) representatives (where applicable), and local city/ county representatives (where applicable). If desired, the district engineer may also consult the proposed statewide access management coordinator for guidance in the classification process to ensure consistency.

Given the size of the state of Texas and the extensive state highway system, it is recommended that the access classification committee look at roadway segments as needed based on new development, permit applications, reconstruction and/or highway maintenance projects and make a determination on the appropriate AC. The district engineer may also consider classification of roadway segments at the request of the Transportation Commission based on a specific need or request. Once a classification determination has been made, this classification can be changed only through petition to the district engineer.

Unsignalized Access Spacing

Unsignalized access points such as private driveways and public streets introduce conflicts and friction into the traffic stream. These access points serve a variety of traffic ranging from local and collector street traffic to large activity center access. Vehicles entering and leaving the main roadway at these locations often slow the through traffic, and the difference in speeds between through and turning traffic increases crash potential. As stated in the 2001 *A Policy on Geometric Design of Highways and Streets* Fourth Edition (2001 AASHTO Green Book), “Driveways are, in effect, intersections and should be designed consistent with their intended use...The number of crashes is disproportionately higher at driveways than at other intersections; thus their design and location merit special consideration” (22).

Recent studies indicate that driveway spacing is one of the key factors that influences crashes on arterial streets. According to *NCHRP Report 348*, “Strict application of traffic engineering criteria may place desirable spacing requirements at 500 feet or more. However, such spacing may be unacceptable for economic development in many suburban and urban environments, where development pressures results in a typical 100 to 200 foot spacing” (8). The increase in access density has a dramatic increase in crash rates. Accident indexes suggest that doubling the access frequency from 10 to 20 accesses per mile (approximately 528 to 264 foot spacing) would increase crash rates by 40 percent. A road with 60 access points per mile (approximately 88 foot spacing) would have triple the crash rate—200 percent increase—as compared with a spacing of 10 access points per mile (approximately 528 foot spacing) (12).

Several different alternatives are currently available for determining access spacing requirements for unsignalized intersections. The three alternatives considered in Texas included research conducted by Layton and Stover, research by Glennon and standard AASHTO stopping sight distance criteria. Layton and Stover identify four alternatives for determining unsignalized intersection spacing including: “minimum stopping sight distance; right-turn conflict overlap; maximum egress capacity; and rule of thumb” (23). The results of this research have been applied to the recommended criteria for both Oregon and Florida. Early research conducted by Glennon outlines another alternative for unsignalized access spacing (5, 6). Glennon’s work was one of several reviewed by New Jersey and the distances outlined by this research were adopted by the state. The final alternative for determining unsignalized intersection spacing relies completely upon stopping sight distances calculated by AASHTO in the 2001 AASHTO Green Book (22). As indicated previously, earlier versions of the Green Book were used to develop the Colorado spacing alternatives.

After careful consideration of the alternatives available, and through consultation with TxDOT personnel, the unsignalized access spacing criteria recommended for Texas are based on the minimum distances necessary to stop a vehicle according to current stopping sight distance criteria outlined in the 2001 AASHTO Green Book. These criteria indicate that the minimum criteria ranges from 660 feet for AC 3 roadways to a minimum of 330 feet for AC 6 classification, depending on roadway conditions and design speed.

It was recognized that in some situations the minimum spacing requirements might not be met. However, safety cannot be compromised in any situation. Various conditions may be considered in making the final determination on unsignalized access location, including sight distance, conflict overlap, and maneuvering or deceleration distance. Adequate stopping sight distance should be maintained in all situations, particularly for unsignalized access locations. The stopping sight distance requirements in Table 1 are recommended for use to determine the required horizontal and vertical sight distance

necessary as measured from the vehicle traveling on the highway to the access and should be adjusted for grade as required by AASHTO.

TABLE 1 Access Spacing Criteria

Design Speed (mph)	Driveway Spacing (Stopping Sight Distance) ¹	
	Calculated (feet)	Design (feet)
25	151.9	155
30	196.7	200
35	246.2	250
40	300.6	305
45	359.8	360
50	423.8	425
55	492.4	495
60	566.0	570
65	644.4	645
70	727.6	730

¹ Lengths shown should be adjusted for any grade of 3% or greater.
Source (22)

Median Spacing Alternatives

The treatment of median alternatives plays an important role in the operation and safety of roadways. Medians are generally introduced to prevent crashes caused by crossover traffic, headlight glare distraction, and left-turning traffic (vehicular safety); to provide a refuge for pedestrians crossing the roadway (pedestrian safety); and, to remove turning traffic from through lanes thereby improving roadway operations (vehicular efficiency). Non-traversable medians and well-designed median openings are proven to be some of the most effective features in a safe and efficient roadway system. The design and placement of these medians and median openings plays an integral part in access management (19).

There are two basic types of median openings; directional and full median openings. Directional median openings provide access for one direction of travel only, as illustrated in Figure 2. Full median openings provide full access for main and cross street traffic. An illustrative example of a full median opening is provided in Figure 3 for a developed area in Houston, Texas.



FIGURE 2 Directional median opening in Houston, Texas



FIGURE 3 Full median opening (developed area) in Houston, Texas

In conjunction with the AC choice made earlier, the Florida standards were determined to be best suited for Texas. The recommended minimum median spacings are outlined in Table 2. In some instances, these criteria cannot be met. These instances and the resulting deviations from the standards must be considered individually and must be designed such that the goals of the access management program are not compromised. These are the goals of improved safety, increased mobility and protection of infrastructure investment.

TABLE 2 Median Spacing Criteria

Access Classification	Minimum Median Opening Spacing (feet)	
	Directional	Full
AC 1	Full Median – No Opening ¹	Full Median – No Opening ¹
AC 2	1,320	2,640
AC 3	1,320	2,640
AC 4	Traversable median	Traversable median
AC 5	660	2,640 (> 45 mph) 1,320 (≤ 45 mph)
AC 6	Traversable Median	Traversable Median

¹ Emergency vehicle median openings may be provided at the discretion of the local agency, but should be designed such that only emergency vehicles can access them.

Source: Adapted from (18)

CURRENT STATUS AND FUTURE WORK

The preservation of access along arterial streets has proven itself to be worthwhile in many parts of the United States through both research and implementation. With the increase in traffic volumes and congestion that has occurred in recent years throughout the state of Texas, the movement of vehicles combined with continued preservation of access must be taken seriously. The results of this research effort have determined that access management is an important step in preserving the access, accessibility, movement, and mobility of Texas' arterial streets.

To ensure that the techniques outlined can be implemented within the current TxDOT process, results of current and ongoing research are currently being incorporated into the TxDOT *Draft Access Management Manual*. The results are also being incorporated into the *Access Management Guidebook for Texas* that is currently being completed as part of the research project. The *Guidebook* contains both the techniques and criteria based upon the first-year research report as well as additional criteria and

policy documentation that are continually being developed as part of the project. The *Guidebook* is anticipated to be of use to planners and engineers in understanding the importance of various access management treatments and further identifying criteria for their recommended use. The *Guidebook* is anticipated to be used in providing policy support for access management decision making and as a tool for consistent access control by design for affected communities.

Further work in year two of the project includes completing the *Guidebook*. The guidelines and subsequent *Guidebook* will then be organized into training materials and a training course for not only Department personnel, but local city, state, and MPO representatives as well. Additionally, a separate research project is currently underway to estimate the benefits of access management by studying the spacing standards and other access management techniques outlined in this project to better quantify driveway spacing requirements, median alternatives, and other techniques.

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5th National Conference on Access Management

UTAH DEPARTMENT OF TRANSPORTATION ACCESS MANAGEMENT STUDY



The UTAH DEPARTMENT OF TRANSPORTATION, in association with FEHR & PEERS ASSOCIATES, INC., conducted a project study to define selected elements for a statewide ACCESS MANAGEMENT PROGRAM

5th National Conference on Access Management, 2002



PRESENTATION OUTLINE:

1. BACKGROUND
2. UDOT Access Management Study Project Scope
3. PROJECT PROCESS, Development of Manual ...
 1. UDOT Highway Access Categories
 2. UDOT Access Category Standards
 3. UDOT Access Permit Process
4. WHAT'S NEXT?

5th National Conference on Access Management, 2002



BACKGROUND...

WHAT WAS "BROKEN"? OR, WHY ARE WE HERE TODAY?

What is the access permit process?
 Why do I need a permit? Who is involved?
 Where and how do I get a permit?
 What is a traffic study?
 Permits Fees? How much?
 What about local government standards?



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BACKGROUND...

WHAT WE KNEW ABOUT UDOT and the PERMIT SYSTEM:

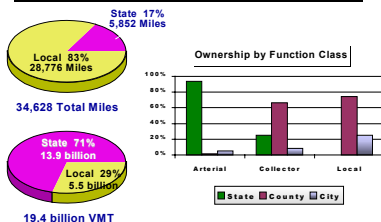
- Utah in a "boom" economy in the 1990's, pace and intensity of development increased during that time.
- Sophistication of Traffic Engineering increased in the 90's
- Decentralized Permitting Process across (4) UDOT Regions
- "Game Playing" in Permitting
 - UDOT vs. Owner, Developer, & Municipality
 - Politics and Networking in the Process
- Lack of Uniform Permit Process

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Utah Highway System

HIGHWAY SYSTEM STATISTICS IN UTAH

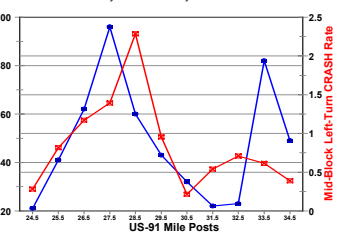


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Case Study in Northern Utah

Access vs Mid-Block Left-Turn Crashes



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ACCESS MANAGEMENT STUDY

PRIOR 2000

Access Management Task Force

UDOT Access Management Q.I.T.

Agreement of Comprehensive Access Management Approach

YEAR 2000

Access Management Program Study

Update:

- Permit Process

Develop:

- Access Manual
- Categories
- Standards
- Municipal Guide

YEAR 2001

UDOT Adoption of:
A.M. Rules
Highway Categories

GIS Database Feasibility

Initiate Revision of:
Traffic Impact Study
A.M. Rules

YEAR 2002

Legislative Support:
Enabling Power, Local Governments

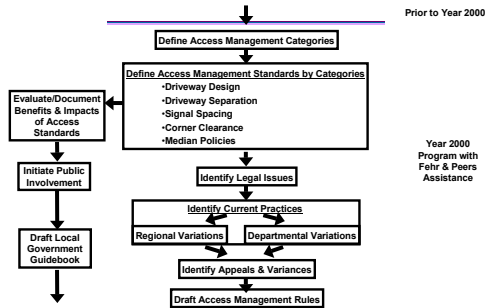
Develop A.M. Corridor Plans

Begin Rule & Program Update

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PROJECT WORK SCOPE



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Access Management Program Establish Authority

- White Paper Legal Review
- State of Utah Code : Rule 930-6
Manual for the Accommodation of Utilities and the Control and Protection of State Highway Rights of Way
- State of Utah Code:
 - 72-7-103 : Limitation on Access Authority
 - 72-2-117 : Corridor Preservation Revolving Loan Fund
 - Call for development of Model Access Ordinance for UDOT
 - Updated HB 218, 2001: amended to include permit process
- State Code Referring to Limited Access :
 - 72-1-202, 72-6-117 Outlined process to break LA & NA lines
- Exaction Power of the Department

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HIGHWAY ACCESS CATEGORY DEVELOPMENT

CATEGORY DEVELOPMENT GUIDELINES

- Preserve System Mobility
- ID: NHS Routes, High Priority Routes
- Function Class and Posted Speeds
- Urban / Rural Designations
- Adjacent Development Intensity



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HIGHWAY ACCESS CATEGORY DEVELOPMENT

State Highway Access Categories

Category Assignment	System Level of Importance	System Level of Importance
1	I	Freeway/Interstate
2	SR	Statewide Rural
3	SU	Statewide Urban
4	RR	Regional Rural
5	RUF	Regional Urban Fluid
6	RUS	Regional Urban Static
7	CR	Community Rural
8	CU	Community Urban
9	O	Other

System Level of Importance	Area Type	Rural
Interstate	Urban	Federal Interstate Standards
Statewide		Move traffic at high speeds (generally greater than 50 mph) over long distances (generally over 10 miles) with emphasis on high speed safety and efficiency.
Regional: Fluid Development		Move traffic across multiple communities or jurisdictions, typically connecting to facilities of Statewide or Interstate Importance and through areas that have significant potential for development or redevelopment of adjacent land to the highest and best use.
Regional: Static Development		Move traffic across multiple communities or jurisdictions, typically connecting to facilities of Statewide or Interstate Importance but through areas that are significantly developed to the point where function (road speed and capacity) has eroded (generally).
Community		Move traffic through a single community or an adjacent community but not generally used for long distances (greater than 5 miles) travel.
Other		Frontage roads, critical connections of short distance, and other special use facilities.

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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
2. Unsignalized Spacing
3. Corner Clearance
4. Medians
5. Access Separation at Interchanges
6. Speed Change Lanes (Acceleration / Deceleration)
7. Driveway Design

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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
 - Progression
 - Cycle Length



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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
2. Unsignalized Spacing
 - Right turn overlap conflict reduction
 - 15 mph speed differential



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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
2. Unsignalized Spacing
3. Corner Clearance
 - Also reducing right turn overlap conflict
 - Allowance for isolated corner properties



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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
2. Unsignalized Spacing
3. Corner Clearance
4. Medians
 - By Policy
 - By Application



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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
2. Unsignalized Spacing
3. Corner Clearance
4. Medians
5. Access Separation at Interchanges
 - Weave Distance
 - Transition Distance to Left Turn Lanes



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ACCESS CATEGORY STANDARD DEVELOPMENT

1. Signal Spacing
2. Unsignalized Spacing
3. Corner Clearance
4. Medians
5. Access Separation at Interchanges
6. Speed Change Lanes (Acceleration /Deceleration)
 - UDOT standard drawings speed change lane
7. Driveway Design
 - UDOT standard drawings driveway design

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Proposed Access Management Category Standards

- Proposed Spacing Standards;
 - Signals
 - Streets,
 - Access Points
 - Location to Interchange

Access Category		Minimum Signal Spacing (feet)	Minimum Street Spacing (feet)	Minimum Access Spacing (feet)	Minimum Interchange Crossroad Access Spacing (feet)		
					R-Inf/R-out	Signal	
						A	B
1	I	Freeway/Interstate Standards Apply					
2	S-R	5,280	1,000	1,000	1,320	1,320	1,320
3	S-U	2,640	No Unsignalized Access Permitted		1,320	1,320	1,320
4	R-R	2,640	660	500	660	1,320	500
5	R-LF	2,640	660	350	660	1,320	500
6	R-US	2,640	350	200	500	1,320	500
7	C-R	1,320	300	150	Not Applicable		
8	C-U	1,320	300	150			
9	O	1,320	300	150			

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Access Design Standards Access Width, Clearance, Radii

State Highway Access Widths

Land Use	Direction Use	Minimum Access Width (feet)	Maximum Access Width (feet)
Commercial or Industrial	two-way	25	50
	one-way	16	30
Residential	two-way or one-way	12	20
Farm	two-way or one-way	16	32

State Highway Edge Clearance

Land Use	Minimum Edge Clearance (feet)	
	Urban Areas	Rural Areas
Commercial or Industrial	10	15
Residential or Farm	15	20

State Highway Access Radii

Land Use	Access Radii (feet)			
	Urban Areas		Rural Areas	
	Min.	Max.	Min.	Max.
Commercial or Industrial	30	60	25	65

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Access Design Standards Grade & Approach Angle

Recommended Driveway Grade Change

Volume Level	Driveway Volume (ADT)	Minimum Grade Change (D)	Maximum Grade Change (D)
Low	0-500	±6%	Controlled by vehicle clearance
Medium	501-1500	±3%	±6%
High	> 1501	0%	±3%

State Highway Driveway Angles

State Highway Driveway Angles			
Land Use		Desirable	Minimum
Commercial or Industrial	Two-Directional Use	90°	80°
	One-Directional Use - Right Turns Only	90°	60°
	Egress or Ingress		
Residential or Farm		90°	80°

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UDOT Access Permit Process: Draft Form

- Internal Effort to Develop Internet Application and Tracking System

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Permit Fee Schedule Estimate UDOT Permit Survey FY2000

UDOT Access Permits FY2000	Type 1	Type 2	Type 3	Type 4
New Request	51	333	311	428
Temp Access	12	3	12	8
Improvement of existing	37	108	118	34
Access Change	13	22	19	18
Removal	8	15	13	4
Total	121	481	473	492

Type	Cost
Type 1	\$357.51
Type 2	\$456.52
Type 3	\$562.81
Type 4	\$1,126.08

EMPLOYEE TIME ESTIMATE ACCESS PERMIT REVIEW: Permit Process	Type 1	Type 2	Type 3	Type 4
Permit Process Step - Initial Concept	10	20	30	60
Encroachment & Permits Officer	10	15	15	30
Maintenance Area Supervisor	0	0	0	0
Office Tech III - Preconstruction Secretary	0	0	0	0
Permits Inspector	10	15	30	40
Permits Office Tech III	30	60	60	120
Permits Officer	20	30	30	60
Permits Officer II	10	30	30	90
Region Environmental/Hydraulic Engineer	0	0	0	0
Region Right of Way Control Coordinator	15	20	60	60
Region Three Right of Way Engineer	10	10	30	30
Region District RW control coordinator	0	0	0	0
Right Of Way Control Coordinator	22.5	37.5	60	90
Traffic Engineer	0	0	0	0

* Permit Survey performed by state of Utah, CPM class.

* Survey determined not to be representative of all UDOT Regions

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PRESENTATION OUTLINE:

- BACKGROUND
- UDOT Access Management Study Project Scope
- PROJECT PROCESS, Development of ...
 - UDOT Highway Access Categories
 - UDOT Access Category Standards
 - UDOT Access Permit Process
- What's Next?



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Access Management Program Utility Manual Draft

ACCOMPLISHED TASKS

- ☒ Draft Developed (Manual for the Accommodation of Utilities and the Control and Protection of State Highway Rights of Way, Chapter 7: Driveways)
 - Authority (white paper)
 - Permit Process
 - Access Categories
 - Category Standards
 - Design Standards

CURRENT EFFORT

- Permit Form / Letters
- Traffic Impact Study Guide
- Permit Fee Schedule
- Assign Access Categories

TO DO LIST

- Finalize Permit Process & Fee Schedule Study
- Re-Write Ch.7 Utility Manual
- Rule Making
- Training / Local Outreach
- Permit Tracking
- Internet / GIS Application

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Retrospective & Suggestions Expect to fix what was thought to be broken

- Strive to include in or enhance existing State Code
- Use other Access Programs as model
- Perform legal review to ID authorization to operate
- Find fault with process internal and external
- Form steering & peer review groups, be representative of all users
- Define permit process to include Local Government & MPO's
- Hire consultant for standards and process draft to remain impartial in development of
- Communicate process and standards, develop on-going education and training - internal / external
- Review Fee Structure
- Implement what you can as developed to see if it works
- Identify who customers are and coordinate with all constantly



Access Management Program

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5th National Conference on Access Management, 2002

Fifth National Access Management Conference

Who's Road Is It, Anyway?

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I. Introduction

This paper expands on the theme addressed by previous speakers from New York at this conference in earlier years: that is, that the success of the State's Access Management Initiative is critically dependant on our ability to develop local government action and support. Why? Because two of the key elements necessary for a successful access management program are either under their control (land-use and local system management, Exhibit 1) or subject to their substantial influence (the design and implementation of our capital projects).

Exhibit 1: Land Use and Transportation Management Authority

<u>Element</u>	<u>Local Authority</u>	<u>State Authority</u>
Comprehensive Planning	Yes	No
Zoning Control	Yes	No
Subdivision Control	Yes	No
Site Plan Approval	Yes	No
SEQRA Lead	Private and local projects	State Projects
GEIS	Private and local projects	State Projects
Advance Acquisition	Yes	Yes
Official Mapping	Yes	No
Transportation Planning	Local System	State Roads
Highway Work Permit	Local Roads	State Roads

Previous NY speakers have talked about the characteristics of our approach: (i) targeting critical areas; (ii) using capital projects to catalyze local action; (iii) customizing our outreach efforts to each specific community; (iv) team-building with direct and frequent interaction; (v) developing win/win solutions; (vi) resolving (purely) local problems; and the like. We believe that the success of this approach is demonstrable. Over the past three years we've probably added 8-10

access management projects to our slate each year. But more importantly, others have adopted the Initiative as theirs: and we've seen at least as many AM projects initiated by the metropolitan planning organizations (MPOs), our regional offices and individual communities.

We now have enough experience around the State to be more prescriptive in implementing future projects and, thus, the focus of this brief paper is two distinct issues that we believe are critical to success.

First, access management doesn't work as a stand-alone initiative, at least in New York if community implementation is necessary then the access management effort must be subordinate to their larger context and a broader set of tools.

Second, the adoption or even adaptation of model access management ordinances and plans is problematic and may be self-defeating unless greater care is taken in other words, uniform standards and plans based largely on transportation concerns won't work if other local objectives are paramount.

II. Larger Context, Broader Objectives, More Tools

Access management fits into a relatively narrow niche. From a transportation perspective it simply minimizes the transportation impacts of individual and cumulative developments and reduces capacity costs in the future. From a business and development perspective it simply enhances the ability of a road to deliver customers (more) safely and efficiently while providing some opportunity for business growth at a fixed level of transportation infrastructure in the future.

Indeed, one of the problems in selling access management in a community is that there are few immediate and observable benefits from its application, and these are usually confined to retrofit projects along corridors that are substantially or fully developed. At the same time, however, the tools most commonly applied in access management efforts are frequently perceived as a threat in most communities: to development and (economic) growth ... as they can increase costs and reduce flexibility (e.g. broader and more restrictive zoning and development requirements); and to business operations as they can reduce immediate access by some share of the market provided by a roadway (e.g. medians and other forms of turn-restrictions).

If we can't sell access management on its own merits, how do we make it work? The answer is relatively simple, although implementation isn't.

First, we subordinate the access management effort to community needs and objectives. And, our experience in a variety of communities suggests that the access management effort needs to address four common sets of issues and objectives: (i) protection and enhancement of existing businesses, (ii) economic growth, (iii) protection of the community's "quality-of-life", and (iv) resolution of existing and in some cases future but generally recognized transportation problems. Our successes have largely resulted from our ability to specifically relate access management to

these broader community issues and objectives. (Exhibit 2)

Secondly, we integrate the access management elements into broader community efforts, which can take many forms, most commonly their comprehensive plans, area development plans, and economic and capital development programs. Again, the access management elements must logically contribute to achievement of these plans. But importantly, since access management is explicitly linked to some larger local plan we work hard to ensure that the larger plan is a success, and that requires that we apply a broader set of tools. What are they? Most commonly:

- * outreach, most commonly education, visioning, consensus building, and dispute resolution;
- * financing for local transportation purposes such as local roads and access roads, and for non-transportation purposes which the Department will not fund ... such as environmental and tourism enhancements, utility and local infrastructure improvements, improvements on private property and the like;
- * context sensitive design tools which most frequently relate to achievement of local aesthetic or development plans, and preferably those tools that can be applied and implemented as part of a Department project;
- * land-use planning and management tools, and rezoning and the use of special districts to achieve desired development patterns; and,
- * reference tools for local purposes, of two types – expertise ... including legal, financial, engineering, environmental, landscaping, and a variety of other skills, and peer-to-peer which can be a key ingredient to persuading local officials and experts that access management works to their benefit.

Let me provide you with a specific and successful example of how our projects are related to local objectives and apply a wider array of tools. The Town of Livonia (with the Village of Livonia embedded within it) is a rural community roughly 25 minutes from the City of Rochester. Early in their joint Comprehensive Plan process they identified two distinct problems to be addressed. First, development spill-over from Rochester threatened their quality-of-life; as manifested by strip retail development which had largely eviscerated the small commercial core of the Village and heavy residential growth based on linear development roads as opposed to the Village grid pattern. Second, they needed to promote economic development to re-energize the Village core, to provide attractive job opportunities for their children, and to strengthen a tax base largely dependant on residential and agricultural sources.

Exhibit 2: Local governments participate in access management to resolve local issues and achieve local goals. The tools they apply are often obtained from their own tool-box.

Local Issues and Objectives

Victor: The Town has been among the 5 fastest growth areas in the state over the last 6 years. The majority of business growth has impacted Rt. 96 which runs through the Village and there is still substantial room for development. As a result LOS in the Village is very poor and there are no realistic opportunities for improvement. There are few opportunities for local traffic to avoid the Village, however, and traffic problems have become a major issue and the principal stimulus for a de facto growth moratorium.

Canandaigua: The Town recognized that Rt. 332 served as the gateway to the community and that its transportation vitality would be a key factor in the Town's ability to grow. They wanted to alleviate the possibility that retail development along Rt. 332 would compete with an existing retail area to the South, but, at the same time, they wanted to promote use of Rt. 332 for office, institutional and light industrial development.

Pittsford: The Town is essentially built-out. A one-quarter mile section of Monroe Ave. is their major retail area (strip developed) and abuts the Village proper, which is both attractive and historic. They wanted a redevelopment plan to improve the aesthetic appearance of the strip and enhance it's use by pedestrians and bicyclists.

Local Actions

Victor: An access management ordinance was adopted, to address safety, but not capacity and circulation. As a result, the Town implemented 2 related programs. The first was a long-range effort to complete the system of local roads around the Village. The second was a Sub-Area Development Plan which would provide off-system circulation within the area where business growth would occur. The latter would be financed through a system of mitigation fees established pursuant to a GEIS.

Canandaigua: As part of a NYSDOT project the Town obtained a restrictive median with fixed (future) signal locations and support for construction of 1.5 miles of access roads. (They later added an additional 1.5 miles at their sole cost.) Rather than re-zone they adopted an access management ordinance which included median break and interconnection standards to ensure that large developments would take their primary access from the access road system.

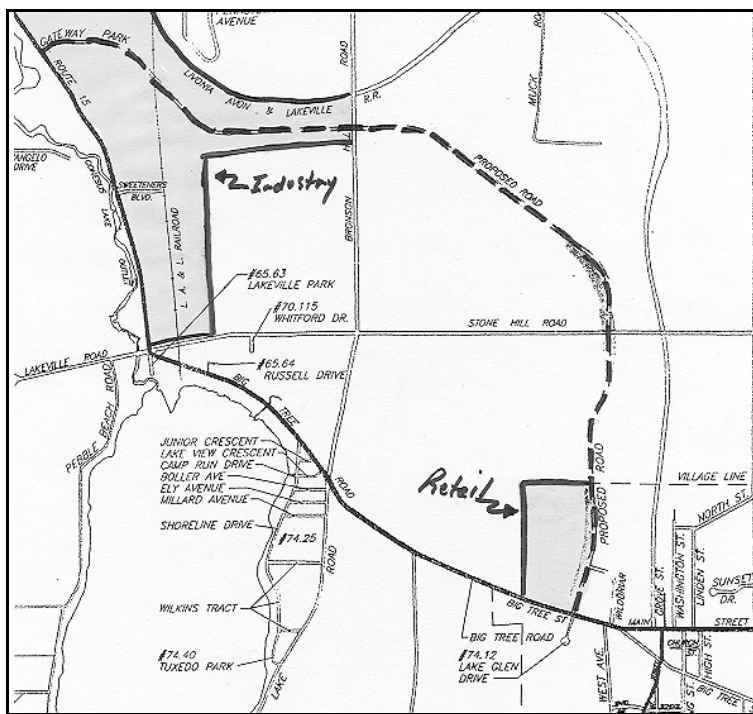
Pittsford: We defined an access retrofit plan that could be implemented by redevelopment consisting of driveway consolidations, rear access roads, and cross circulation. We then worked with the Town's consultant to overlay architectural and street-scape standards, and a bike and pedestrian trail network which linked to the Village's Canal-to-Trail system.

The Plan which they finally implemented had 5 basic components: (i) retail and commercial development was frozen at existing locations with one exception an undeveloped 85 acre parcel abutting the Village core which lacked access; (ii) a single industrial development zone with rail but limited road access; (iii) large lot requirements for all residential zones outside of the Village core (1 home per 5 acres and up) – with explicit incentives for clustering; (iv) a comprehensive access management ordinance; and (v) a new road serving both the industrial zone and the Village retail zone. (Exhibit 3)

The key to success, however, was and is the new road, simply because it provides the best if not only opportunity to attract retail and commercial development to the Village in the foreseeable future. If growth doesn't occur in the Village, they'll have to relax growth restrictions along the State roads in order to attract the development necessary to reduce pressure on their tax base.

We participated in developing and stipulating the rezoning and access management elements and were directly involved in their public outreach and formal hearing undertakings. But, perhaps as importantly, since we want this Plan to succeed over the long-term, we are currently involved in their ongoing effort to finance the new road.

(I should probably note at this point, that we've had to follow the same general tactics but a different strategy within the Department, as many of our regional designers and planners have been reluctant to get involved in local affairs or to integrate what they see as purely local amenities in our capital projects. The basic strategy, "start small and build on winners", has been successful and resulted in substantial local good-will which, in turn, has spilled over to facilitate implementation of a number of projects. We're hoping that the community-oriented initiatives recently undertaken by the Department Smart Growth, Quality Communities, and Environmental and Context Sensitive Solutions ... will provide additional incentive for the regions to call on our services.)



The preceding discussion has largely focused on projects in lightly to moderately developed areas. Retrofit projects which, obviously, occur in areas that are largely or totally developed present a distinct problem: in large part because most local governments lack the necessary

planning capabilities and the “plans” that emerge mesh poorly with the (local) implementation tools available. As a result, our approach is quite different and has three distinct characteristics, so far. They are all specifically connected to a NYSDOT project. Planning and implementation is the joint responsibility of a team comprised of NYSDOT staff (and consultants) and local officials, at a minimum. (Property owners are brought directly into the planning process as it advances.) And, we will not force retrofits on any property owners if they do not agree we will not do it, at least at their property.

Several of the communities that we are working with have indicated their desire to pass an access retrofit ordinance. We are in the midst of considering how this might best be structured. But, it is clear that any such ordinance would have to be considerably leaner and more flexible than any of the model (access) codes we’ve seen.¹

III. Realistic Plans and Standards

The greatest benefits of access management obtain when it is applied before development occurs: that is, according to a Plan which is generally implemented through changes to local ordinances (subdivision, zoning, and site-plan approval) and capital development activities. The key issue is “will the community enforce their access requirements and follow through on their Plan in light of the realities of development; today, tomorrow, and 10 years from now?” Most often the answer depends on one’s ability to define requirements that are relatively simple, are not onerous, and can be applied fairly to the type of development that will be allowed along a road.

In a number of cases, however, we’ve found weaknesses in proposed access management plans and ordinances that will inhibit if not bar their implementation. I’ll briefly discuss 3 of the areas where we find frequent problems.

Driveway Spacing Requirements

Most of the plans recognize that driveway spacing requirements need to reflect the existing environment, but few go beyond that. Instead, driveway spacing requirements for future developments are drawn from the transportation-based standards presented in NCHRP and FHWA publications and model codes in Florida and other states. Thus, on arterials where

¹ A number of the Town access ordinances we’ve reviewed do contain retrofit provisions. These apply to businesses existing “as of” the date of the access ordinance, apply when redevelopment occurs, and requires that the developer work with the community to bring the property into conformance with the access code “to the maximum extent practicable”.

substantial new development may occur we see spacing recommendations on the order of 400-600 feet. While such standards are beneficial from a transportation perspective they are extremely difficult to implement, at least in New York, because of their inherent drawbacks:

- * they can increase developers cost and inhibit development and particularly smaller developments
- * they can increase other public infrastructure costs (e.g. water and sewer) and can create inter-jurisdictional friction due to annexation requirements
- * they can create a wasteful pattern of land-use and propagate “nouveau” strip development (at least until build-out occurs, which may be never)
- * they often conflict with other zoning requirements (e.g. allowable lot size ranging from one-quarter to one-half acre and minimum frontage requirements most frequently ranging from 100 to 200 feet)
- * they inhibit implementation of other access management tools, and specifically interconnections and shared driveway systems

These problems can't all be resolved but they can be addressed by a pragmatic plan. We most often use a three-step process. First, we ask the local government to identify the size, type and pattern of development they want, with particular attention to small and very large developments those that are most frequently accommodated at single sites. Second, we then ask them to change their zoning and zoning ordinances to reflect these elements. Finally, we establish the access management requirements to support these patterns with the smallest possible transportation impacts. And in this regard, we most frequently define driveway spacing requirements in one of two ways: on a sliding scale based on trip generation or as a single standard based on the function of the road and allowable land-uses, with smaller minimum spacings allocated to roads where smaller developments are encourage. (Exhibit 4)

Exhibit 4: The driveway spacing standards established in Canandaigua recognize that businesses of different size need to be accommodated. They also provide an incentive for great spacing.

Spacing Standards for	Small Development	Medium Development	Large Development
	0-150 PHT	151-300 PHT	301 PHT or more
All State Roads	220 feet	330 feet	550 feet
Local Collectors & Arterials	150 feet	250 feet	400 feet
Access & Development	50 percent of frontage	65 percent of frontage	80 percent frontage

Driveway Location

This is, I suppose, one of my pet peeves because it is given little if any attention in any of the ordinances I've reviewed (including a number of the model ordinances as well as those proposed for local enactment in New York) but can have substantial impact on the access system at full build-out. I'm not going to spend a lot of time on it, but I'd like to mention four conditions that deserve much greater attention when it comes to access management ordinances and plans:

- * Left-turn overlaps: cross-road driveways should be spaced sufficiently far apart to eliminate head-to-head conflicts and minimize the potential that the tail of one line might block left turns across it.
- * Cross-alignment: avoid cross-road driveways where installation of a signal is not warranted, as they create head-to-head and left-turn conflicts.
- * Signalized at developments: generally avoid installing signals which would be exclusive to individual businesses, even where cross alignment with another business or intersecting road is possible. Require that signalized driveways be located so as to serve abutting properties and to link up with the local road system.
- * Along the property line: Don't be dogmatic about driveway spacing as there are cases where safety, efficiency and access are best served by a shared driveway system with cross-access. This is most easily accomplished through advanced planning: allowing a dual driveway system with one along the property line and another more centrally located but imposing conditional site plan requirements for cross access and driveway closure should the abutting property be developed.

Access Roads

We're generally proponents of access roads and particularly when they are proposed to connect to or extend the local road system. In evaluating the practicality of access roads three criteria are preeminent: (i) is the level of current and imminent development sufficient to justify the road, (ii) does the road promote the pattern and nature of development proposed by the locality, and (iii) can it be financed? A number of the plans we've reviewed have fallen short, by our judgement, in one or more of these criteria.

Most of those we think will fail in implementation are proposed in lightly to moderately

developed areas and rely on one of three methods of implementation²:

- * a requirement that developers construct the road through their (entire) property prior during development, or
- * immediate construction using bond financing with some form of business and development fees used for bond payments, or
- * future construction financed through impact or mitigation fees generally imposed as a one-time charge at the time of development.

From our perspective there are three problems with these types of proposals:

- * the level of existing development and any likely short- to mid-term development is unlikely to justify the access roads on transportation benefits and impacts, alone,
- * the incremental cost involved in constructing a piece of an access road as a condition to the site plan approval can impede new development,

² The reports we've reviewed have already eliminated traditional means of financing: e.g. the locality has determined that they will not use their general revenue funds to construct the access road and the consultant has determined that state funds cannot be used to construct private or local roads.

- * the incremental cost involved in financing through impact or mitigation fees falls disproportionately on existing businesses or developments that will take place in the near future, depending on how they are implemented.³

There are, potentially, ways around these problems. Where financing and/or construction of an access road is neither necessary nor feasible in the short- to mid-term (given potential objections) we generally recommend that the locality: (i) map the proposed alignment and require that developers provide a conditional easement to the locality for that portion of the alignment falling within their property; (ii) include a condition in the site plan approval that the developer will finance “his or her share” of the access road when / if it is constructed; and, (iii) that the developers will agree to alter their access when the access road is constructed.

What's the bottom line? (....at least in New York ...)

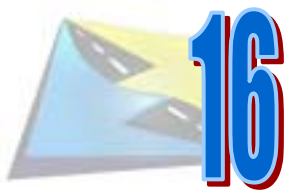
We're a bit envious of those States that have been able to establish State access ordinances and greater land-use control, but it's not going to happen here.

Nevertheless, we've been able to establish an effective initiative. It's effective because we've been able to use local self-interest to “justify” access management and local plans and tools in implementation. In the process, however, our relatively narrow access management initiative with its limited objectives and tools has been transformed. The majority of our projects have to be seen as community planning with access management as a component.

In the transformation we've learned that access management standards (and ordinances) based purely on transportation objectives and/or engineering criteria will be unacceptable and/or unenforceable if they conflict with broader community needs. Beyond that, it's our feeling that there are internal conflicts in most model ordinances that can lead to inferior access solutions given the realities of development.

These problems can be resolved, but their resolution requires more effort, more flexibility in the development and application of access plans and ordinances, and a longer term commitment to the community.

³ This is exactly the case in the Town of Victor where the (new) Town Supervisor refused to impose a system of mitigation established in its Sub-Area Development Plan because he felt it fell unfairly on new, early, development and threatened the Town's ability to attract business to the sub-area. The access road and interconnection elements of the Plan remain in place but an alternative method of financing their construction has yet to be determined.



Public Involvement Workshop

Panel Discussion

 Paper

16. RETROFITTING: WHAT WOULD YOU DO WITH THIS MESS? A discussion of how to retrofit or correct actual existing situations

Moderator:

Jim Gattis, Ph.D., P.E.

Associate Professor

University of Arkansas

RETROFITTING: WHAT WOULD YOU DO WITH THIS MESS?

A discussion of how to retrofit or correct actual existing situations

Panel moderator: J.L. Gattis, Univ. of Arkansas

Panel members: Gene Chartier, Regional Municipality of Durham, Ontario

William Frawley, Texas Transportation Institute, Arlington, TX

Chris Huffman, Kansas DOT, Topeka, KS

Donna Lewis, Mercer County Planning Division, Trenton, NJ

Clay Smith, Texas DOT, San Antonio, TX

BRIEF DESCRIPTION OF THE URBAN AREA

The two shopping areas and three arterial streets situations to be considered and evaluated are located in Fayetteville, Arkansas. Fayetteville has a population of about 58,000, and is at the south end of an urbanized area with a population of about 175,000. The area has been cited as one of the fastest growing urban areas (by percent growth) in the United States. The urbanized area is elongated along a north-south axis.

Examine each of the following five situations (either a site or a street segment) from the perspective of:

1. what are the existing access controls or lack thereof;
2. what is the nature of this site or roadway segment; and
3. what, if any, changes in access are needed.

Use your judgement to consider automobile, pedestrian, bicycle, or transit needs. Based on the given drawings and photographs, state what you think any problems are; what, if anything, should have been done differently in the first place; and what, if anything, should be done now to improve the situation.

SITUATION 1: OAK PLAZA SHOPPING CENTER

Description

Oak Plaza, with about 35,500 gross square feet of lease space, was developed in the 1960s. It originally contained a grocery store and a Ben Franklin variety store, but due to changing retail practices, it now houses a movie rental store, a bookstore, a self-serve laundry, and other smaller spaces, such as a barber shop.

The site has a short frontage along north-south Garland Road, and a longer frontage along east-west Mt. Comfort Road. The parking lot also connects to a “stub-out” of Lindell Ave. on the north side of the tract.

Highlights of Panel Member and Audience Comments

1. “This is the poster child for [the need for] access management.”
2. “Yikes.”
3. “Tornado and instant urban renewal.”
4. There is a problem with trying to define where Mt. Comfort Street is.
5. You don’t have any defined curbs -- just a continuous curb cut -- you need more curb than cut.
6. You need to clearly define where the access points are, and consolidate driveways.
7. Within the site, you need to more clearly delineate where driveways are and restripe the parking lot. The pedestrians are exposed -- they have no protected place to walk.
8. The entire tract should have been considered and evaluated as a whole before it was broken into parts. Access allowed off of Garland should have been shared with the adjacent tract.
9. Combine drives off of Garland into one, and align it with the drive across the street.
10. Have direct access onto Mt. Comfort or Lindell, and fewer or no drives directly off of Garland.
11. Need a single entrance off Garland with adequate throat length.

12. Garland needs a left turn lane for traffic into the center.
13. Abandon and close Mt. Comfort, and in return for implementing access control, integrate the land area occupied by Mt. Comfort into the center.

SITUATION 2: NORTH STREET from Garland Avenue to Gregg Avenue

Description

North Street is currently a 4-lane design. Left turn lanes exist near the west end. Near the middle of this segment, left turn lanes have been “squeezed into” the cross section at the signalized Leverett Ave. intersection. To the west of this segment, North Street was recently widened to 4-lane; to the east, North Street is 2-lane. North Street is one of the few through east-west streets in a city that is elongated along a north-south axis.

Much of the area was developed before World War II. The street network in this area might be described as a partial grid.

Abutting land uses are highly mixed. They include smaller commercial (e.g., service station, fast food, restaurant) near the west end; a few older houses (some of which are probably rental units); a church; a convenience store; small professional offices; a concrete mixing plant (a deep tract, so the mixing operation is far back from the street); and multifamily at the east end.

Along the south side of North Street near the west end, some abutting tracts do not have actual access to North Street, due to differences in elevation (the tracts are much higher elevation than is North Street).

Although the posted speed is 25 mph, actual free flowing vehicle speeds are in the 30 to 40 mph range. The graph shows that volume has been growing in recent years.

Highlights of Panel Member and Audience Comments

1. Has good (about 1300 ft) spacing of traffic signals.
2. The posted speed limit [25 mph] is too low.
3. This segment lacks continuous sidewalk -- need to fill in the missing pieces.
4. Implement shared access between adjoining property owners.
5. Volumes on this road are far too high for a 4-lane undivided roadway; should have two way left turn lane (TWLTL), five lanes.
6. Should have 120 foot (ft) wide right-of-way (R-O-W), not 80 ft.
7. On North street east of Garland, the Lindell left turn lane is too close to Garland Avenue intersection -- need to adjust the area street network to move this farther away.
8. Create a corridor plan with other enhancements, too.

SITUATION 3: FIESTA SQUARE SHOPPING CENTER

Description

Fiesta Square appears to be of 1980s vintage. It fronts College Avenue (on the east side). The main entry is in mid-site off of College Ave., and a minor, almost alley-like entry is off of College at the site's northeast corner. Along Appleby Road on the south side, there is a secondary main-entry and an alley-like entry at the southwest corner.

The center contains a large grocery store, a 16-screen theater (in the NW corner), and smaller stores. The space previously occupied by a Wal-Mart now contains a discount department store (SteinMart) and another store. Outparcels near College Ave. house a nice restaurant, a branch bank, and a fast-food store.

Highlights of Panel Member and Audience Comments

1. Has good control of access points.
2. There are no provisions for pedestrians who enter the site.

3. Provide pedestrian connection to residential area to the west.
4. The access [driveway] at the northeast corner could be closed, or might right-in/right-out only.
5. Consider crash history to assess whether a raised median is needed.
6. The road is at the threshold of needing a raised median.
7. The throat length at the main entry/exit off of College Avenue is too short.
8. At the main exit, need a dedicated right turn lane and perhaps dual left turns.
9. Correct (realign) the offset intersection at the main entry (with Rolling Hills Dr.).
10. The developer has to take on the responsibility for internal traffic circulation (that meshes with the access). Perhaps install island to help define paths.
11. The site could have been developed with buildings more to middle, so it would be better integrated with the residential area to the west.

SITUATION 4: COLLEGE AVENUE -- NORTH (from Township Street to Millsap Road)

Description

College Avenue, from Township north to Millsap, is currently a 5 lane design, with a center two-way left turn lane (TWLTL). Strip development occurred along this segment in the 1960s and later. The farther north you travel, the larger the tracts tend to be. The land to the rear of or “behind” the strip developed later, and has fewer streets connecting to College than might be expected.

There are a variety of land uses, including two medium-size or “community” shopping centers (discount store anchor types), automobile dealerships, restaurants, service stations or convenience stores, two motels, automobile service and repair, and a veritable plethora of all imaginable small businesses. A small but steady amount of new redevelopment occurs.

The posted speed limit is 40 mph. Free flowing vehicle speeds are probably in the 40 to 50 mph range. As the graph shows, volume appears to be holding steady.

Highlights of Panel Member and Audience Comments

1. Drivers are probably trying to find other routes in order to avoid this section of College Avenue.
2. Seems like total chaos, with the number of left turns and curb cuts.
3. At the north end, the southbound ramps near the traffic signal may be a problem.
4. Lack of sidewalks in some parts is a problem.
5. When sidewalks reach intersections, the needed pedestrian treatments (ped. Signals, markings) are absent in some places.
6. Consolidate driveways and interconnect (parking lots).
7. Some driveways are too close to intersection, and should be eliminated.
8. Some driveways need a bigger radius.
9. The city needs to acquire a wider right-of-way.
10. The 80 ft. Right-of-way...the city needs to be looking at something wider in their code for their street network.
11. Some parts may need a raised median.
12. Need a four lane divided cross section with mid-block U-turns.
13. Need right turn lanes to get right turn vehicles out of the through lane.
14. The new street (Sunbridge) produced a signalized intersection that is too close to the Township signalized intersection.
15. Rolling Hills should not have been laid out to dead-end into Fiesta Square, but should have been a through street.
16. This is a prime candidate for a corridor study -- perhaps institute an overlay zone.
17. Better traffic flow could increase volumes and improve economic viability [by increasing the size of the market area] of the area.

SITUATION 5: COLLEGE AVENUE – MIDDLE (from Dickson Street to North Street)

Description

College Avenue, from Dickson Street north to North Street, is currently a 5-lane design for the two blocks from Dickson Street up to Maple Street, then 4-lane up to North Street. There is a left turn lane for College Avenue traffic at the North Street intersection.

Much of the area was developed before World War II. The street network in this area might be described as “an attempted grid, but with several interruptions”.

Over the years, commercial development has created a strip effect along this part of College Avenue. With a few exceptions, commercial tracts in this area tend to be small by today’s standards. Turnover of commercial tenants is evident. The land to the rear of or “behind” the strip is mostly residential.

Larger-size land uses near the south end include a church, a grocery, utility company, an auto parts store. There is a large hospital parking lot at the north end. Most tracts are smaller, and are occupied by smaller restaurants, small shops, and professional offices.

The posted speed limit is 35 mph. Free flowing vehicle speeds are probably in the 30 to 40 mph range at the south end, and the 35 to 45 mph range at the north end. As the graph shows, volume appears to be holding steady, between 20,000 and 25,000 vehicle per day.

Highlights of Panel Member and Audience Comments

1. Some of the sidewalks are very narrow, have grass growing in them.
2. Need to correct some of the “wide open” driveways.
3. Can any of the closely-spaced traffic signals be eliminated?
4. The curvature near the north end appears to be problematic.
5. Perhaps have some short medians near intersections.
6. Be careful that attempts to control access do not have the undesirable side effect of directing traffic into residential areas.
7. Conduct a corridor study, and implement an overlay district.



Access Management Resources Workshop



Slides

17.

Access Management Resources

Frank Broen

President

Teach America Corporation

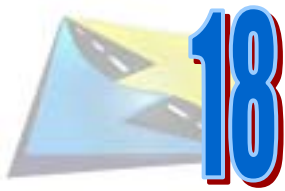
This workshop featured a discussion of resources about access management. The primary sources are:

- ◆ [AM CD Library](#)
- ◆ www.accessmanagement.gov
- ◆ [University and State websites](#)
- ◆ [FHWA video and brochure](#)
- ◆ [State handbooks](#)

The Access Management CD Library is the single best resource of information. The national conferences provide the highest level of interaction between people.

Dissemination of information is a key concern. More training products should be developed to meet a broad range of needs, from practitioners to developers to public officials.

The Tour CD link found on the Home page is the summary of this presentation. Given feedback from the attendees, the menu structure for the CD Library was simplified. New documents were added, including Michigan's Guidebook, Iowa's Handbook, and Florida's Median Handbook and Draft Driveway Handbook.



Legal Issues in Access Management



Slides

18A. Legal Prototypes in Access Management

Philip Demosthenes, *Colorado*



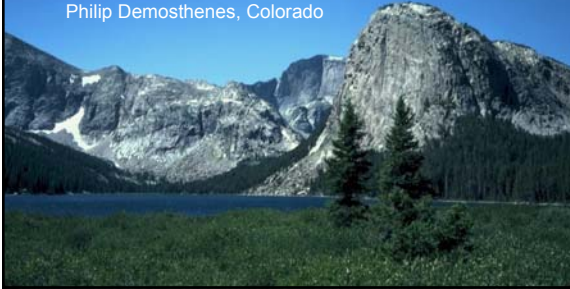
Slides

18B. Legal Authority for Access Control in Texas

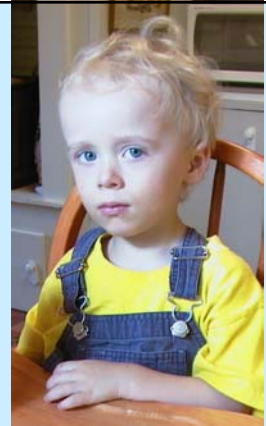
Suzanne Roach, *Texas*

Legal Prototypes in Access Management

June 25, 2002
Philip Demosthenes, Colorado



Life is Precious



Children

- The leading cause of death of a child between the ages of 4 and 14 is a traffic accident.
- In only one week, over 48 children will die and 6,100 will be injured in traffic accidents.
- Until age 28, traffic accidents are the leading cause of death in the USA.

3

Access related accidents, occurring at driveways and intersections represent over **55** percent of all traffic accidents.
Even higher in urbanized areas



4

- Over 400 people are killed each **week** in the United States in Access Accidents



5

What is the Most Dangerous Public Utility of the Face of the Earth?

- Is it reasonable to manage, to regulate this public utility?
- What is the single most dangerous element along a highway?
- Every new access increases accident potential, and on average, increases the crash frequency by 4% per mile

6



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



9

Are We doing our best to protect the public?

- A small child gets trapped in a well – the community responds and saves him
- Someone gets lost in the mountains – the community responds to search and rescue.
- Over 400 people die each week and over 200 are injured each hour, over the last 40 years in access related accidents.
- Access management is a method to achieve a 30 to 60 % reduction in this crash history.
- and only 7 states out of 50 have modern access standards.

10

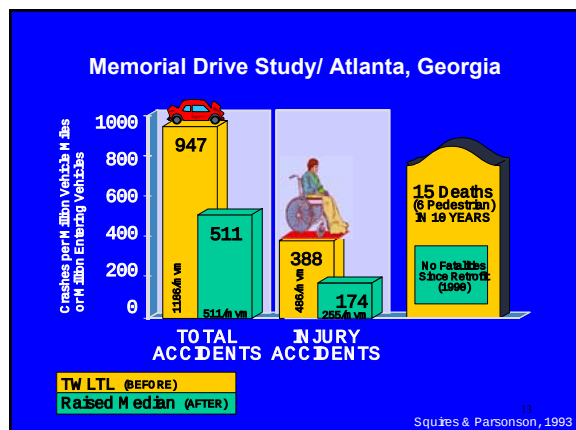
100 Years of Knowledge

- The problems of lax control of access and the benefits of managed access were identified over 100 years ago.
- Studies in the last 50 years on modern highways have only served to confirm the issues and provide specific statistics.

11

Memorial Drive, Atlanta





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.

14

When access principals are applied to a specific Corridor

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



15

Purpose of Paper

- To assist State DOTs in selecting issues and developing appropriate language.
- To assist in writing both statutory and regulatory language.
- To help make the policy development process easier.

16

New Access Law in 1979

- Our Legislature Passed the Highway Access Law in 1979 CRS § 43-2-147(1)
- ..authorizes the CDOT and local governments to regulate vehicular access to or from any public highway under their respective jurisdiction from or to property adjoining a public highway.

17

- The Transportation Commission adopted the first State Highway Access Code in 1981
- The current edition of the Access Code is 1998.

STATE OF COLORADO

State Highway Access Code

Volume 2, Code of Colorado Regulations 601-1

As adopted by
The Transportation Commission of Colorado
Effective August 31, 1998

Minimum vs. Desirable Access Design Standards

- Minimum standards achieve 100% minimum improvements and 100% of minimum safety mitigation.
- Minimums achieve a higher crash rate, and contributes to congestion and operational problems.
- Colorado uses desirable AASHTO standards for new access points, and we design using 20 year factors.

25

"Proper" Police Power

- By Colorado Case Law, a proper control of access means that actions of the government will not substantially impair access.
- There are no "abutters" access rights.
- Reference to the Code is a good beginning point to determine appropriate and reasonable access.

26

Reasonable Access is the Sufficiency of Design and Operation

- Ability of alternative driveway(s) to handle traffic
- Ability of alternative roadway links to handle traffic
- Shopping convenience, direct access to improve retail sales is NOT a priority.

27



Mc Donald's without direct access





Why has Colorado been successful?

- Adopted access statute & regulations.
- We have a dedicated central program manager – expert.
- Had good attorneys who are prepared and argue the key cases.
- Achieved good case law.
- Reasonable access not abutter's rights.
- "Substantially Impaired" is the test.

37

Convincing Policy Makers

- Good pictures of bad conditions caused by poor access decisions.
- Numbers - the safety impacts
- Numbers - preserving arterial function
- Balance - finding a balance between access needs and safety needs

38

Thank - you
for listening



39

Questions?



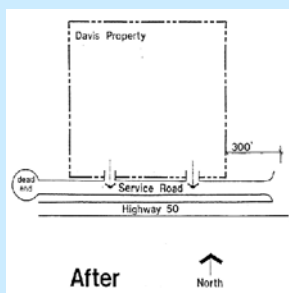
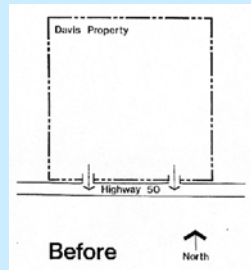
Key Statute Elements

- Basis and Purpose
- Authorization for rule-making
- Reasonable access not abutters rights
- Condemnation for access rights
- Permission to construct required
- Fees
- Violations and enforcement

41

- Planning shall reflect access law
- New Permit for access use change
- Access management corridor plans
- Management by access classification
- Key definitions

42



43

Please do not republish or post this power point presentation or any of the slides without specific permission. Thanks, Phil

- Philip Demosthenes
- Access Program Administrator
- Safety and Traffic Engineering Branch
- Colorado DOT
- 4201 East Arkansas Ave, EP 770
- Denver CO 80222-3400
- Phone 303-757-9844
- FAX 303 757 9219
- mailto:phil.demosthenes@dot.state.co.us
- Colorado Access Mgmt Web page
- <http://www.dot.state.co.us/accesspermits/>

44

Legal Authority for Access Control in Texas

Suzanne Roach
Director of Legal Section
Right of Way Division
Austin, Texas
512.416.2925
sroach@dot.state.tx.us



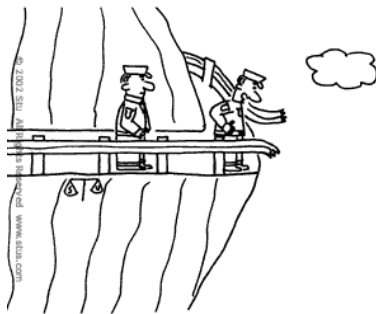
Trust me. I'm a lawyer.

Did you hear that the Post Office had to recall its series of stamps depicting famous lawyers?

People were confused about which side to spit on.

What do you have when you bury six lawyers up to their necks in sand?

Not enough sand.



A busload of personal injury lawyers...
Sarge, would you call this
more "funny" or "ironic"?

Authority for Control Of Access

- Statutory
- Police Power (Control by Design)

Definition of Controlled Access Highway

- 203.001 In this chapter:
 - (1) "Controlled access highway" means a *designated* state highway to or from which access is denied or controlled, in whole or in part, from or to adjoining real property *or an intersecting public or private way, without regard to whether the designated state highway is located in or outside a municipality.*

Modern State Highway System

- § 203.002.
 - (a) To promote **public safety**, facilitate the **movement of traffic**, preserve the public's **financial investment** in highways, promote the **national defense**, and accomplish the **purposes of this chapter**, the commission may:
 - (1) lay out, construct, maintain, and operate a modern state highway system, *with emphasis on the construction of controlled access highways;*
 - (2) plan for future highways; and
 - (3) *convert where necessary an existing street, road, or highway into a controlled access highway in accordance with modern standards of speed and safety.*

Jurisdiction (State power over local control)

- § 203.003.
- (a) Subject to Section 203.021, the commission may lay out, construct, maintain, and operate a designated state highway, *with control of access as necessary to facilitate the flow of traffic and promote the public safety and welfare, in any area of this state, whether in or outside a municipality, including a home-rule municipality.*
- (b) Subject to Section 203.021, the department and the commission may exercise any power granted by this chapter in a county or municipality *without the consent of the county or municipality.*
- (c) The department's or the commission's exercise of a power under this chapter in a county or municipality removes the county's or municipality's exclusive jurisdiction over the specific public way affected by the exercise of power, to the extent the exercise of power affects the public way and its use.

Commission's Authority

- § 203.031. Control of Access
- (a) *The commission*, by order entered in its minutes, may:
 - (1) *designate* a state highway of the designated state highway system *as a controlled access highway;*
 - (2) *deny access to or from a controlled access highway from or to adjoining public or private real property and from or to a public or private way intersecting the highway, except at specific locations designated by the commission;*
 - (3) close a public or private way at or near its intersection with a controlled access highway;
 - (4) *designate locations on a controlled access highway at which access to or from the highway is permitted and determine the type and extent of access permitted at each location;*
 - (5) erect protective devices to preserve the integrity, utility, and use of the controlled access highway; and
 - (6) repeal an order entered under this section.
- (b) *This section does not alter the rights of a person under another law of this state to compensation for damages caused by the exercise of the commission's powers.*

Commission order supersedes local

- § 203.032. Precedence of Commission Order
- An order of the commission under Section 203.031 supersedes a conflicting rule or ordinance of a state agency or subdivision of this state or any county or municipality, including a home-rule municipality.

New Location: Nothing to purchase

- § 203.034. Right to Access; Damages for Denial of Access
- (a) An owner of real property **adjoining a new controlled access highway location** is not entitled to access to the new highway location as a matter of right.
- (b) Denial of access to or from a new controlled access highway location is not a ground for special or exemplary damages **unless**:
 - (1) in connection with the purchase or condemnation of the real property adjoining the new controlled access highway location and to be used in the new highway location, the **commission specifically authorizes access** to or from particular real property adjoining the new highway location; **and**
 - (2) the **commission denies highway access** to or from the particular land where the real property adjoins the new highway.

Police Power or Control by Design

- Implied easement of ingress/egress to and from property adjacent to a road. (*DuPuy v. City of Waco*, 396 S.W. 2d 103 (Tex. 1965))
- Police power is the regulation of property to prevent the use thereof in a manner that is detrimental to the public interest. It differs from eminent domain where there is a taking of property because of its need for public use.

Quiz

- True or False: Denial of access by design is by police power, and therefore, no payment for acquisition of access rights is required.



"Business ethics" are all the craze.
Obviously, we'll just have to wait it out.

False

- Both the Texas and the U.S. Constitutions require payment when property is taken for a public purpose.
- In Texas, the state constitution requires payment when property is taken, **damaged** or destroyed. The test is whether the access denial results in a permanent, material and substantial denial of access, or a temporary total denial of access.

To Pay or Not to Pay

- New location- no pay unless Commission giveth, then taketh away
- Taking under the constitution- yes, only a matter of how much
- Police power- maybe, possibility of being sued in an inverse condemnation action and liable for significant damages if substantial and material denial of access.





Applying Access Management to Site Design and Development Review

Workshop



Slides

19. Applying Access Management to Site Design and Development Review

John Taber, Ph.D., P.E.

President

Tabermatics, Inc.



New Software to Analyze Access Management Impacts Workshop



Slides

20.

New Software to Analyze Access Management Techniques

Jerry Gluck P.E., P.T.O.E.

Senior Vice President

UrbiTranAssociates

NCHRP Report 420 (Project 3-52) Impacts of Access Management Techniques

Jerry Gluck, PE, PTOE
Urbitran Associates, Inc.

NCHRP Project 3-52 Study Purpose

- Quantify the Safety and Traffic Operation Impacts of Selected Access Management Techniques

NCHRP Project 3-52 Panel Members Represent:

- British Columbia Ministry of Transport
- Federal Highway Administration
- Florida DOT
- Illinois DOT
- New Jersey DOT
- Ohio DOT
- Oregon DOT
- Polytechnic University

NCHRP Project 3-52 Phase I:

- Identify Access Management Techniques
- Classify Techniques
- Recommend Priority Techniques for Further Analyses
- Survey Practitioners
- Prepare Study Plan

NCHRP Project 3-52 Phase II:

- Assemble Secondary Data and Collect Primary Data
- Analyze Data to Quantify Impacts of Priority Techniques
- Prepare Project Report

Access Management Techniques:

A. Policy

- Administrative & Regulatory Procedures 12
- Zoning & Subdivision Regulations 5
- Other 3

B. Design

- Interchanges 3
- Frontage Roads 5
- Medians – Left Turns 21
- Right Turns 7
- Access Location –Design 23
- Access Location - Retrofit 13

NCHRP Project 3-52 Priority Techniques

- Traffic Signal Spacing
- Integrated Median Techniques
- Unsignalized Access Spacing (including Corner Clearance)
- Left - Turn Lanes
- Access Spacing at Interchanges
- Frontage Roads

NCHRP Report 420 Contents

- Introduction & Research Approach
- Access Management Techniques & Impacts
- Traffic Signal Spacing
- Unsignalized Access Spacing
- Corner Clearances
- Median Alternatives
- Left-Turn Lanes
- U-Turns as Alternatives to Direct Left Turns
- Access Separation at Interchanges
- Frontage Roads
- Policy Considerations

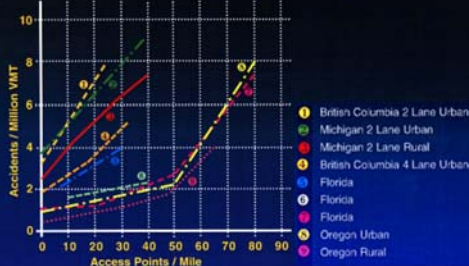
Issue: Access Spacing - Safety



NCHRP Project 3-52 Safety Analysis

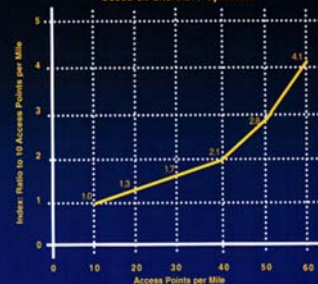
- Performed Synthesis of Prior Research
- Analyzed Crash Data for 8 States
 - ♦ 152 Urban/Suburban Segments
 - ♦ 89 Rural Segments
- Developed Data Base Representing 37,500 Crashes

Effect of Access Spacing on Accident Rates (Composite)

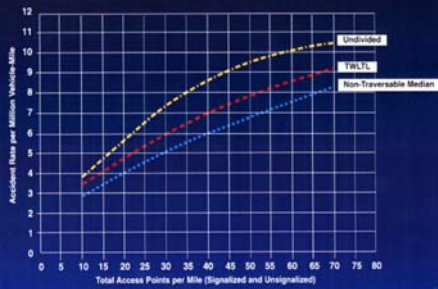


Composite Accident Rate Indices

Based on Literature Synthesis



Estimated Accident Rates by Type of Median; Urban and Suburban Areas

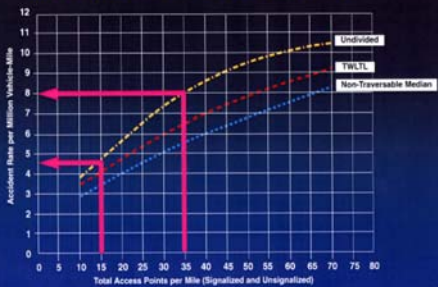


Application Example

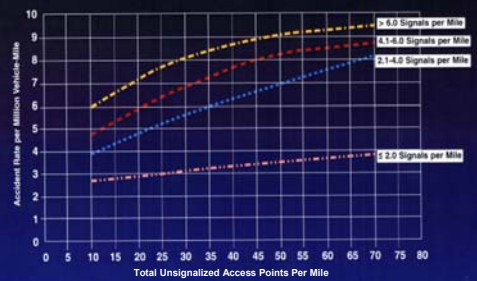
- Current Condition on Segment
 - 15 Access Points Per Mile
 - Crash Rate Unknown
- Projected Conditions
 - 35 Access Points Per Mile
 - Estimated Crash Rate Increase of 74%

$$[(8-4.6)/4.6] \times 100$$

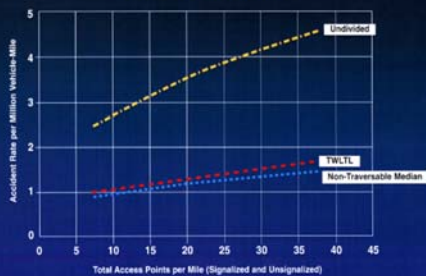
Estimated Accident Rates by Type of Median; Urban and Suburban Areas



Estimated Accident Rates by Access Density; Urban and Suburban Areas



Estimated Accident Rates by Type of Median; Rural Areas



Issue: Access Spacing - Operations

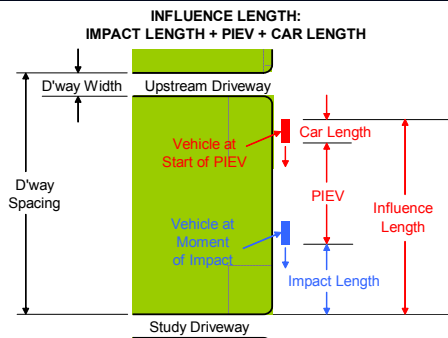
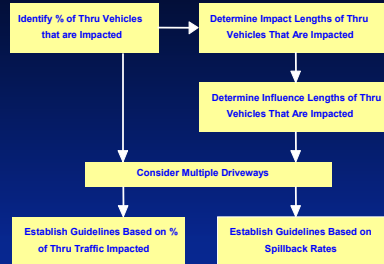


NCHRP Project 3-52 Unsignalized Access Spacing

Operational Effects of Driveway Traffic:

- Impacts on Through Vehicles
- Influence Area
- Access Separation Guidelines

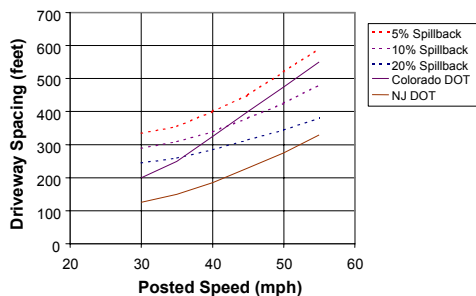
Establishing Unsignalized Access Spacing Guidelines



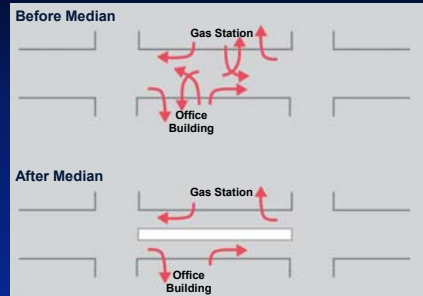
MULTIPLE DRIVEWAY CASE: SPILLBACK RATES - AT LEAST ONCE PER 1/4 MI POSTED SPEED = 45 MPH

D'way Spacing (ft)	Right Turn In Volume (vph)			
	RTI < 30	31 < RTI < 60	61 < RTI < 90	RTI > 91
100	27.3%	64.2%	82.1%	96.1%
150	19.1%	49.6%	68.2%	88.5%
200	14.6%	40.0%	57.5%	80.1%
250	11.3%	32.0%	47.5%	70.2%
300	7.8%	23.0%	35.3%	55.5%
350	4.4%	13.5%	21.2%	35.4%
400	2.6%	8.0%	12.9%	22.1%
450	1.6%	5.1%	8.2%	14.4%
500	0.9%	2.9%	4.7%	8.3%
550	0.5%	1.5%	2.5%	4.4%
600	0.3%	0.8%	1.3%	2.3%
650	0.1%	0.4%	0.6%	1.1%

COMPARISON OF ACCESS SEPARATION CRITERIA 31 < RTI < 60



Issue: Economic Impacts of Closing a Median Opening



Simplified Approach Economic Analysis Factors

- Size and Type of Each Activity where Left-Turn Access will be Removed
- Reliance of Each Activity on Pass-by Traffic
- Number of Vehicles Turning Left into the Activity or Land Use
- Average Purchase Per Vehicle

Calculating Maximum Economic Impact

Maximum Economic Impact

$$= \sum_{i=1}^M N_i P_i D_i$$

- Where: N_i = Number Turning Left at Location i Per Day
- P_i = % Pass by at Location i
- D_i = Dollars/Purchase
- M = Number of Businesses with Left-Turn Access Removed

IMPACT CALCULATOR Impacts of Access Management Techniques



NCHRP Report 420
Transportation Research Board
Washington, D.C.

Version 2.0.4



National Strategies for Access Management

 **Slides**

21A. FHWA Access Management Activity

Vince Pearce

Transportation Specialist

Federal Highway Administration

 **Paper**

21B. Access Management 2002 and Beyond

Kathy Facer

Realty Specialist

Federal Highway Administration

 **Slides**

FHWA Access Management Activity

Vince Pearce and Kathy Facer
FHWA

FHWA AM Activity Areas

- Training
- Technical Guidance
- Outreach
- Research
- Policy

2

Training

- Supported 1-2 requests for assistance per month, including NC statewide rollout
- Retained contractor and got the course back to delivery mode
- Planning for update of course following release of manual

3

Technical Guidance

- Participation in development of national strategy
- Changed contractor and supplemented funding to get manual completed
- We have announced and negotiated two contracts on intersection safety and mobility (Guidelines for high volume signalized intersections; Surrogate safety measures for application into traffic simulation models)
- Increased awareness in FHWA Division offices by distribution of CDs, reports, meeting notes, website articles

4

Outreach

- Reviewed conference display for renovation
- Arrangements for display at TRB 2002 annual meeting
- Support of planning for 2002 national access management conference
- Update and duplication of video and trifold brochure
- Discussions of plans for expansion and duplication of CD
- Distribution of video and brochures at ITE 2002 and APWA 2002
- Attended Winter and Summer meetings of TRB access management committee

5

Research

- Prepared two research papers related to intersection/access management (Median U-Turn treatment as Alternative to Direct Left-Turns at a Signalized Intersection (peer reviewed and accepted for publication in the ITE Journal for early next year) and Advantages of offset T-Intersections and Guidelines (Accepted for publication at the upcoming Traffic Safety in Three Continents Conference in Russia).
- Participated on NCHRP panel for driveway synthesis
- Research efforts underway or being developed, especially the intersection study
- Researched using 3 dimensional photography underway

6

Policy

- Discussions of potential access management presence in reauthorization
- Analyzed, commented on and promoted rules and policies developed by DOTs, in particular, Maine and Idaho

7

Access Management 2002 and Beyond

Kathleen A. Facer

Federal Highway Administration

Presented at the Access Management Conference in Austin, Texas, June 2002

FHWA National Access Management Strategy

♦ Support Research, Training and Outreach

FHWA has provided funding for courses, videos, displays and brochures over the past ten years. Studies have been ongoing since the 1960's. If you were to look back, there are traffic studies showing the effect of number of driveways on the crash rate.

While funding levels are always uncertain, we continue to support these efforts. Vince Pearce, who works in the Office of Highway Operations in Washington, is leading the way to get additional funding for these efforts.

♦ Support Access Management Conferences

FHWA is very supportive of the national conferences. The sharing of knowledge and experience that takes place at the conferences is invaluable. The sixth national conference on access management is already being planned for August 29th to September 1st, 2004, in Kansas City, Missouri. Chris Huffman from KDOT is making arrangements at the Fairmont Hotel. We hope to bring together an even more diverse group of practitioners. We will reach out to those who operate on the local level. We will try to bring in developers or elected officials for their point of view.

We have had Conferences in Colorado, Florida, Oregon, Texas and we will have conferences in Missouri (2004) and Utah (2006). We need a host in the East, somewhere around New Jersey, Maryland, or Pennsylvania. Since these are well attended regionally, we need to focus our attention on the East/Northeast for 2008.

♦ Support the TRB Access Management Committee Strategic Plan

The Access Management Committee is a part of TRB. FHWA was instrumental in forming the Committee and setting the original goals that included the three-day NHI course and the access management manual under development. FHWA has three members on the Committee and numerous friends who contribute.

TRB has asked the Committee to develop a Vision, Mission, Goals and Strategic Plan. Ron Giguere, past Committee Chair, is heading the subcommittee to develop the Strategic Plan. The draft Vision statement calls for continued research, education, and outreach. FHWA is committed to these efforts and endorses the direction the Committee is headed.

- ◆ **Focus on States currently in start-up and study phases**

I did an informal poll of FHWA Division Offices before I came to this Conference. Approximately fifteen Divisions responded that their State has an active, well thought out, access program. Another fifteen responded that their State had not given it much thought. The remaining twenty States are undergoing change of some sort. They have studies underway, have tried a few pilots, have had the 3-day NHI course and are in a state of flux regarding where to go. I will focus on these twenty States by making contacts and asking what additional resources they can use.

FHWA Strengths

- ◆ **Division Office in each State**

We have Division Offices in each State, the DC Division and Puerto Rico. This gives us the advantage of having someone local to serve on committees, help with outreach, and help develop local standards. Since access management involves planning, legal, traffic operations, design, right of way, safety, and maintenance, it has always had difficulty finding a home in the Division Office. It remains difficult to find the “key” Division Office person who is responsible for access management.

That said, I use the Division Realty Officer as my primary contact. This is because historically the first request for an access break often comes into right of way as a disposal action. Or else it goes to maintenance or traffic for a permit. It has been natural that we question the break or the disposal. It has always seemed odd that we developed a corridor with access control in mind, often making sure that access rights were acquired and shown on the plans, but then we remained open to requests for breaks in access control. Those of us in the right of way field welcome the increased interest in managing access. Hopefully, our actions and goals are now more consistent.

- ◆ **Local Transportation Assistance Program (LTAP Centers)**

Each State has an LTAP center that reaches the local agencies, usually the transportation engineer. The Centers are available to facilitate workshops. They keep a library of materials. They have copies of the access management CD and will receive copies of the TRB access management manual when it is available. They put out information in newsletters. We have provided them articles that go out to cities and counties.

- ◆ **NHI Course 133078**

The NHI course on Access Management, Location, and Design continues to be offered. Every State has not had it. It is an excellent in-depth course.

- ♦ **Assist with pilots, demonstration projects, and local studies**
We can sometimes find a way to fund a local study, perhaps through State research funds. Sometimes there is local “Technology Transfer” money, sometimes not. For example, we funded KDOT to go around and put on several local workshops a few years back. Every Division operates differently, but if you think you need help getting started, it doesn’t hurt to ask.
- ♦ **Integrate right of way, design, planning, project development, and context sensitive design**
The current FHWA emphasis on congestion mitigation, environmental streamlining, and safety, parallels what we are doing in the access management program. We saw a need to increase awareness of access management benefits so we are currently developing a brochure to do just that!

Planning

- ♦ **Need access management strategies in State and metro planning system plans**
We need to get access management strategies considered in the planning phase. These strategies would be good additions to the Long Range Plan. We need consistency with what we do in planning and the subsequent development of projects. Projects can be developed with access management techniques in mind. Or separate access management projects can be programmed.
- ♦ **Need corridor preservation and access management to work together**
Each State has funding and legal constraints. Often the legal section does not fully understand what we are trying to accomplish and needs to be included in these discussions. We also need to increase awareness by the environmental section.

DOCUMENT why you are taking an action, especially when acquiring key parcels early to protect the corridor. This will allow you to overcome major environmental and legal fears. Many perceive these actions as making a decision prior to completion of the NEPA process. We have major work ahead to overcome the current constraints. I believe if the planning and environmental processes are working together, then decisions made in the planning process should be reflected in the NEPA document. We need planning and environment to work more closely together, to support each other. We should not be throwing out all the public involvement and studies done at the planning stage and starting over from scratch to complete the NEPA documentation. I believe if you can document that an action to preserve a corridor was taken to serve a public interest, the Judge will be inclined to support your action.

- ♦ **Need land development and access management collaboration when making improvements**

This is a problem for everyone. It includes the need for public awareness. There is a great deal of misinformation out there and a huge “fear factor.” There is a need for data, especially local studies to support what you want to accomplish at the local level.

- ♦ **Need local support roads**

The lack of Federal and State funding to support the local access roads inhibits progress in this area. Many local jurisdictions have not planned for a system of local supporting roads. To accomplish this over the next ten years there may be a need for new funding sources and enabling legislation. It’s an area that needs careful thought. Support needs to be developed or our effort will not be as successful as it could be.

- ♦ **Need to work through legal and funding issues**

Many people are unaware of what can be done and don’t understand the long-range goals of access management. The legal staff is often not aware of what we are trying to accomplish. It is often easier for them to say something can’t be done under State law than to look for ways to assist us in making it happen. It is going to take real teamwork with your legal office to get laws, codes, and funding lined up the way you want it.

Education

- ♦ **NHI Course Number 133078: Access Management, Location and Design**

This 3-day course is the place to start. The textbook alone is worth it! I’ve often seen people come back after the course and begin a series of 1-day training workshops around their State. It contains excellent technical material for a traffic engineer to develop new solutions to old problems.

- ♦ **LTAP Centers can facilitate workshops and get the word out to local Agencies**

If you’ve had the course and are ready for workshops, the LTAP Centers are ready to help you facilitate getting the word out. It’s what they do best. They have contacts in place with local traffic engineers and county engineers. Take advantage of what they offer. Provide the local LTAP Center with articles for their newsletters!

- ♦ **Need Agencies to sponsor workshops**

While the national conferences reach one audience, we need Agencies to sponsor smaller, focused, workshops or regional conferences. It often takes a State coordinator

to become a champion for access management. Those States that have made the most progress have a champion.

- ♦ **Need training templates for outreach and education**

The local champions are in need of training templates. We have shared research, brochures, power point slides, case studies and guides. The access management CD that is being prepared for this conference will have many useful files on it, as well as proceedings from previous conferences. However, we still need to develop training templates that are easy to use.

Research Materials

- ♦ **Need “in State” studies to support change**

My observation is that property owners, councilmen, elected officials, and the general public are not impressed by studies or data that come from case studies in other parts of country. They have a real need to focus on a route in their own State or something they can go see or themselves. To that end, you might as well plan on getting some local studies underway.

- ♦ **Need data to overcome concerns of property owners, developers, businesses**

This data is very hard to come by. Several States have done studies, including Iowa and Texas. There is always a need for additional economic data to show businesses that they can survive after access management, maybe even thrive. As more States start looking at site development plans earlier, this will alleviate the need for expensive last minute changes and perhaps cut down on calls to the Governor’s Office.

- ♦ **Use extensive research available and the access management CD**

Many files containing technical reports and safety related data are available on the Access CD. This information is still valid today. Take your time to really study the CD library. I think you will be surprised at the information available and shared freely. We just ask that you credit the source.

- ♦ **Practical applications: techniques for GIS and photo imagery; intersections; and roundabouts**

1. A first phase study, combining elements of 3-D photo-imagery with GIS overlays, is being developed to test a web-based permitting process. The prototype is being tested in a Florida DOT district.
2. A project is underway to synthesize safety and operational treatments and develop guidelines for signalized intersections with medium to high traffic flow. Targeted completion date is June 2003.

3. A project is underway to develop surrogate safety measures for intersections. This will be used to develop safety evaluation logic for intersections.
4. A project is underway to determine roundabout design characteristics that affect driver selection of path and speed through different roundabout designs. Targeted completion date is November 2002.

This does not cover all the access related research underway.

Best Practices

- ♦ **Don't look for an "access management requirement" before projects are funded**
FHWA will rely on sharing ideas, information and best practices. Don't look for anything regulatory on access management.
- ♦ **Rely on education, guides, resource sharing, best practices, research results**
We have provided many of these products and will continue to look for new products. Vince Pearce in the FHWA Office of Operations has provided hundreds of brochures, videos, and CDs to practitioners this year.
- ♦ **Continual need for LOCAL best practices and LOCAL success stories**
The State Coordinator can use local best practices and case studies. We can showcase the best examples at national conferences. The course instructors are always looking for new material to update the course manual.

Get In, Get Out, and Stay Out

- ♦ **Borrowed phrase from the Construction Technology Team**
When working on an Innovative Construction Team, I picked up that they are moving away from the traditional 20-year design life. They are talking about solutions to last for several generations. I think this is a good idea for us as well.
- ♦ **Do it right this time**
This time we should develop the best solution and not try to do a quick fix to last for a few years. We should encourage the design engineers to think about a long-term solution that helps mitigate congestion and provide safety.

- ◆ **Buy right of way when you need it**

Except for Florida, where right of way costs are out of sight, I recommend buying right of way when you need it. For some reason, designers think they have to design within the existing right of way when they doing projects for access management. When asked why, they have no reason. It's part of their thinking, to minimize the right of way required. I say design for the best solution and have the right of way section get you the right of way you need. If you need to relocate a business out of the corner of an intersection, then let's do it. These projects are fairly low cost compared to other projects so we shouldn't try to squeeze in a bad design just to save a few dollars. It is preferable to solve the problem now rather than come back in a few years and fix it again!

Marketing

- ◆ **Market the TRB Access Management Manual**

We will provide each Division Office and LTAP Center a copy of the TRB Access Management Manual. It should be used as a tool and a guide. It does not set standards. The right of way and legal chapter contains information regarding how some States operate. You will need to check with your lawyers to understand what you can currently do under State law.

- ◆ **Market research studies and products**

The Access Management Committee is committed to marketing access studies and products.

- ◆ **Provide brochures and CDs**

The Access Management CD is very well done. It is a library that was originally compiled using information from Florida DOT and others who are the forerunners in this area. Conference proceedings, course manuals, and research reports have been added. It has been distributed widely and can be copied. The proceedings from this conference will be added and the CD will be updated.

- ◆ **Provide and update access video and display**

FHWA, with the Access Management Committee, will look into updating the current video and display board. We are marketing access management at conferences, such as APWA, APA and ITE.

- ♦ **Market local guides, policies, best practices**

We are more than happy to market reports, case studies, guides, brochures, and best practices. Send me a copy or tell me where it can be obtained electronically and we will tell people via the website www.accessmanagement.gov

State and Local Actions

- ♦ **Need State Access Management Coordinators**

For the most progress, in order to get a good policy and plan in place, you need a local champion. This is best when assigned to a full time position.

- ♦ **Need State and local access management conferences and workshops**

There have been several State and MPO workshops around the country. These are needed to reach the next level of acceptance and implementation. Without a collaborative effort, this program will only function at the State level and often erodes when it interfaces with the local system.

- ♦ **Invite transportation engineers, planners, right of way and local officials**

For the next level of outreach, we need to inform people who have a wide variety of interests. Even then, it will be difficult to keep an informed group of elected officials, since they change over so quickly.

Where Will You Be Ten Years from Now?

- ♦ **Get legislation changes needed**

I often talk to people, including lawyers, who tell me their State law does not allow certain actions, acquisitions, or approvals, or even that their State law is unclear. My response is that it will be the same way ten years from now unless we work to get needed legislative changes. There is a very real need to look at where you would like to be ten years from now. It could take the whole ten years, as many of these things do not happen quickly. All the States that have made substantive change have gone through extensive legislative and regulatory actions.

- ♦ **Get started with a Plan**

Many States start with studies, demonstrations and pilot projects. These are difficult without a funding mechanism. Try to get a designated pot of money for pilot projects.

Then set up an advisory board to oversee development of a plan or access management policy. Get public input, including input from developers.

Make Change Happen

- ◆ **Appoint a State Access Management Coordinator**

This is an important step to make change happen.

- ◆ **Work with locals to get a local road system that supports access management**

This is also very important. It may prove difficult if a funding mechanism does not exist. It may take special legislation for local taxes to support development of the local road system. Developers and businesses are used to getting direct access to the State road system. Even when they know the development will function without it, they always ask. They often get it.

- ◆ **Use the TRB AM Manual**

- ◆ **Host the 3-day NHI Access, Location and Design Course**

- ◆ **Host a State Conference or Local Workshops**

Spread the word in your State. Get local agencies involved. We need lots of education to overcome resistance to change.

Kathleen A. Facer
Federal Highway Administration
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www.fhwa.dot.gov

www.accessmanagement.gov



Working Together for Success



Slides

22A. Land Development Planning and Coordination

TxDOT San Antonio District



Slides

22B. Adopting Access Management Guidelines

Hugh McNeely

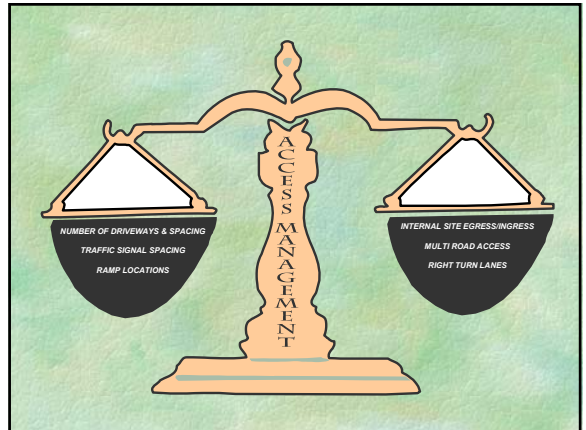
The Fifth National Conference On Access Management

June 26, 2002

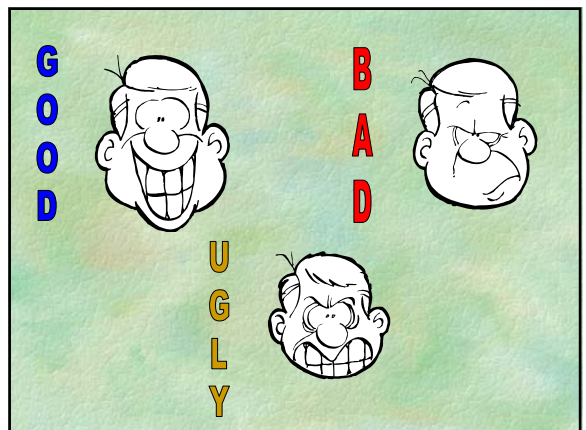
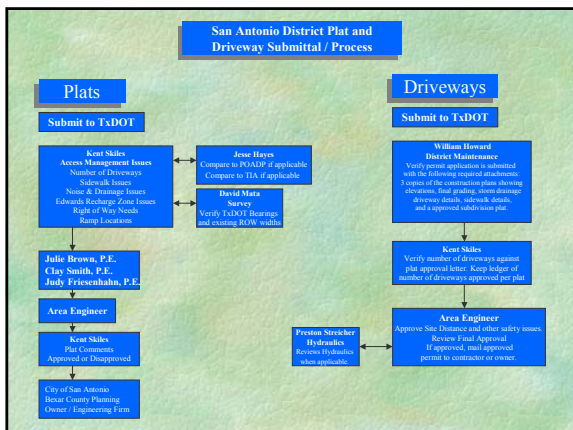
Land Development Planning & Coordination

•TxDOT San Antonio District

•City of San Antonio



SAN ANTONIO DISTRICT APPLICATION

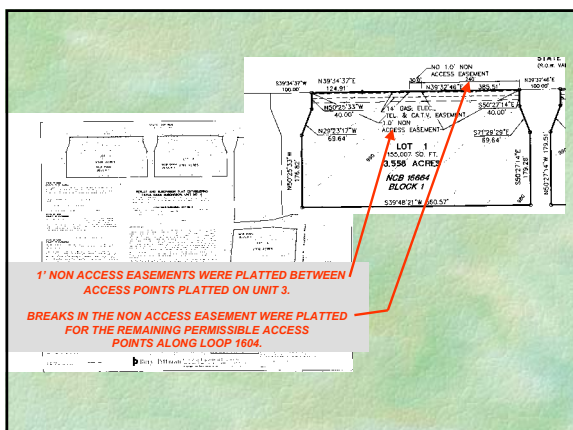
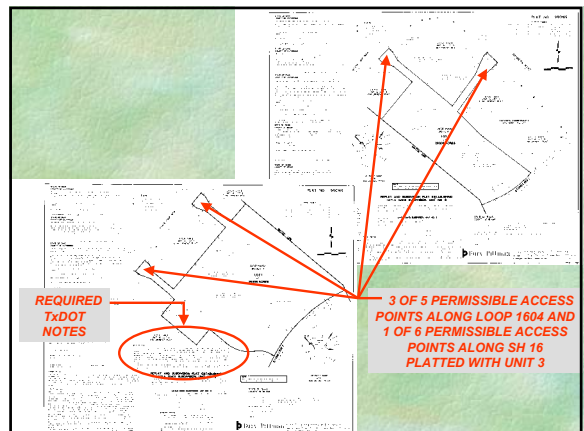


ACCESS MANAGEMENT COORDINATION PRIOR TO SUBDIVISION PLATTING ACTIVITY

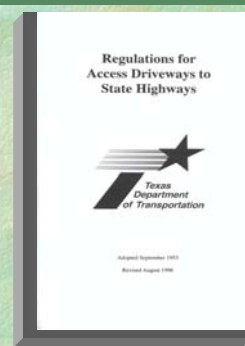
- SUBDIVISION PLAT REVIEW
- SITE PLAN
- T.I.A. REVIEW
- DRIVEWAY/ACCESS PERMIT

ACCESS MANAGEMENT ISSUES REVIEWED

- NUMBER OF DRIVEWAYS
- SIDEWALKS
- NOISE
- DRAINAGE
- RIGHT OF WAY NEEDS
- RAMP LOCATIONS
- RIGHT TURN LANES
- TIA



EXISTING TxDOT PUBLICATION "Regulations for Access Driveways to State Highways"

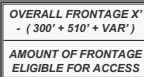


Page 13



Chapter 4 – Asset Spawning and Design		Section 1 – Asset Evaluation and Scoring			
Table 4-1 Asset Scoring		Asset Scoring			
Asset Name	General Information	Asset Scoring		Asset Scoring	
		Asset Scoring	Asset Scoring	Asset Scoring	Asset Scoring
Asset 1	Asset 1	Asset 1	Asset 1	Asset 1	Asset 1
Asset 2	Asset 2	Asset 2	Asset 2	Asset 2	Asset 2
Asset 3	Asset 3	Asset 3	Asset 3	Asset 3	Asset 3
Asset 4	Asset 4	Asset 4	Asset 4	Asset 4	Asset 4
Asset 5	Asset 5	Asset 5	Asset 5	Asset 5	Asset 5
Asset 6	Asset 6	Asset 6	Asset 6	Asset 6	Asset 6
Asset 7	Asset 7	Asset 7	Asset 7	Asset 7	Asset 7
Asset 8	Asset 8	Asset 8	Asset 8	Asset 8	Asset 8
Asset 9	Asset 9	Asset 9	Asset 9	Asset 9	Asset 9
Asset 10	Asset 10	Asset 10	Asset 10	Asset 10	Asset 10

OVERALL FRONTAGE (X')

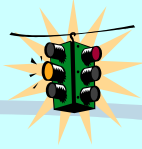


REQUIRE THE FOLLOWING TxDOT NOTES BE ANNOTATED ON YOUR PLAT:

- SUBDIVISION PLATS ARE NOT APPROVED BY THE SAN ANTONIO DISTRICT
WITHOUT CORRECT ANNOTATION OF THESE NOTES
ACCESS PERMITS WILL NOT BE ISSUED WITHOUT AN APPROVED SUBDIVISION PLAT**

1. PRIMARY ACCESS FROM HIGH-SPEED
2-LANE UNDIVIDED HIGHWAY

The Fifth National Conference On Access Management June 26, 2002



TRAFFIC IMPACT ANALYSIS REVIEW AND ACCESS MANAGEMENT

Introduction



- Review Process – Zoning, POADP/MDP, Subdivision Plats and Building Permits
- Highlights – UDC Requirements
- TxDOT and COSA – Building Teamwork!
- Summary

TIA Review – Access Management

- Key items to keep in mind:
 - Common Access/Shared Driveway Access
 - Always check plat for ingress/egress easement
 - All lots with less than 400 feet fronting an Arterial Street shall provide for shared access easement with adjacent lot(s) - UDC Section 35-506, (r), (3)
 - Driveways
 - Spacing - UDC Section 35-506, (r), (5)
 - Corner Clearance - UDC Section 35-506, (r), (7)
 - Throat Length - UDC Table 506-7
 - Dimensions - MTP or SH, 16' in and 12'-12' out

TIA Review – Access Management

- Key items to keep in mind:
 - Driveways continued
 - Right Turn Deceleration Lane
 - Left Turn Storage Lane
 - COSA MTP or TxDOT State Highway?
 - Raised Median Criteria on Arterials
 - Every 400 feet - UDC Section 35-506, (n)
 - Traffic Impact Analysis Requirements
 - > 1000 PHT – Level 3 TIA (\$1000 Fee)
 - 500 – 1000 PHT – Level 2 TIA (\$800 Fee)
 - 100 – 500 PHT – Level 1 TIA (\$300 Fee)
 - < 100 – TIA Worksheet – DSED does fill out this form.

FUNCTIONAL CLASSIFICATION SYSTEM COSA UDC Table 506-1

FUNCTIONAL CLASS	LEVEL OF MOBILITY	SYSTEM ACCESS	LEVEL OF ACCESSIBILITY
Freeway	Connects all area sub regions together, connects urban and rural service areas with metro major activity centers, connection to outside cities.	To other freeways, principal arterial, and selected arterial; no direct land access.	Long trips at high speed within and through the metro area; express transit trips.
Primary Arterial	Connects two or more sub regions; provides secondary connections outside cities; complements freeway in high volume corridors.	To freeways, other principal arterial, and high volume collectors; no direct land access except major traffic generators.	Medium distance to long trips at high to moderate speeds within the urban area; express transit trips.
Secondary Arterial	Connects adjacent sub regions and activity centers within sub regions.	To freeways, principal arterial, other arterial, and collectors; restricted direct land access.	Medium to short trips at moderate to low speeds; local transit trips.
Collector	Connects neighborhoods within and between sub regions.	To arterial, other collectors, and local streets; direct land access.	Primarily serves collection and distribution functions for the arterial system at low speeds; local transit trips.
Local	Connects blocks within neighborhoods and specific activities within homogeneous land use areas.	To collectors and other local streets; direct land access.	Almost exclusively collection and distribution short trips at low speeds.

TIA Review - COSA



- Streamline the Review Process
 - Do Not Forget the TIA Worksheet and/or Study
 - Worksheet reviewed & approved by Engineering Technician
 - TIA Study requires closer analysis by the Senior Engineer
 - When a TIA Study is required, it is recommended to request a preliminary scope meeting with Senior Engineer.

Summary

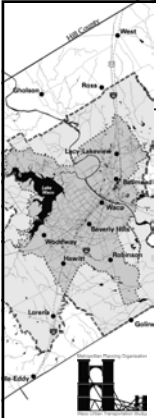


- All TIA's are submitted to TxDOT Planning and Development
- All TIA's are reviewed on a first-come-first serve basis.
- TIA Studies require close analysis.
 - Avoid Delays – submit Promptly and Complete. Follow TIA Ordinance.
- Participation in Express Review
 - After-hours review
 - At request of applicant

Definitions and Questions



- TIA – Traffic Impact Analysis
- UDC – Uniform Development Code
- COSA – City of San Antonio
- POADP – Preliminary Overall Development Plan
- MDP – Master Development Plan
- MTP – Major Thoroughfare Plan
- SH – State Highway
- PHT – Peak Hour Trips



WACO METROPOLITAN PLANNING ORGANIZATION

Adopting Access Management Guidelines

Hugh McNeely, AICP
Director, Waco MPO

MPO Background

- Waco is located midway between Dallas-Fort Worth and Austin
- Represents 9 Cities and McLennan County
- Approximately 175,000 population
- Covers approximately 351 square miles
- MPO established in 1974

Why Access Management in Waco?

- Special emphasis of TxDOT District Engineer
- Poorly managed in recent and distant past
- No time like the present to change

Commercial Driveway



Head-in Off Street Parking

Urban Residential Driveway



Closely Spaced Driveways

Commercial Driveway



Poor Accessibility

Corner Management



Access Unrestricted

Managed Lane Movement



Uncontrolled Traffic Movements

Turning Movement Control



Continuous Left Turn Lane / Driveways

Turning Movement Control



Multi Lane Roadway / Continuous Left Turn Lane

Rural Residential Driveway



Lots Fronting on Highway

Rural Business Driveway



Continuous Driveway

Rural Street Intersection



High Turning Movement

Ramp / Street Access



Unsafe Weaving Conditions

Initial Steps in Adopting Guidelines

- Discussions with TxDOT District
- Included in Unified Planning Work Program (UPWP)
- Developed RFP with technical assistance
- Interviewed firms with top 3 proposals
- Selected Kimley-Horn and Associates

Development of Guidelines

- Held meetings with MPO staff and consultant
- MPO Technical Committee met with Consultant several times
- Local cities reviewed and public involvement was conducted
- Presented to MPO Policy Board (initially and later for adoption)

Guidelines vs Standards

- Initially proposed as standards
- MPO has no authority over member governments
- Guidelines was more politically acceptable
- Guidelines include ultimate goals not what should be implemented now

Adopted Guidelines

- Waco MPO adopted guidelines on July 30, 2001
- Some member cities have implemented partial guidelines
- TxDOT district is very proactive on state roads (great example for member cities)

What's Included?

- Applicability
- Definitions
- Access Management Classification System
- Access Management Guidelines
- Recommended Interim Guidelines
- Recommended Land-Use Controls

Applicability

- Applies to entire MPO Study Area (each member city identified)
- Primarily for new or improved thoroughfares

Definitions

- 30 definitions
- Easily understood by general public
- Absolutely necessary

Classification System

- 5 Access Classes
- Future or current land development intensity
- Determined by MPO & Cities
- Access Class I - Most Restrictive
- Access Class V - Least Restrictive

Access Management Guidelines

- Median spacing
- Signalized intersection spacing
- Driveway spacing
- Frontage roads
- Corner clearance

Interim Guidelines

- Median opening spacing
- Signal spacing
- Roadway connection spacing

Land Use Controls

- Lot width-to-depth ratios
- Shared Driveway access
- Connectivity

Other Considerations

- Landscaping
- Pedestrian and bicycles
- Driveway design
- Turn bays

What Next?

- Reevaluate after TxDOT adopts Access Management Policy
- Designate classifications for each thoroughfare
- Continue to educate new MPO members on the need for Access Management
- Educate public and developers on the benefits of Access Management

Questions?



Closing Session



Slides

23A. Tact and Diplomacy in Communication (How Engineers Can Speak English)

Del Huntington

Access Management Program Manager

Oregon Department of Transportation

23B. Access Management Jeopardy and Closing Remarks

Arthur Eisdorfer

Manager of Civil Engineering

New Jersey Department of Transportation

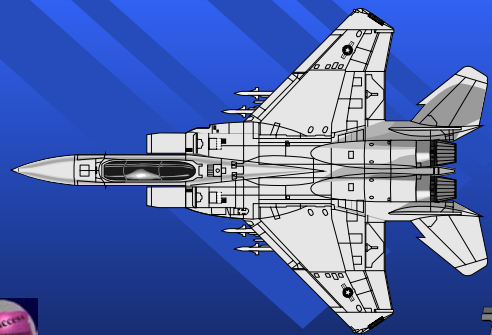
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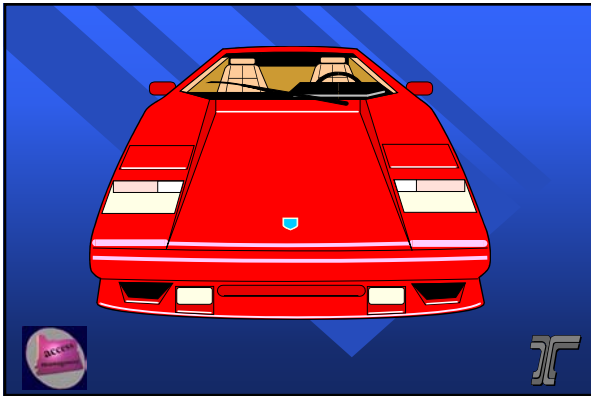
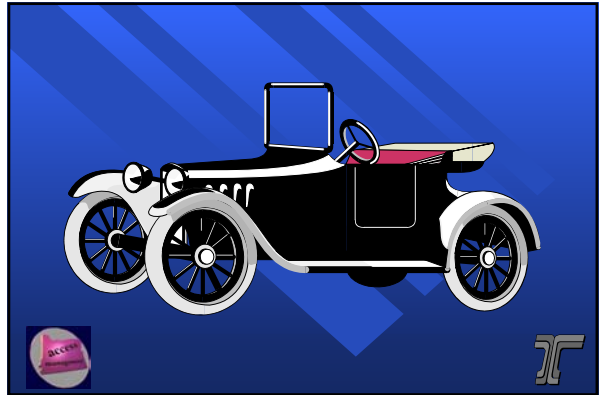
Senior Associate

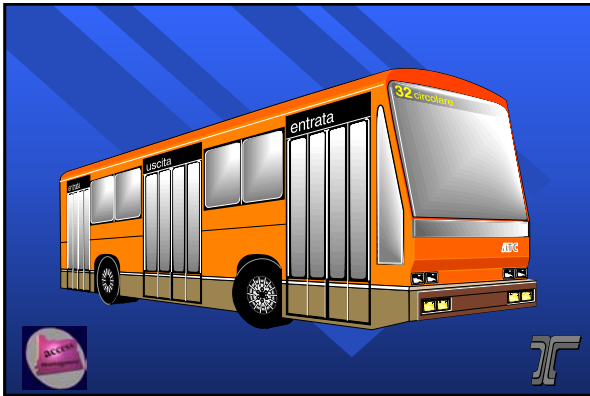
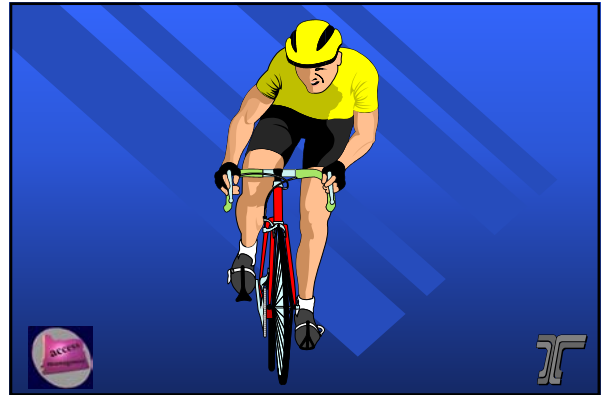
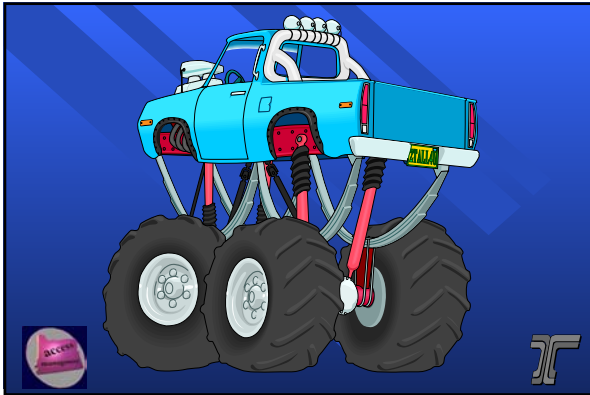
Louis Berger & Associates

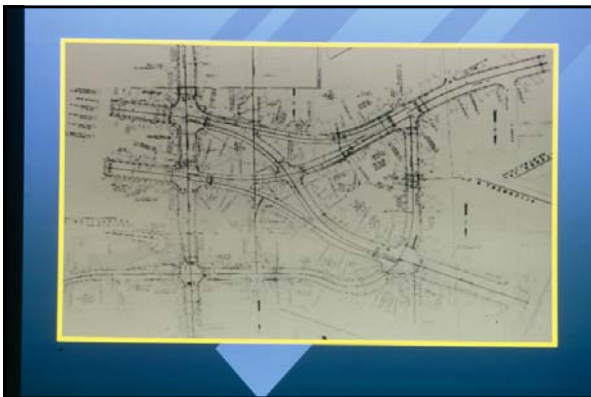
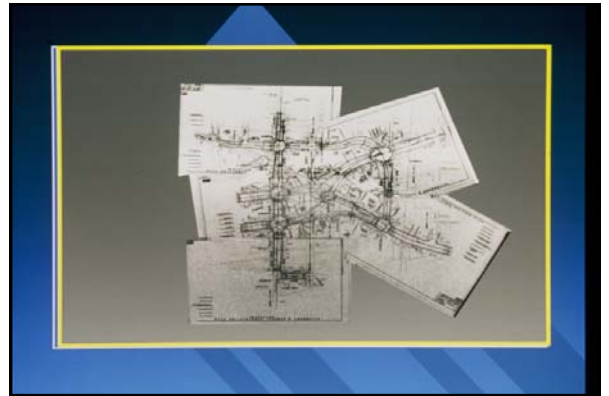
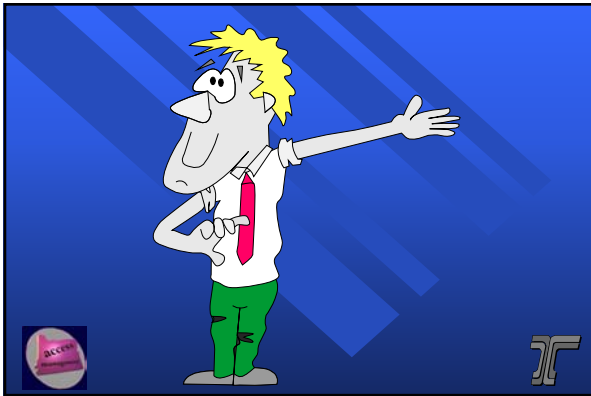
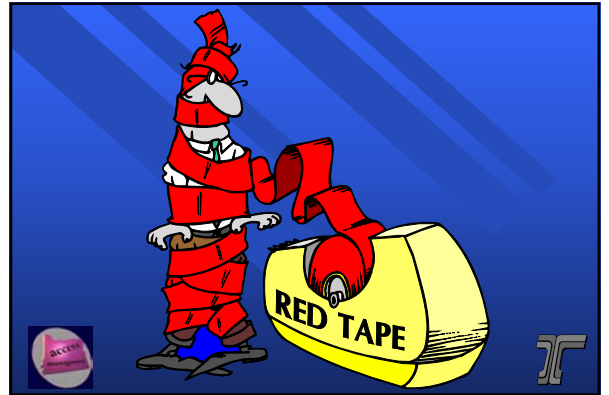
Tact and Diplomacy in Communication

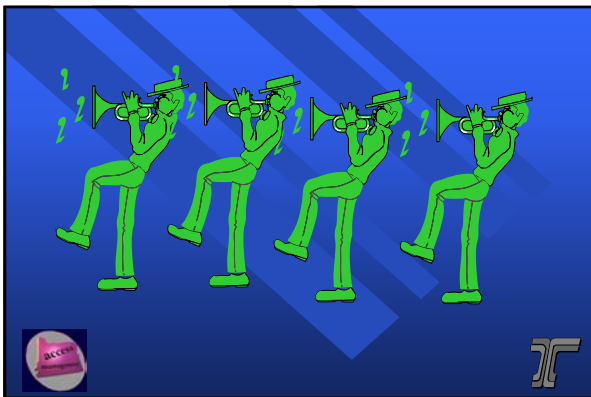
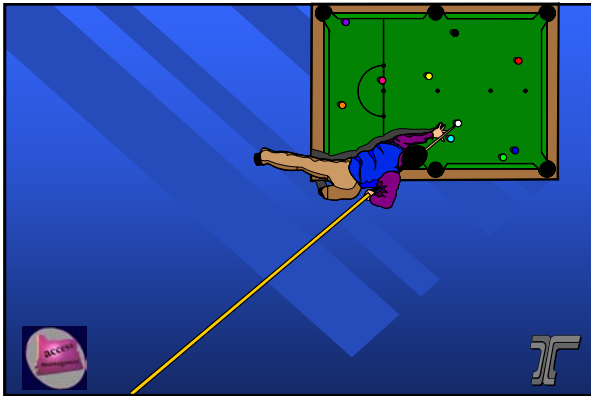
(How Engineers Can Speak English)

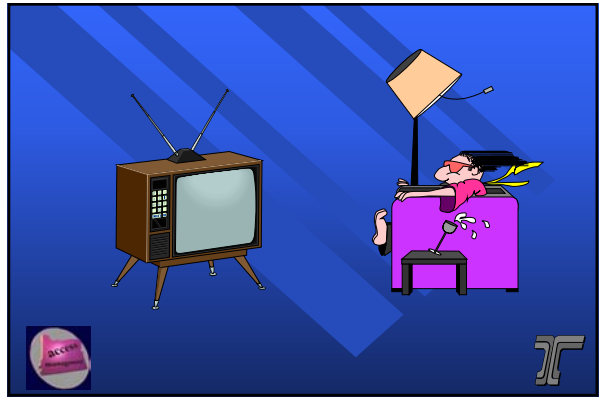
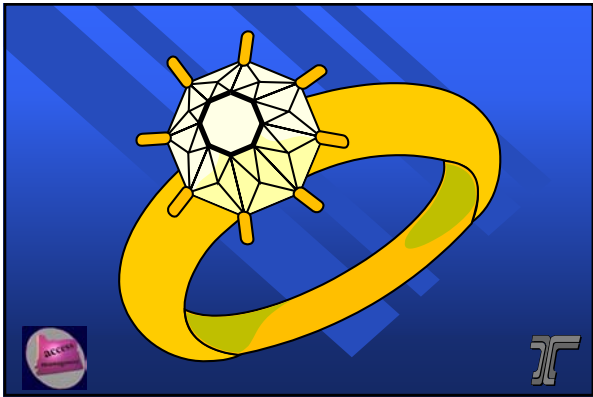
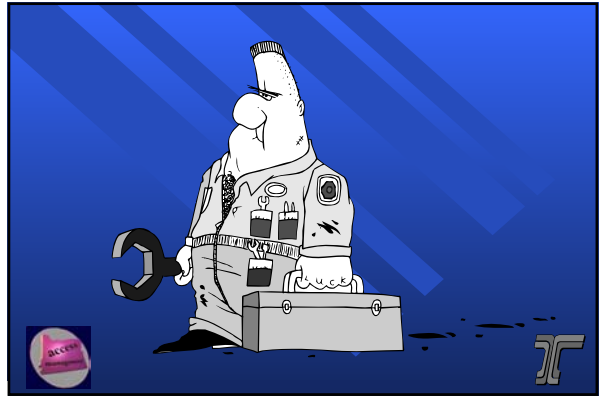












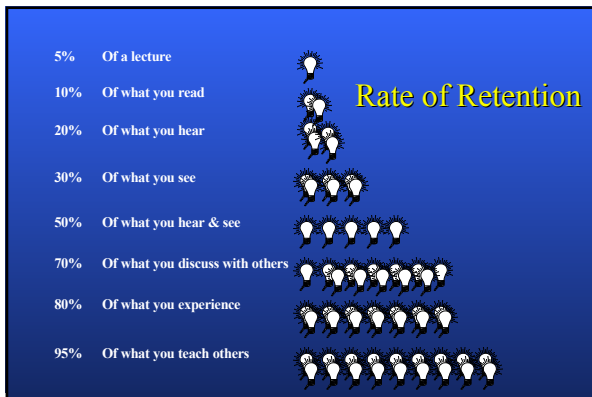


- Who is the audience?
- Have you considered the impacts from their perspective?

- What is the purpose of the communication?
- Are you trying to achieve general awareness, political buy-in, or project approval?
- Are you introducing new concepts, or are you trying to persuade?
- What action do you hope to achieve?

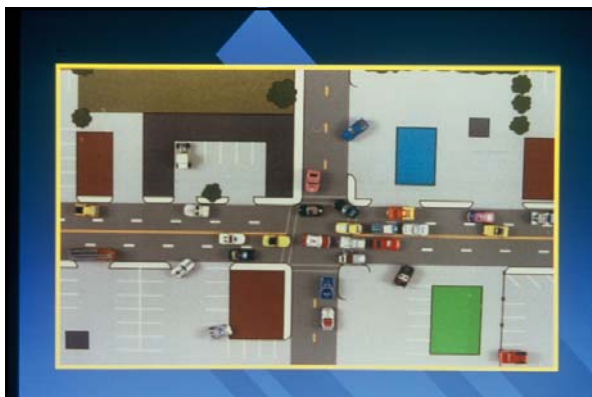
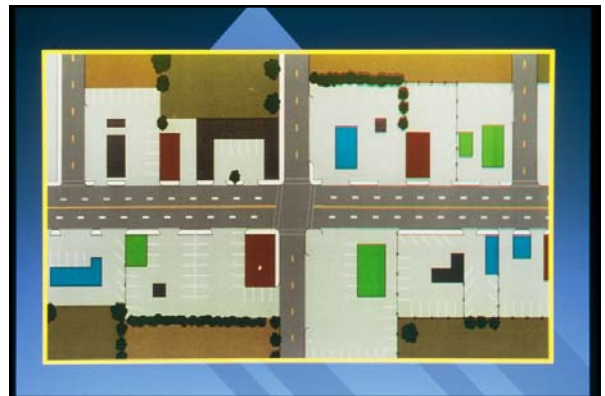
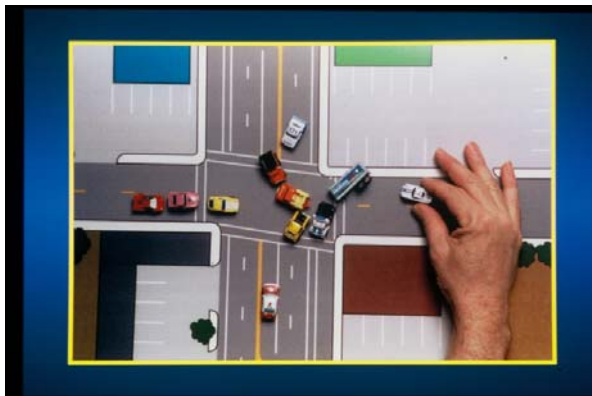
- Are you thoroughly familiar with all the important information on the issue or design?
- Can you answer all the questions?
- If not, is there someone who can?

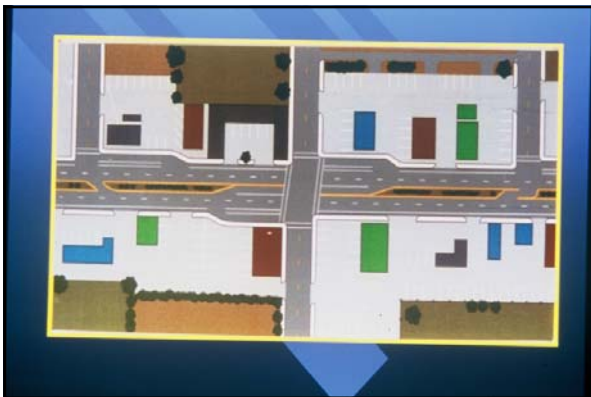
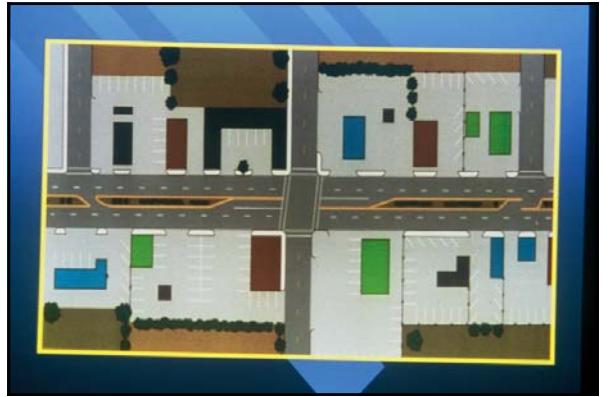
- What general ideas, concepts, opinion or conclusions should be stressed?
- What are the facts that must be presented?

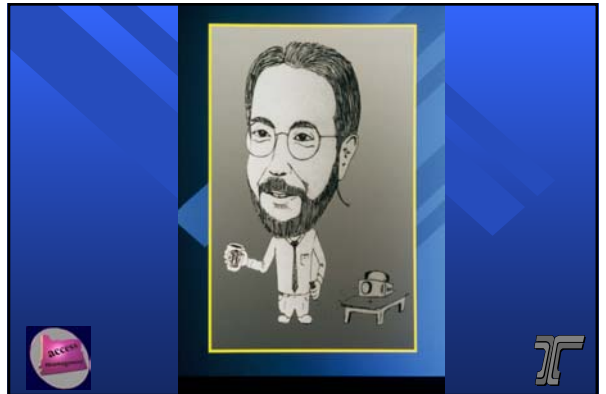
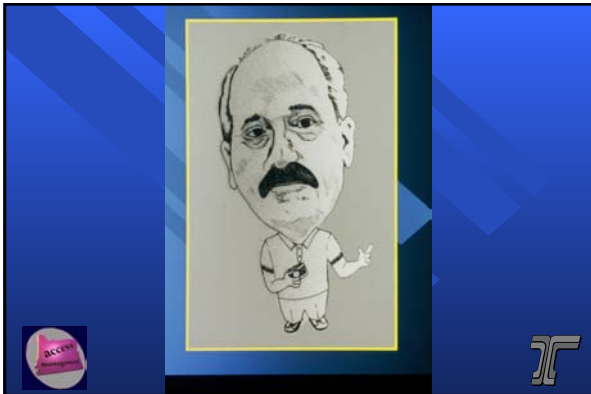


- Tell me and I forget,
- Show me and I remember,
- Involve me and I understand.

Chinese Proverb







■ Tell me and I forget,

■ Show me and I remember,

■ Involve me and I understand.

Chinese Proverb