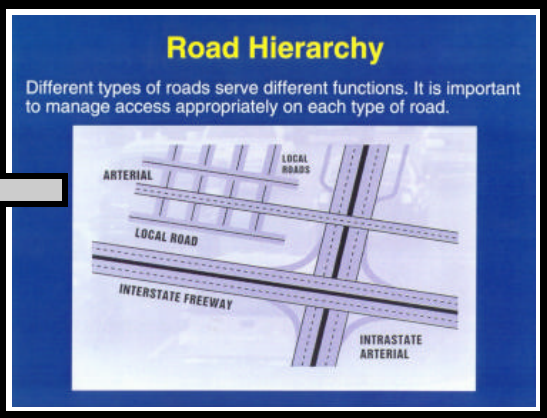
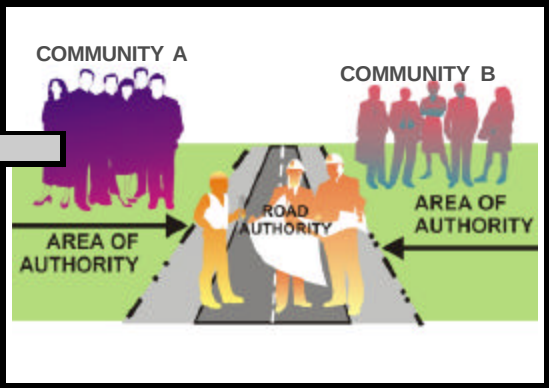
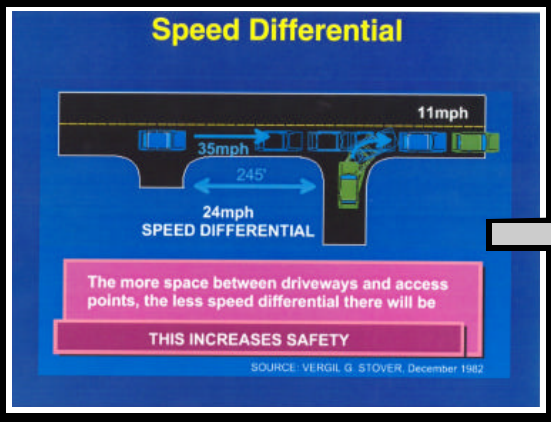
Reducing Traffic Congestion and Improving Traffic Safety in Michigan Communities:

THE ACCESS MANAGEMENT GUIDEBOOK







Michigan Department of Transportation

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Reducing Traffic Congestion and Improving Traffic Safety in Michigan Communities: THE ACCESS MANAGEMENT GUIDEBOOK

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Prepared by the
Planning & Zoning Center, Inc.
715 N. Cedar Street
Lansing, MI 48906-5206
517/886-0555 (tele), www.pzcenter.com

Under contract to the
Michigan Department of Transportation
With the assistance of three Advisory Committees
listed on the next page

Dedication

This Guidebook is dedicated to the countless local elected officials, planning and zoning commissioners, zoning administrators, building inspectors, professional planners, and local, county and state road authority personnel who:

- work tirelessly every day to make taxpayers investment in Michigan roads stretch as far as it can with the best possible result; and
- who try to make land use decisions that build better communities without undermining the integrity of Michigan's road system.

ACKNOWLEDGEMENTS

The following committees were instrumental in the development, review and refinement of this Guidebook. We greatly appreciate the time and contribution of committee members, particularly those who provided supplemental information.

State Advisory Committee

Michigan Department of Transportation

Sue Datta, AICP
Transportation Planner
Metro Region

Mark Dionise
Manager
Utility and Permits Section

Tom Doyle
Transportation Planner
Project Planning Division

Brad Funkhouser
Transportation Planner
University Region

Imad Gedaoun
Engineer
Geometrics Unit, Traffic and Safety Division

David Geiger
Transportation Planner
Bay Region

Tim Little
Associate Engineer
Grand Region

Connie Morrison
Transportation Planner
Southwest Region

****

Mark Graham, AICP, PCP
Planning Director
Delta Township, Eaton County

Michael F. Craine, AICP
Managing Director,
Livingston County Road Commission

Rebecca Harvey, AICP, PCP
Harvey Consulting
Oshtemo Township, Kalamazoo County

Gary McCririe
Genoa Township Board Trustee
Livingston County

Brad Strader, AICP
Langworthy, Strader, LeBlanc & Associates
Royal Oak

Terri Blackmore
Executive Director
Urban Area Transportation Study
Ann Arbor

Robert Tetens, AICP
Former Executive Director
Urban Area Transportation Study
Ann Arbor

Cynthia E. Winland, AICP
Crescent Consulting, Inc.
Midland

National Advisory Committee

Philip Demosthenes
Access Program Manager
Colorado Department of Transportation

Arthur Eisdorfer
Chair
TRB Access Management Committee

Dane Ismart
Louis Berger and Associates

Kristine Williams, AICP
Senior Research Associate
Center for Urban Transportation Research
University of South Florida

Michigan Department of Transportation Ad Hoc Advisory Committee

Mark Dionise
Tom Doyle
Imad Gedaoun
David Geiger
Amanda Hopper
Carlos Libiran
Tim Little
Kim Zimmer

Report Authors

Mark A. Wyckoff, FAICP and Michele Manning, AICP, Planning and Zoning Center, Inc.

Project Manager

David Geiger, MDOT

PREFACE

This guidebook presents and explains how and when to use a wide-range of access management techniques to address common traffic problems. Access management is a set of proven techniques that can help reduce traffic congestion, preserve the flow of traffic, improve traffic safety, prevent crashes, preserve existing road capacity and preserve investment in roads by managing the location, design and type of access to property.

Purposes of the Guidebook

This guidebook is targeted for use by elected and appointed local government officials, planners and road authority personnel. It is based on the growing recognition that many benefits are achieved through local, county, regional and state cooperation in solving existing and preventing future transportation problems. It is believed that by raising awareness of planning, design and regulatory techniques on effective access management among local, county, regional and state officials, that better communication and success in the pursuit of common transportation and land use objectives will result. Chief among these common objectives is the prevention of needless deaths and injury caused by poor access design. Good access design also prevents traffic crashes, improves roadway performance, and preserves the investment in our roadways.

There are six principal purposes of this guidebook:

1. Identify and explain the role and benefits of access management in contributing to solutions to 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 developing 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 own communities.

Guidebook Organization

This guidebook presents access management techniques designed to help address common traffic problems. These techniques are organized around 15 access management principles listed in the first chapter but described in more detail in subsequent chapters. Few access related traffic problems can be solved with a simple “quick fix”. Typically, many techniques must be used together as part of a coordinated set of long range initiatives to achieve the desired result. Similarly, most principles and many techniques

are interrelated. This interrelationship is evident with the references to multiple techniques for nearly every question and answer presented at the start of Chapter 1 and the multiple cross references throughout the guidebook.

Following is a listing of each of the Parts and chapters in this guidebook. The Table of Contents provides greater detail.

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.

Note: Many terms used in this guidebook may be unfamiliar to the reader. While an effort has been made to define a term the first time it is used, subsequent references are not defined. In lieu of a glossary, most of the technical terms are defined in the definitions section of the sample ordinances in Chapter 8 (see page 8-4). Hopefully, this will meet the needs of most readers.

Contacting MDOT on the Guidebook

As noted in the Acknowledgements, this guidebook was prepared with considerable assistance from a large number of local, state and national experts on access management. It is intended to meet a wide range of user needs. It is also published in a 3-hole punch format so that it can be easily updated. Research regularly contributes to refining various access management techniques. State and national guidelines sometimes change. Local officials unfamiliar with the access management techniques in this guidebook may require more information, or clarification. Please contact MDOT using the postcard on the last page if you wish to get more information, to suggest an improvement to the guidebook or to order additional copies. The postcard can also be used to register your ownership of a copy of this guidebook with MDOT so that you can be notified of any future updates.

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Chapter 1
COMMON TRAFFIC PROBLEMS

Following are some of the common traffic questions and complaints expressed by drivers, nearby residents and business owners about travel along congested major streets and highways. Some of these complaints can be addressed with a change in how abutting land uses access the roadway; others by improvements to the design of the roadway. Some improvements may be able to be made quickly, others over a period of time. Some of the problems along developed roadways can also be avoided along undeveloped roadways if local governments and road authorities work cooperatively to apply access management techniques. The approaches and processes used to fix or prevent these traffic problems are commonly referred to as "access management." Access management is a set of proven techniques that can help reduce traffic congestion, preserve the flow of traffic, improve traffic safety, prevent crashes, preserve existing road capacity and preserve investment in roads by managing the location, design and type of access to property.

Each of the following questions motorists commonly ask about traffic problems has an accompanying illustration or photo. Each question is followed by a brief answer and a reference to one or more specific access management techniques in Chapter 3 which address that problem in more detail (the references are in [BRACKETS AND CAPS]).

By learning about and implementing effective solutions to these common traffic problems, you can improve traffic movement in your community and make it safer. YOU CAN MAKE A DIFFERENCE!

COMMON QUESTIONS & ANSWERS

Question 1

Q. *"Why do I sit through two-three light changes every day at this traffic signal (or why does it take one hour to go 10 miles)?"* …an anxious driver (see Figure 1-1).

A. Assuming that traffic signals are timed properly and are not improperly spaced, the problem may be more traffic than the road is designed to handle. However, even if the road is not carrying more cars than it is designed for, then too many driveways and conflicting traffic volumes could be a significant part of the problem. [SEE TECHNIQUES #1, 4, AND 22-23]

Figure 1-1

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

Question 2

Q. *"I want to shop at two businesses that are separated by two other stores. I can't go from one to the next without going back on the main street. Walking between properties is also difficult because there is no sidewalk. Can't connections be built between properties so people can easily go from property to property without going back onto the busy street?"*…an unhappy shopper (see Figure 1-2).

A. Yes they can. This can be done with connections between parking lots or with new front or rear access drives. [SEE TECHNIQUES # 1, 4 AND 17-21]

Figure 1-2

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 3

Q. *"How can we protect our children walking and riding bikes in this area? They have to cross so many driveways and I am afraid motorists turning into the driveway too fast will not see them."*…a concerned mother (see Figure 1-3).

A. Good driveway spacing and design can improve the safety of access by pedestrians and bicyclists. [SEE TECHNIQUES # 1, 3, 4, 10, 17 AND 18]

Figure 1-3

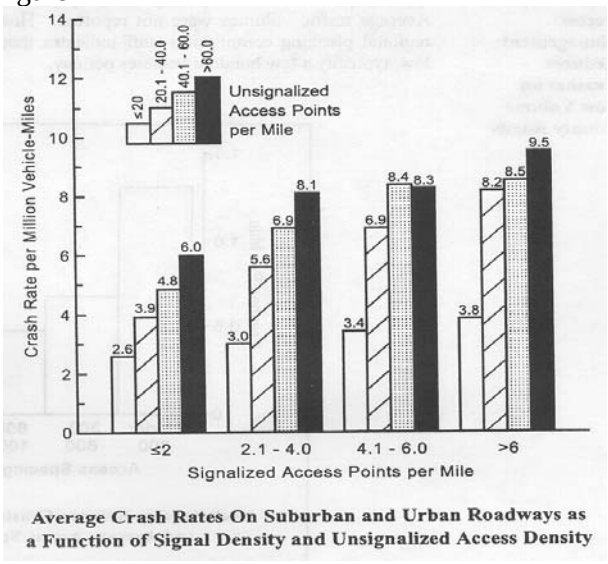
Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 4

Q. *"I see so many accidents in this stretch of road. What can we do about so many drivers slowing down suddenly because someone ahead is turning or trying to speed out of driveways?"*…an ambulance driver (see Figure 1-4).

A. Crashes increase sharply as the number of driveways per mile increase. By reducing the number of driveways, improving the ease of right-turns, more carefully directing left-turns, and by limiting some left-turns, crashes are prevented or their severity reduced. [SEE TECHNIQUES # 1, 3, 4, 5-10 AND 13]

Figure 1-4



Average Crash Rates On Suburban and Urban Roadways as a Function of Signal Density and Unsignalized Access Density

Source: National Highway Institute, Course 15255, FHWA, 1998, p. 2-6.

Question 5

Q. *"This looks like really bad planning. All of the exits and entrances to the stores are grouped close together and on Saturdays traffic backs up because so many people want to shop. Is there something we could do to reduce the traffic backup in these areas?"*…a frustrated shopper (see Figure 1-5).

A. Consolidating driveways, properly spacing driveways and improving access design to the new, fewer driveways will help considerably. Improving parking lot design to quickly accommodate entering vehicles and prevent them from backing up in the street, and possibly redirecting some traffic to side streets, rear access drives or frontage roads may also help. [SEE TECHNIQUES # 1, 3, 4, 5-10, 19 AND CHAPTERS 4-6]

Figure 1-5

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 6

Q. *"All of the driveways and signs are so confusing because they are so close to one another, people slow down to make sure they enter the right driveway and sometimes they miss it. What can we do to limit the confusion and provide for a smoother flow of traffic?"*…a planning commissioner (see Photo 1-1).

A. Consolidating driveways leaves the remaining driveways further apart which gives motorists more room to make decisions. It also has the added benefit of freeing space for more effective signage and better landscaping between driveways. Consolidated signs (with multiple establishment listings) by the consolidated driveway can also help. Sign placement should give a clear visual cue where the proper driveway is. [SEE TECHNIQUES # 1,4, AND 7]

Photo 1-1

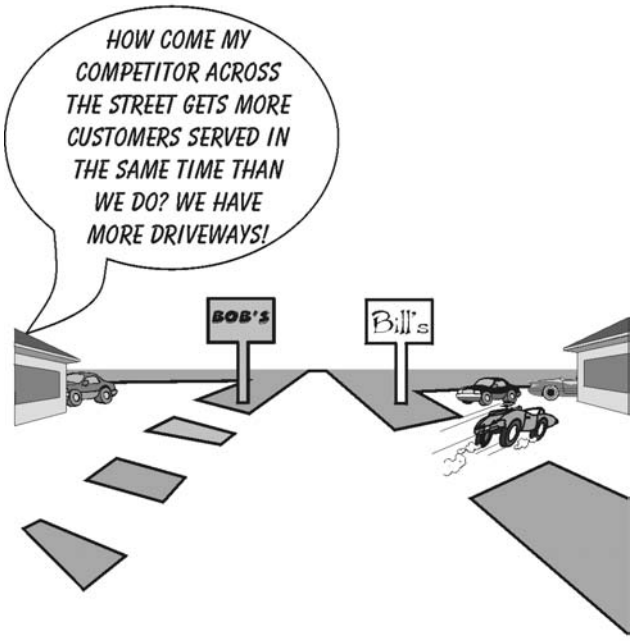
Photo by: Mark Wyckoff, Planning and Zoning Center, Inc.

Question 7

Q. *"How come my competitor across the street gets more customers served in the same time than we do? We have more driveways!"*…an entrepreneur (see Figure 1-6)

A. More driveways doesn't mean more business. More driveways means more places for vehicles to turn in and out and hence, more places for vehicular conflicts. One well designed and located access will safely accommodate more in-coming and out-going traffic than a host of separate driveways. People are more comfortable shopping at establishments that offer safe access than they are at businesses which have so many driveways they feel they risk an accident each time they shop there. [SEE TECHNIQUE #1.]

Figure 1-6



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 8

Q. *"People can get onto my property but they can't get out. Can we do something to ease the traffic or create another exit so my customers will keep coming back?"*…a local business owner (see Figure 1-7).

A. This problem often occurs to businesses with driveways located close to a corner on a busy street where traffic backs up during red signals. Possible solutions include creating connections to abutting parking lots or uses, replacing an unrestricted driveway with a right-in and right-out only driveway, moving the business driveways further from the intersection, and depending on the depth of the lot, connecting to a service drive or sidestreet. [SEE TECHNIQUES # 1, 4, 5, 9, AND 17-21]

Figure 1-7

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 9

Q. *"What can be done to decrease the time it takes to turn left out of the shopping plaza?"*…a postal carrier (see Figure 1-8).

A. Assuming traffic volume isn't great enough to justify a traffic signal, and there is no median, then a center left-turn lane or other left-turn designs may be appropriate. Where these will not help, or would cause another problem, then it may be necessary to direct left-turn traffic to a side street or new rear access drive for a safe and timely departure. [SEE TECHNIQUES # 13, 15, AND 19-23]

Figure 1-8

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 10

Q. *"There are several driveways on this street that are either narrow or very steep, where you practically have to stop before turning in order to turn safely. Is there something we can do about these driveways so drivers don't need to stop and hold up traffic behind them or risk rear-end collision?"*…a semi-truck driver (see Figure 1-9).

A. Where there is adequate land, providing a deceleration lane and smoothing the turning arc and grade onto the site will help. Separating access points for passenger vehicles and delivery trucks (especially on larger sites) may also be appropriate. However, it is usually better to have only one driveway that is designed to meet the needs of all vehicles. To prevent future problems of a similar nature, insert wider lot widths, and driveway design standards in the zoning ordinance addressing grade, width, curb radii, etc. [SEE TECHNIQUES # 3 AND 10]

Figure 1-9

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 11

Q. *"Can we do anything to stop drivers from darting between establishments on opposite sides of the street in heavy traffic?"*…a commuter (see Figure 1-10).

A. If the problem is infrequent, improved enforcement of existing traffic laws may be a simple solution. However, if the problem is common and the darting cars frequently go at diagonals, rather than straight across from one driveway to another, then other measures may be necessary. It is also likely this problem is part of a wider set of problems that may require a more expansive response. Consolidating driveways, realigning driveways, adding a continuous center turn lane, putting in a traffic light between major traffic generators, or installing a median are all techniques that may help to better direct motorists. Preventing future problems on emerging commercial strips can be achieved by carefully aligning and spacing driveways as site plans for new development are reviewed, or by establishing a median. [SEE TECHNIQUES # 4, 10, 11, 13, AND 15)]

Figure 1-10

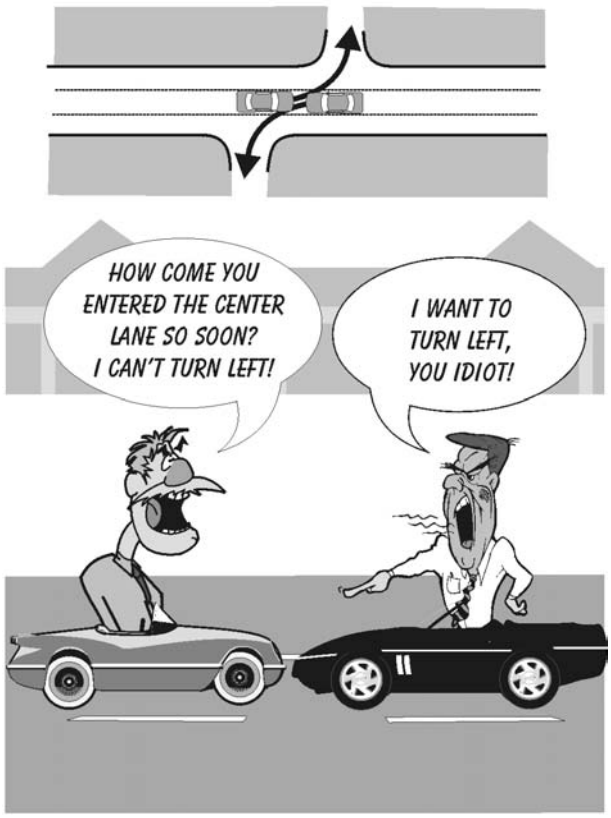
Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 12

Q. *"How can we reduce the left-turn lock up problem on some of our roadways? Drivers get very anxious when they have to sit for several minutes in the center lane waiting for traffic to clear and the car facing them to turn left so they can move ahead and turn left into another business."*…a police officer (See Figure 1-11).

A. This may be symptomatic of many other access related problems and usually only occurs on high volume roadways. Where right-of-way is adequate or could be cost-effectively acquired and traffic volumes warrant (now or in the future) a median with controlled u-turns may be appropriate. Where medians are not feasible, proper driveway alignment, spacing of driveways, driveway consolidation, connecting parking lots and front or rear access driveways may provide significant relief. Often the best solution is to consolidate access onto the arterial at a signal and improve the supporting street system (including front or rear access driveways) for alternative ingress and egress points. [SEE TECHNIQUES # 4, 11, 13, 15, AND 17]

Figure 1-11



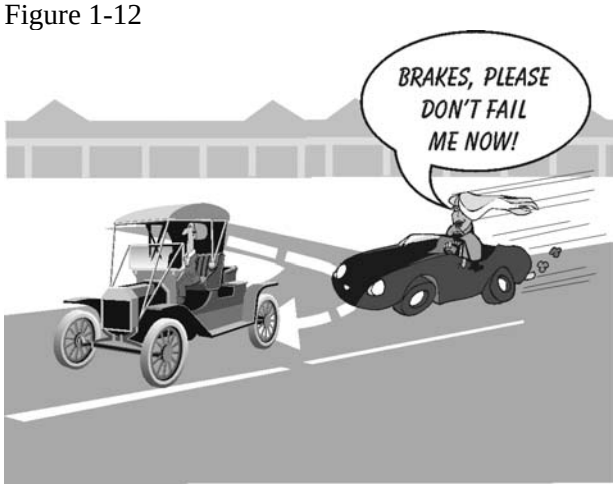
Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 13

Q. *"Drivers pulling out of driveways are going at a slower speed than those already on the roadway, causing other drivers to slow down. This increases traffic congestion and increases my travel time to work. How can we limit congestion and preserve my travel time to work?"*…a commuter (see Figure 1-12).

A. Minimum driveway spacing standards can limit this problem by giving entering drivers more room between access points to achieve roadway speed or react to another entering driver. For large trucks, the great difference in speed can also be reduced by giving drivers a chance to accelerate in a separate lane or taper. [SEE TECHNIQUES #7, AND 10]

Figure 1-12



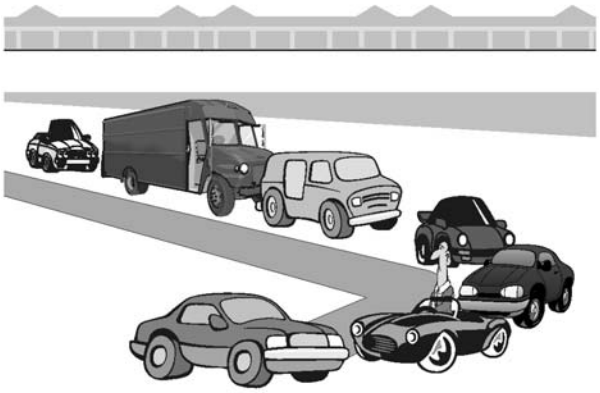
Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 14

Q. *"What can be done when internal circulation within a parking lot is poor and traffic is backed out of the driveway and onto the street?"*…a community planner (see Figure 1-13).

A. Local ordinances can make it illegal for cars to queue into the street. When the opportunity presents itself, such as during a building remodeling or expansion, the driveway may benefit from a redesign that adds significant stacking space (provided it does not interfere with appropriate parking maneuvers). This is especially true with drive-through establishments. The parking lot might also benefit from a redesign that lengthens the driveway and better directs cars lining up to exit. Connections to abutting parking lots, and to side streets or alternative access may also be helpful. [SEE TECHNIQUES # 4, 10 AND 17-21]

Figure 1-13



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 15

Q. *"Can't we improve the appearance of this road? All you see are signs, telephone poles, and driveways everywhere, it is ugly."*…a garden club member (see Photo 1-2).

A. As mentioned earlier, driveway consolidation has the added benefit of enlarging available space for landscaping, parking and sign consolidation. Narrowing excessively wide driveways also helps. Frontage and rear access roads may provide this benefit as well. [SEE TECHNIQUES # 1, 4, 10, AND 19]

Photo 1-2

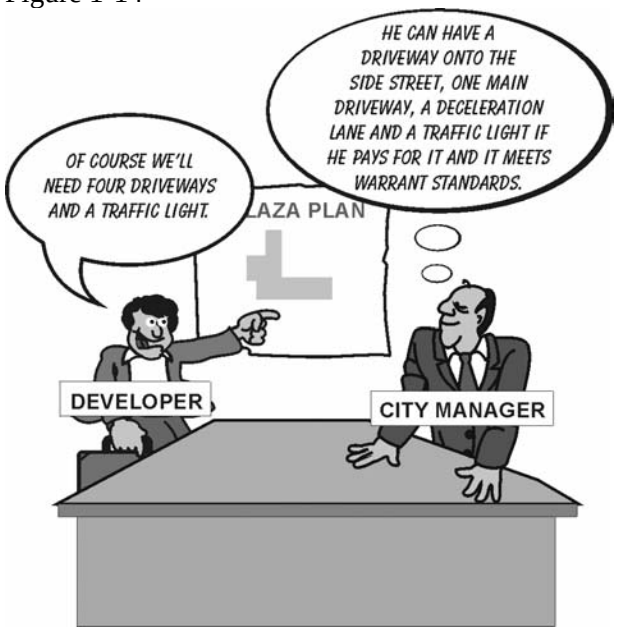
Photo by: Mark Wyckoff, Planning and Zoning Center, Inc.

Question 16

Q. *"We can't afford the cost of remedial measures caused by too many driveways and curb cuts. How can we minimize driveways or have the developer pay for off-site impacts when new property is developed?"*…a city manager (see Figure 1-14)

A. Preparing a corridor management plan or an access management plan and associated access management regulations is one of the most effective prevention techniques. Such a plan will identify the feasibility of utilizing techniques such as wide minimum lot widths, wide driveway spacing, combined driveways, use of frontage and rear access drives, medians, etc. These techniques must be given extra consideration because Michigan communities do not have statutory authority to use impact fees or to require a developer to pay for off-site impacts. [SEE TECHNIQUES # 1-4 AND CHAPTERS 4-6]

Figure 1-14



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 17

Q. *"We spend a lot of money to improve road capacity only to have it reduced with new driveways from new development. We don't have enough money to build our way out of congestion. How can we preserve the investment in our road improvements?"*…a mayor (see Figure 1-15).

A. Preparing a long range transportation plan that focuses on the needs of all major corridors or a corridor management plan for key corridors is one of the best ways to both prioritize long range road improvement spending and to protect the existing investment in roads. Such plans need to include a clear description of the role of access management in meeting identified needs and the role of all the affected road authorities in pursuing common objectives. Access management is only a part of the problem, and will only be a part of a comprehensive solution. [SEE CHAPTERS 5-7]

Figure 1-15

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 18

Q. *"What can we do to plan and prevent some of these problems before they arise?"*…a township trustee (see Figure 1-16)

A. Linking your land use planning with transportation planning is critical. But so is preparation of corridor and/or access management plans for the major roadways in your community. Once a plan is prepared, the necessary regulations must be adopted as part of the zoning ordinance. [SEE CHAPTERS 5, 6, 7 AND 8]

Figure 1-16

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 19

Q. *"What can we do within our zoning code to alleviate some of the traffic problems that may be caused by new development or redevelopment?"*…a zoning administrator (see Figure 1-17).

A. Many of the techniques presented in this guidebook can be added to local zoning or subdivision regulations. [SEE CHAPTERS 4 AND 8]

Figure 1-17

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Question 20

Q. *"Our zoning ordinance has driveway spacing and design standards that are more restrictive than those of MDOT. Does a developer have to comply with our standards or those of MDOT?"*…a traffic engineer.

A. A community's zoning standards apply to the land abutting a right-of-way while those of MDOT (or other road authorities) apply within the right-of-way. Obviously a driveway crosses (or at least abuts) each. Thus, both standards apply and an applicant must conform with both sets of standards without violating either. This is one reason why local governments need to develop access management standards carefully and with MDOT assistance when applied to land along a state trunkline. Often, local standards are more restrictive than MDOT's and would achieve mutual objectives. The coordinated planning and site plan review process in Chapters 5 and 6 set forth a method for ensuring access management objectives of both a local government and MDOT (or other road authority) are met without undo inconvenience on a property owner. [SEE CHAPTERS 5 & 6]

Question 21

Q. *"How come planning and road officials always blame each other for congested roads? Don't they all work for us?"*…a confused citizen (see Figure 1-18).

A. It is easy for planning and road officials to get frustrated and blame each other for congested roads as each makes only ½ of the decisions that count. Land use decisions by local governments generate more traffic; at the same time road improvements by road authorities often increase road capacity making more new development attractive. Unfortunately, the "blame game" doesn't serve Michigan's citizens well. Only coordinated land use and transportation planning and coordinated local site plan review and driveway permit decisions based on effective access management techniques can ensure new land development consistent with existing and planned road capability and vice versa. [SEE CHAPTERS 5-9].

Question 22

Q. *"What can I do to achieve the benefits of access management in my community?"*…a motivated access management guidebook reader.

A. First, become very familiar with this guidebook. Second, educate local planning and elected officials in your community and/or road authority about access management. Third, contact your road authority and/or local land use planners and encourage development of a coordinated planning and permit approval system. Fourth, follow the steps outlined in Chapters 5, 6 and 9. [SEE CHAPTERS 5, 6 AND 9]

Figure 1-18

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

Many of the common traffic problems addressed on the preceding pages can be improved by proper application of the access management techniques and processes described in this guidebook. But before presenting these techniques (see Chapter 3), a definition of access management and a clearer explanation of the benefits of access management may be helpful.

WHAT IS ACCESS MANAGEMENT?

Access management is a set of proven techniques that can help reduce traffic congestion, preserve the flow of traffic, improve traffic safety, prevent crashes, preserve existing road capacity and preserve investment in roads by managing the location, design and type of access to property.

Access management extends the function of a roadway while still assuring safe reasonable access to adjacent land uses. Poor access management is most obvious along major arterials that are lined with many narrow lots with driveways located close together. These often have relatively high traffic volumes and higher crash rates. Neither the land development nor the traffic problems on these roadways occurred overnight. But over time, the traffic problems grow and create a need for very expensive remedial improvements, that may only mitigate, rather than solve, the growth problems. Access management can not only help where remediation is the only option, but is most effective in preventing future problems where intensive land development is planned along arterial roads.

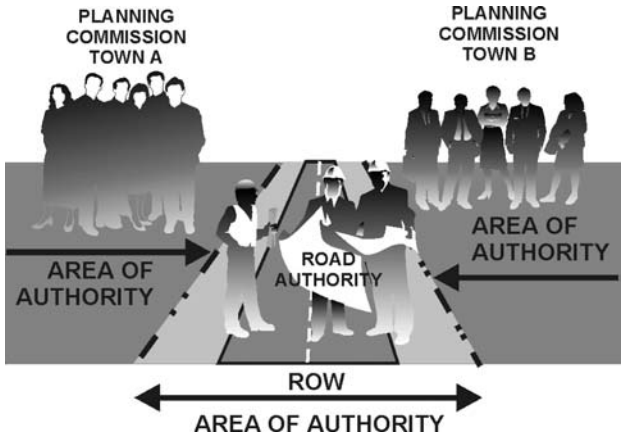
Access management focuses on the number, location and design of driveways as they relate to the following elements within the road right-of-way: travel lanes, medians, by-pass lanes, dedicated turn lanes and signal operations. On the land use side of the road right-of-way, driveway location considerations can include: internal site design and circulation, shared driveways, connected parking areas, frontage and/or rear access roads, building setback, and sign design and placement. Special consideration must also be given to meeting the needs of pedestrians, bicyclists, the handicapped and bus riders as well.

Decisions within a road right-of-way and connections to a road right-of-way are the responsibility of various road authorities: MDOT on state trunklines, county road commissions on the county road network and municipal road authorities on local streets. Decisions regarding land use abutting a road right-of-way are made by private land owners in conformance with applicable (mostly local) land use regulations. See Figure 1-19.

Successful access management requires cooperation between property owners, local land use authorities, and local, county and state transportation agencies in order to provide safe access to private property and protect the public's investment in roads.

A planning process that links access management principles with land use and corridor planning is the best way to look at the big picture and ensure appropriate relationships between present and future needs. Access management is implemented through review of development proposals under local zoning and subdivision regulations, as well as during the driveway permit process administered by local, county or state road authorities. It is also implemented through improvements to roadway design and specific capital improvement projects on targeted corridors with adopted access management or corridor improvement plans.

Figure 1-19



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc

WHY MANAGE ACCESS?

Major Benefits of Access Management

There are five major reasons why access management is beneficial:

1. Access management improves traffic safety and can prevent vehicular crashes. Roadways are the most dangerous public facilities in the USA. Over 900 people die each week. The highest risk of death for a child is a traffic crash. In Michigan between 1992 and 1994, sixty-eight percent of all nonlimited access trunkline crashes were related to access movements. There were 69 people killed and 13,855 persons injured in 33,310 driveway related traffic crashes between 1992 and 1994. Table 1-1 summarizes trunkline crash data between 1997 and 1999. Nearly 25,000 driveway related crashes were reported during this period. Fatality and injury data associated with these crashes is not yet available.

Each new driveway adds to the number of conflict points along a roadway at which a traffic crash could occur. While it is certainly necessary to provide for new access points as new development occurs, since the number, type, spacing and location of new driveways can have a negative impact on traffic safety, it is important for local governments, road authorities and land developers to coordinate driveway decisions based on established access management techniques. Failure to do so will only create or exacerbate traffic congestion or traffic crash potential.

Few other land use and transportation tools are as cost effective at improving traffic safety as the integrated access management design and regulatory techniques presented in this guidebook. For over two decades, various studies have shown access management can result in fewer crashes, fewer injuries, fewer fatalities and less property damage. Access management does this by reducing the number of conflict points for vehicles and pedestrians and by reducing the speed differentials between vehicles. Together the crash potential is reduced. Since most automobile crashes occur within 20 miles of home, access management improvements will have the greatest benefits for those who live, work, go to school, and get entertained in your own community. What better reason to manage access than to protect the safety of your own family, friends, co-workers, neighbors and fellow community residents or visitors? Traffic crashes caused by too many driveways is a

Table 1-1

Michigan Trunkline Crashes, 1997 through 1999

MDOT Crash Type	Area Type							
	Interchange		Intersection		Midblock		3-year Total	
	Crashes	Col %	Crashes	Col %	Crashes	Col %	Crashes	Col %
Driveway Related	1,722	1.7 %	15,688	9.2 %	7,272	4.9 %	24,682	5.8 %
Other Crash Types	100,950	98.3 %	154,836	90.8 %	141,455	95.1 %	397,241	94.2 %
Total Crashes and ***Area Type Percentage***	**102,672**	***24.3 %***	**170,524**	***40.4 %***	**148,727**	***35.2 %***	**421,923**	**100.0 %**

NOTE:
Driveway Related Crash Types:

- Angle crash in which one of the vehicles was entering or exiting a driveway.
- Rear end crash involving a vehicle intending to enter or exit a driveway.
- Other crashes involving use of a driveway.
- Crashes that occur on private property at a driveway are not included in this table.

Source: MDOT Traffic and Safety Division

community problem. Access management is a solution with direct community benefits. Table 1-2 summarizes research on the effects of access management techniques on reducing traffic crashes, improving traffic flow and saving fuel.

2. Access management results in shorter travel times and reduced motorist costs. Good access management helps motorists get to their destinations with fewer delays. When traffic flow is maintained or improved due to effective use of access management, then average travel time either stays the same or improves. For citizen's, shorter travel time means more time for other activities (instead of being trapped on congested roads). For businesses, this means that delivery vehicles can make more stops in a day, or the market area for customers is larger because they can travel farther to a business without expending more time. Often there is also reduced average vehicular costs due to less idling and lower overall vehicle damage from fewer crashes.

3. Access management extends the function and capacity of roadways. Congestion angers motorists, prevents roads from functioning as they were designed, and is a source of air pollution. One major contributor to congestion is unnecessary or uncontrolled points of conflict caused by too many opportunities to turn onto or off the road. As cars slow to turn, the capacity of the road to move cars at the posted speed is diminished. Stated another way, poor access management and too many driveways or streets too close together contribute to the functional deterioration of a road. Good access management preserves a road's capacity to move vehicles at the posted speed and extends the useful life of the road. A Florida Department of Transportation study found that the typical four-lane arterial road with good access management can handle almost 10,000 more vehicles per day than the same four-lane road with poor access management. Michigan's taxpayers, through its local governments, county road commissions and the MDOT spend over a billion dollars a year to build and maintain our street and road system. Yet, there are more transportation improvement needs than public resources available or committed to meet those needs. At the local level, building more roads and roads with more lanes is not always possible. When it isn't possible, access management can often improve roadway function. When capacity is increased it is important to preserve the capacity that is gained. The cost of even modest road expansion and improvement projects is often very great. Thus, any techniques that extend or enhance road capacity, especially if done at a relatively low cost, must be given high priority for they represent the best return on our investment. Many access management techniques

Table 1-2: Summary of Research on Effects of Access Management Techniques

Treatment	Effects
1. Add two-way left turn lane (TWLTL)	• 35% reduction in total crashes • 30% decrease in delay • 30% increase in capacity
2. Add nontraversable median	• >35% reduction in total crashes • decrease in delay • increase in capacity
3. Replace TWLTL with a nontraversable Median	• 15%-57% reduction in crashes on 4-lane roads • 25%-50% reduction in crashes on 6-lane roads
4. Add a left-turn bay	• 25% to 50% reduction in crashes on 4-lane roads • up to 75% reduction in total crashes at unsignalized access • 25% increase in capacity (22)
5. Type of left-turn improvement a) painted b) raised	• • 32% reduction in total crashes • 67% reduction in total crashes
6. Add right-turn bay	• 20% reduction in total crashes • Limit right-turn interference with platooned flow, increased capacity
7. Increase driveway speed from 5 mph to 10 mph	• 50% reduction in delay per maneuver; less exposure time to following vehicles
8. Visual cue at driveways, driveway illumination	• 42% reduction in Crashes
9. Prohibition of on-street parking	• 30% increase in traffic flow • 20%-40% reduction in crashes
10. Long signal spacing with limited access	• 42% reduction in total vehicle-hours of travel • 59% reduction in delay • 57,500 gallons fuel saved per mile per year

Source: National Highway Institute Course No 15255: *Access Location and Design*, S/K Transportation Consultants, Inc, 1998.

have relatively low costs compared to more traditional lane expansion, bypass or new road building projects.

4. Access management improves access to property while enhancing the value of private land development. Good access management programs provide uniform standards and procedures, and promote their fair and equal application. The quality of site access and the protection of private investments are more than a function of the number of driveways. They also depend on the design and spacing of driveways, the ease and safety of pulling off or onto a road, distance from intersections, and traffic signal sequencing. Highly managed site access results in a carefully designed and safe means of access to each property. In some cases this may not be direct access from a major arterial, but controlled access from a side street or frontage road. Businesses with safe and easy access are more inviting to shoppers and visitors, and are the scenes of fewer traffic crashes. Thus, access management is a tool that also helps protect (if not enhance) the value of private land development.

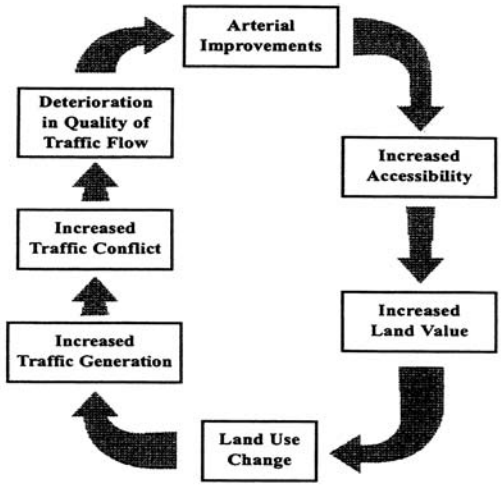
5. Access management results in nicer communities. A drive through a community with an effective access management program in place for a decade or more, is likely to result in the following observations:

- Traffic flows smoothly,
- Drivers have ample time to react to turning movements,
- Wide driveway separation results in less sudden stops,
- There is more green space between driveways,
- Signs are spaced more widely and more clearly demarcate driveway openings,
- The overall appearance is often characterized as more attractive,
- Businesses are better able to attract workers and managers that place a premium on high quality of life.

Land Use/Transportation Relationships

There is a strong relationship between the traffic along a roadway and abutting land. As more intensive land development occurs, congestion occurs on the roadway, traffic safety declines, and pressure builds for road improvements. Generally, as road improvements are made, the accessibility and value of abutting land often go up resulting in more intensive land development. Figure 1-20 illustrates this land use/transportation cycle.

Figure 1-20



The Transportation Land Use Cycle

Source: National Highway Institute, Course 15255, FHWA, 1998, p. 1-18.

A roadway is also a land use that has a function within a network of roadways and is designed to provide that function. Freeways and highways were principally built to provide for "through traffic" – that is vehicles that travel relatively long distances. Local roads are built principally to provide access to abutting land uses. Traffic conflicts and congestion occur when one roadway is required to perform unintended or multiple functions. While the characteristics of roadways are explored more fully in the next chapter, it is important to recognize which agencies are responsible for road decisions and which are responsible for land use decisions.

The function, design, construction and maintenance of state highways are the responsibility of MDOT, while that of county roads is the responsibility of county road commissions. Cities and villages are usually responsible for all public roads, except state highways, within their jurisdictions. The roads within Michigan townships are built and maintained under the responsibility of a county road commission or MDOT (or both), except on a very few township built and maintained roads. Many townships contribute funds to a county

road commission, MDOT (or both), to help finance the cost of improvements to county or state roads within the township. See Table 1-3 for a simple list of these relationships.

Table 1-3
Authority of Land Use & Transportation Agencies

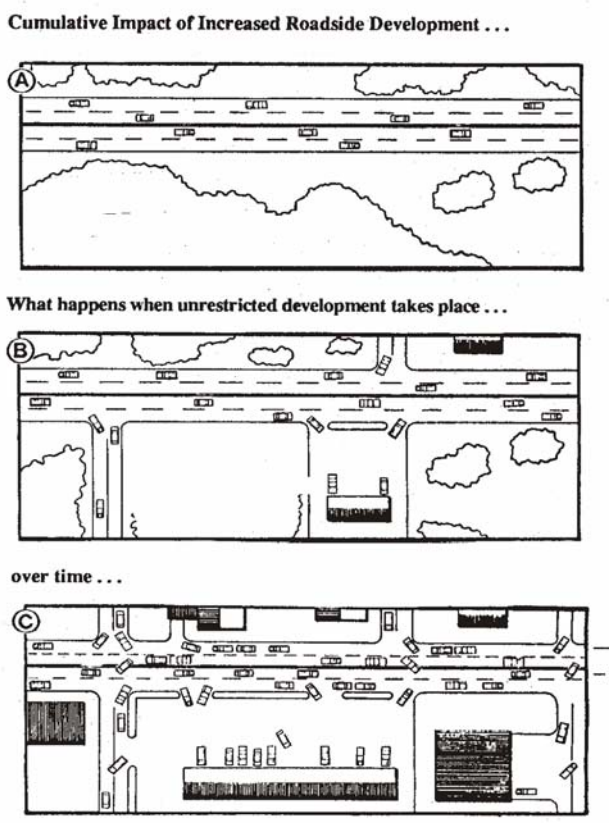
Authority	Townships	Cities & Villages	Counties	MDOT	County Road Commissions
To plan for future roads	X	X	X	X	X
To plan future land use	X	X	X		
To zone land	X	X	X*		
To approve access through site plan review (in the zoning ordinance)	X	X	X*		
To approve access in a proposed subdivision	X	X			
To approve driveways on local roads	o	X			
To approve driveways on county roads					X
To approve driveways on state highways				X	

* only in townships without their own zoning
o a few townships have built a few township roads which they maintain, the township may regulate driveways on those purely township roads.

Figure 1-21 demonstrates that how land is used adjacent to roadways has a tremendous impact on roadway function and operations. Land is developed by private property owners consistent with regulations largely adopted and administered by local units of government. Zoning and subdivision regulations are the most common tools used.

Traffic growth and any subsequent congestion on roadways is often the result of adjacent land use development. Therefore, the responsibility for resolving congestion problems is not just that of

Figure 1-21



Source: Center for Transportation Research and Education, Iowa State University, *Iowa Access Management Guidebook*, October 2000, p. 19.

road authorities. But road authorities do not have the power to approve a land development proposal or to receive taxes from it. Local governments do. If local governments approve intensive land development along a road that is not designed to accommodate the traffic from that development, then unnecessary congestion often occurs. Likewise, if local governments coordinate land use decisions with road authorities, then many congestion and traffic safety problems can be avoided. This relationship works best if

- abutting jurisdictions cooperatively prepare a corridor management plan (with a specific access management component) for each major roadway in the area, that is also consistent with coordinated long term land use plans for all affected communities; and
- appropriate access management standards are incorporated into the zoning and subdivision regulations of all the communities along each corridor; and

- all affected road authorities are also directly involved in the preparation of these plans and regulations; and if
- subsequent land use decisions are made by following a coordinated site plan review process that involves the local governments and affected road authorities.

ACCESS MANAGEMENT BENEFITS…

Motorists: by reducing traffic crashes and congestion, and decreasing travel delays.
Businesses: by preserving or enlarging market and/or delivery areas; by reducing stress and crash risks for employees; by improving safety for customers.
Land Owners: by increasing economic development potential of land associated with an efficient transportation system, and enhancing property values by decreasing travel time that extends market areas.
Developers: by establishing access design criteria in advance of development approval thereby preventing the high cost of delay and redesign.
The Public: by prolonging the functional life of existing roads. By maintaining or increasing a road's design capacity, funds that might otherwise have to be spent for expensive lane additions can be spent on road maintenance and operations.

CONSEQUENCES OF NOT MANAGING ACCESS:

- The efficiency of our transportation system will deteriorate, and traffic and land use conflicts will increase.
- Poorly planned strip commercial development will be encouraged.
- The number of private driveways will proliferate.
- More driveways mean more traffic conflicts; crashes and congestion.
- The public's investment in Michigan's roadways will be diminished.
- Roads will have to be widened to add new lanes at great public expense to make up for capacity lost to inefficient traffic operations.
- The incompatibility of providing land service and traffic service will become more severe.
- Neighborhood streets will be used to bypass congested intersections.

Trip Generation

Detailed studies have been performed around the country to document the amount of traffic that is generated by all types and density of land use development on a daily and peak hour basis. This documentation has been published by the Institute of Traffic Engineers in the Trip Generation Manual, Trip generation is an important dimension of the land use/transportation relationship. Understanding trip generation as well as the direction of those trips is often essential to proper driveway location, design, access management and prevention of congestion.

Table 1-4 Traffic Equivalents

Land Use	**100 Peak Hour Directional Trips**	**750 Daily Trips**
Single Family	150 Units	70 Units
Apartments	245 Units	120 Units
Condos/Townhouses	295 Units	120 Units
Mobile Home Park	305 Units	150 Units
Shopping Center	15,500 sq. ft.	2,700 sq. ft.
Fast Food Drive-Thru Restaurant	5,200 sq. ft.	1,200 sq. ft.
Convenience Store w/gas	1,300 sq. ft. + 5 Pumps	1,000 sq. ft.
Hotel/Motel	250 Rooms	90 Rooms
General Office	55,000 sq. ft.	45,000 sq. ft.
Light Industrial	115,000 sq. ft.	115,000 sq. ft.

Evaluating Traffic Impact Studies, TCRPC, 1994, p. 7.

Table 1-4 illustrates a range of land uses that have roughly equivalent traffic generation. A common citizen complaint at some land use hearings is that a particular land use will create a lot of new traffic. Sometimes this is true, but many times other land uses that don't arouse the same opposition create far more (or at least the same) traffic. For example, 150 single family dwelling units generate about 100 peak hour trips, where as it takes 245 apartments to generate the same amount of traffic. Similarly on a daily basis, a 120 unit apartment complex generates roughly the same number of daily trips as a small convenience store. There is often opposition to apartment projects on the basis of traffic while a convenience store proposal may not have any opposition. From an access management perspective, the convenience store is often more problematic, because it is usually on a small corner lot, driveways are requested on each street and there is usually inadequate corner clearance for safe ingress and egress on either street. In contrast, the apartment complex is likely to have two major

points of entry/exit that are widely spaced from the intersection. Of course, the peak hour traffic at the apartment complex may be worse, and is all new trips, whereas the convenience store may be largely picking up pass-by traffic rather than generating all new traffic. However, each presents important access management issues that should be examined carefully.

Land uses generating over 100 vehicle trips during the peak hours should not receive local site plan or driveway approval without the community first evaluating a traffic impact study prepared by a qualified traffic engineer. (The content and methodology for such a study is outlined in Evaluating Traffic Impact Studies described in Appendix C and on-line at http://ntl.bts.gov.DOCS/etis.html.)

Chapter 2
THE RELATIONSHIP BETWEEN ACCESS AND ROADWAY FUNCTION

This guidebook is organized around 15 access management principles. All 15 principles are listed in the sidebar on the next page. This chapter explores four of those principles and describes the importance of protecting existing road function. It also explains the importance of an interconnected street system.

ACCESS MANAGEMENT PRINCIPLES

"Reasonable Access" is Protected

The goal of access management is to achieve a safe and efficient flow of traffic along a roadway while preserving reasonable access to abutting properties. Achieving this goal requires a careful balancing act in the application of access management standards to ensure safe movement of motor vehicles while still providing reasonable access. Fully understanding this balancing act requires some background on the meaning of *"reasonable access."*

Property that abuts a public road can attribute a part of its value to the access that it has to the public road system. Access to public roads is limited by state law and administrative rules, as well as by rules of county road commissions and ordinances of local units of government. Most of these regulations center on the issuance of driveway permits, or approval of a site plan which designates particular driveway locations. *"Reasonable access"* to property abutting a state highway or county road is protected by state law (Sec. 4 of Act 200 of 1969). This act also seeks to ensure safe and efficient traffic flow on Michigan roadways.

Some people confuse reasonable access with direct access and while they are often the same, sometimes they are not. An example of direct access is where a driveway directly connects a lot or parcel of land to an abutting public road. Two or more parcels that abut a public road can share the same driveway and still have direct access. Similarly, a corner lot with frontage on two public roads that takes it access from the local road, rather than the arterial, still has direct access to a public road. Indirect access may also be reasonable access. Indirect access is where a property that abuts a public road connects motorists to the public road through an indirect means, such as a service road, an access easement, or a private drive.

Reasonable access is determined on a case by case basis and depends on all the relevant circumstances. For example, prior to the issuance of a driveway permit, or approval of a site plan, driveway locations must be considered in light of potential negative impacts on clear sight distance, traffic at nearby driveways or intersections, drainage, road characteristics, volume of traffic and other features. If a proposed driveway location will increase safety hazards in a particular location, but not in another, then the safer location should be the one approved. Where access to property from a local street, alley, front or rear service drive is available, it is usually safer due to lower speeds and traffic volume, and it is more likely to preserve the function of the public road, especially if it is an arterial. In this situation, the driveway connecting to alternative indirect access is preferable. Most often when indirect access is approved, it is because direct access creates a serious traffic safety concern.

Benefits to Businesses and Taxpayers

Proper application of access management techniques assures businesses and drivers of safe access and taxpayers of cost-effective use of their money. These are very important benefits. In

15 ACCESS MANAGEMENT PRINCIPLES

The techniques in this guidebook are rooted in the following fifteen access management principles (and are discussed in the Chapter indicated in parentheses):

1. "Reasonable access" to property abutting a state highway or county road is protected by state law. (Act 200 of 1969). Direct access is not mandated if other access options are available. (Chapter 2)
2. Proper application of access management techniques assures businesses and drivers of safe and convenient access and taxpayers of more cost-effective use of their money spent on roads. (Chapters 1 and 2)
3. The more important the roadway (the higher its functional classification) the higher the degree of access management that should be applied so that the road continues to perform according to the function it was designed to serve. (Chapter 2)
4. Interconnections between adjacent sites and between new subdivisions and the existing street system is important in maintaining safe and efficient traffic flow. (Chapters 2 and 3)
5. Limit the number of driveways and other conflict points. (Chapter 3)
6. Separate driveways and other conflict points. (Chapter 3)
7. Improve driveway operation by fitting the best design to the need. (Chapter 3)
8. Remove turning vehicles from through traffic lanes. (Chapter 3)
9. Reduce conflicting traffic volumes. (Chapter 3)
10. Improve roadway operations on arterials by achieving the proper balance between traffic flow and access to abutting property. (Chapter 3)
11. Lay the foundation for correcting existing access management problems and preventing future ones in the local comprehensive plan and/or an access or corridor management plan. (Chapters 6 and 7)
12. To optimize the benefits of access management, coordination with all appropriate transportation agencies is essential when preparing access management plans, design techniques and the elements of local access management regulations. (Chapters 6 and 8)
13. To optimize the benefits of access management, multi-jurisdictional coordination with all appropriate transportation agencies is essential when applying access management standards on lot split, subdivision, site plan and other zoning reviews. (Chapter 5)
14. Educate the public about the benefits of access management and involve them in development of access management plans and implementation activities. (Chapter 6)
15. Many access management techniques are best implemented through zoning and others through local lot split, subdivision, condominium and private road regulations. (Chapter 4 and 8)

contrast, both the private investment in property adjacent to public roads and the public investment in the road system are negatively impacted by poor site access and poor vehicular circulation design. Individual driveways in poor locations and with poor design can have an inordinately high safety and congestion impact on the public street. Businesses with poor access (such as a small lot at a busy corner), or with severe congestion in front of the business often do not do well. Customers cannot easily get in or out of the parking lot, and consequently choose to shop or eat somewhere else.

Prior to the advent of access management, it was common for land to develop along major arterials with small narrow lots and many driveways. These areas became very congested over time and the businesses suffered. Most older cities in Michigan have many examples of old narrow lot commercial strips, which are often only marginally viable today, if they rely on passing vehicles for business.

Similarly, property that does not abut a public street or highway is referred to as "landlocked". The value of landlocked property is usually much lower than property with access to a public road. Clearly, property has a much higher value if its driveway locations are well planned and designed.

Motorists dislike gas tax hikes, but at the same time want all roads smooth, and well-maintained, all year long. Traffic from new development often places substantial demands on road authorities to add lanes or to build bypasses or even new roads. However, gas tax revenues don't cover all the maintenance costs of existing roads and bridges, so financing new roads and other major improvements to existing roads is a continuing challenge. ***Many access management techniques provide low cost methods for preserving road capacity***. This is good for businesses, motorists and taxpayers alike. Shouldn't we always look at low cost access management options before examining higher cost road improvement options? This is easiest to accomplish before land development occurs. When it comes to many access management solutions, local governments don't have to wait year-after-year for state or federal road improvement funds. Instead, they can take action themselves or better, can act in cooperation with state and/or county authorities to jointly finance lower-cost access management solutions that are often more cost-effective and much cheaper than traditional solutions.

Beyond these obvious benefits of access management to all businesses, there are other more particular benefits to some businesses. For example, predictable travel times are very important to service industries and manufacturing facilities operating under "just in time" delivery contracts. A road network that is congested because of unnecessary access conflicts can greatly reduce predictability of delivery. Professional services, insurance, banking, and other offices strongly compete with other areas for salaried employees who often can locate wherever they want. A community with congested roads caused in part by poor access management is at a competitive disadvantage with communities that don't have much congestion. (See the discussion of the survey of businesses along Tittabawassee Road in Saginaw County on Table 6-2 in Chapter 6.)

Retail businesses often benefit from strong access standards because:

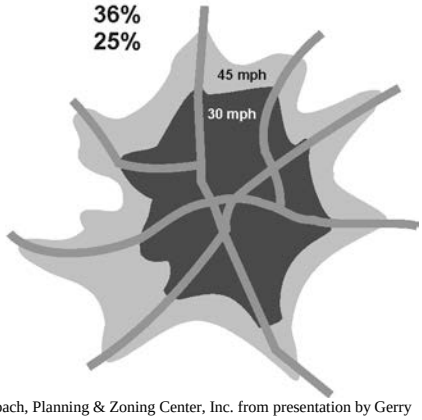
- Combining driveways creates more room for parking and landscaping,
- Combining driveways may result in lower maintenance,
- Providing cross-access between retail parking lots often encourages multi-stop business trips by customers who otherwise may not have stopped,
- Combining driveways often makes it easier for a motorist to more easily determine how to access a business.

The market area of a specific business is largely determined by the time a person is willing to drive to and from the business. Time of travel is greatly affected by the average speed that can be sustained over the distance. Figure 2-1 illustrates the dramatic reduction in market area from various reductions in average system speed. Thus, preventing congestion and maintaining average vehicle speeds at or near posted speeds maintains the largest market area. Poor access management can greatly contribute to congestion and reduced travel time.

Figure 2-1

Economic Benefit

Reduction in Average System Speed	Market Area Relative to Previous Size
0%	100%
10%	81%
20%	65%
30%	45%
40%	36%
50%	25%



Graphic adapted by John Warbach, Planning & Zoning Center, Inc. from presentation by Gerry Gluck, Urbitran Associates.

Listed in the sidebar below are many other consequences of poor site access and poor circulation design. These consequences go far beyond negative impacts on businesses and motorists.

What are the Consequences of Poor Site Access and Circulation Design?

- Inadequate access capacity
- On-site congestion
- Congestion on the public street system
- High crash experience on the public street
- High crash experience on-site
- Pedestrian-auto crashes
- Limited flexibility to adjust the design or operation to changed conditions
- Loss of customers
- Frustrated motorists
- Unstable land use – declining commercial corridor stability
- Decrease in property value
- Decreased tax revenues
- Diverts motorists onto neighborhood streets.

Protecting the Functional Classification of Roads

The need for better access management is most obvious in strip commercial areas where driveways are found every few feet. Too many driveways can confuse drivers, who become uncertain as to when turns into or out of driveways will be made. Too many driveways result in a large number of turning movements and conflict points, increasing the potential for traffic crashes. In addition, when there are no turn lanes, each turning vehicle slows traffic and reduces the carrying capacity of the road. Unfortunately, once an access management problem is obvious, it is often too expensive to correct.

Access management can benefit properties in all communities and along all types of roads. Access management principles have been a part of roadway design for many years. For example, freeways function to move large volumes of traffic at high speeds for long distances because access is limited. In contrast, residential streets function only to provide access to homes. The key to effective access management is linking appropriate access design to roadway function.

What this means is that roads should be managed so they perform according to the function they were built to serve. The simplest road classification system has four types of roads.

1. Freeways (also known as expressways, or limited access highways) which permit high speed travel over long distances. There are usually two or more lanes in each direction separated by a median. Speed limits of 55-70 mph are common.
2. Arterials (sometimes classified into primary and secondary arterials) are major streets and roads that carry large volumes of traffic at higher speeds than collectors or local streets. In rural areas they are usually two lanes. In suburban areas they are often 3, 4 or 5 lanes wide with separate right and left-turn lanes at major intersections. They may have continuous left-turn lanes. Most of the "mile" roads in Michigan suburbs are arterials. State highways in rural areas, and many county primary roads function as

arterials. Speed limits of 35-55 mph are common.

3. Collectors are mini-versions of arterials that typically "collect" traffic from nearby residential or other local streets and connect it with the arterial system. Collectors are often only 2 or 3 lanes wide, but in some communities 4 and 5 lane roads are classified as collectors. Speed limits on collectors typically range from 25-35 mph.
4. Local streets make up the bulk of the local road network. The principal purpose of these roads is to provide access to abutting property. They are usually low speed roads (rarely more than 30 mph).

The method used by traffic engineers and road agencies to classify roads by function involve consideration of:

- Trip length and/or travel volume served
- Mobility and speed of vehicles on the road
- Land use or activity served
- Road network continuity.

Figure 2-2 illustrates the relationship between the movement or mobility function of different classes of roads and the access function. Freeways permit access only at on- or off-ramps. They are designed exclusively for moving vehicles at high speeds for long distances and they have great capacity. At the other end of the spectrum are local roads. The principal purpose of these roads is to provide access to abutting property and to connect to the road network. Arterials are designed more for movement than for access while collectors often provide both functions in equal shares.

The reason so many arterials are congested and have high traffic crash counts is because strip commercial development usurps the traffic movement function with many driveways (an access function). In order to restore or preserve the movement function and reduce or prevent congestion, it is necessary to reduce or limit the number of driveways and to safely space them from one another. The fewer the number of driveways, the better and safer the movement function on an arterial.

Figure 2-3 illustrates an interconnected street system with examples of roads of all types.

Local traffic should flow on local roads and collectors, and long distance traffic should travel on arterials, state highways and freeways. Access should always be assigned to the lowest functioning road available. This means that driveway permits should be granted with access to the abutting road which is best suited to accommodate the anticipated traffic, without diminishing the function of the road. If a parcel is on a corner of an arterial and a local road, or an arterial and a service drive, access should come from the local road or service drive instead of the arterial in most cases, because the local road is the lowest functioning road. Maintaining the functional integrity of the road network over time also preserves the overall travel capacity and safety hierarchy of the road network. This in turn, maximizes taxpayer investment in the road network.

Figure 2-2 Functional Classification

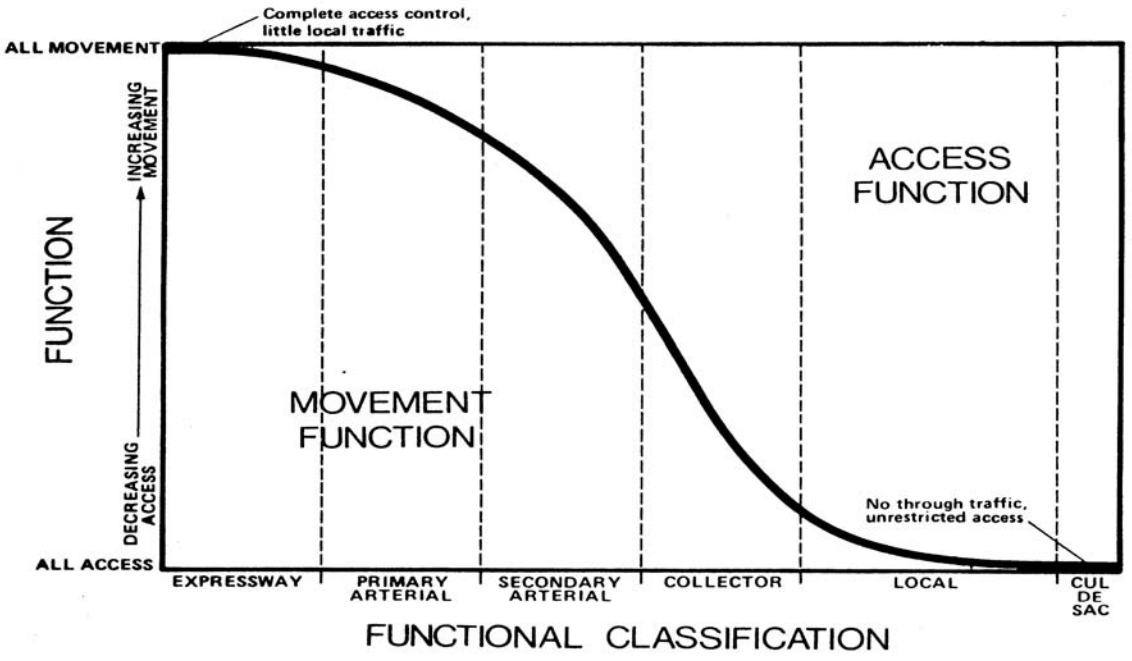
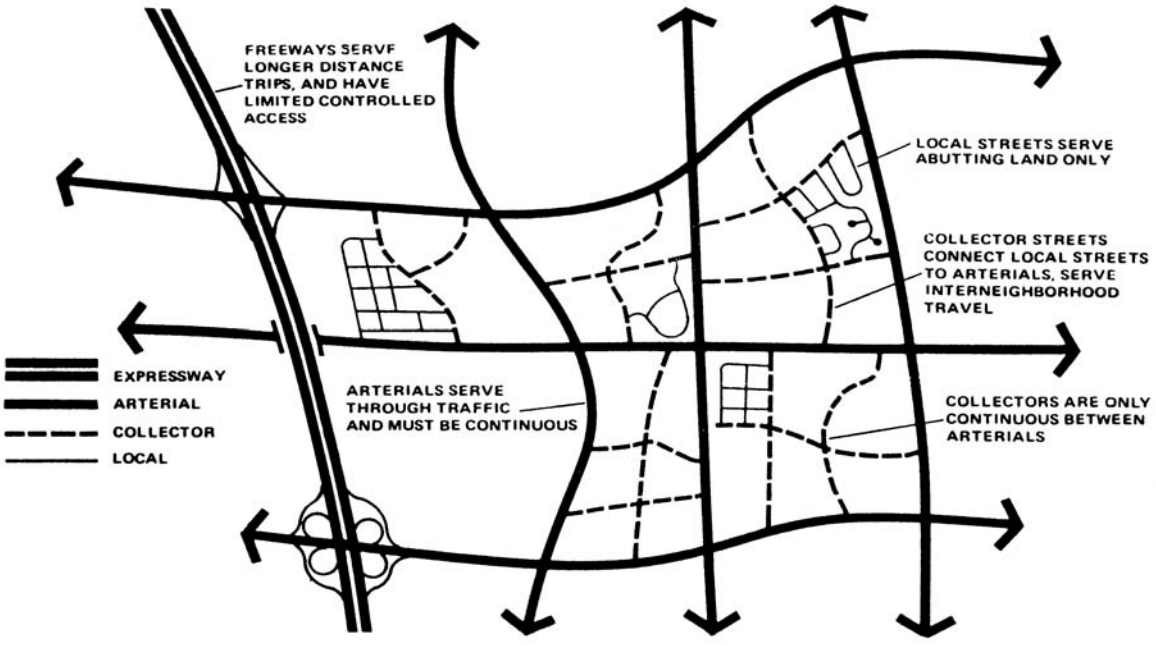


Figure 2-3 Design Characteristics of Classifications



Source for Figure 2-2 and 2-3: *Arterial Street Access Control Study*, Tri County Regional Planning Commission, 1981, p.3.

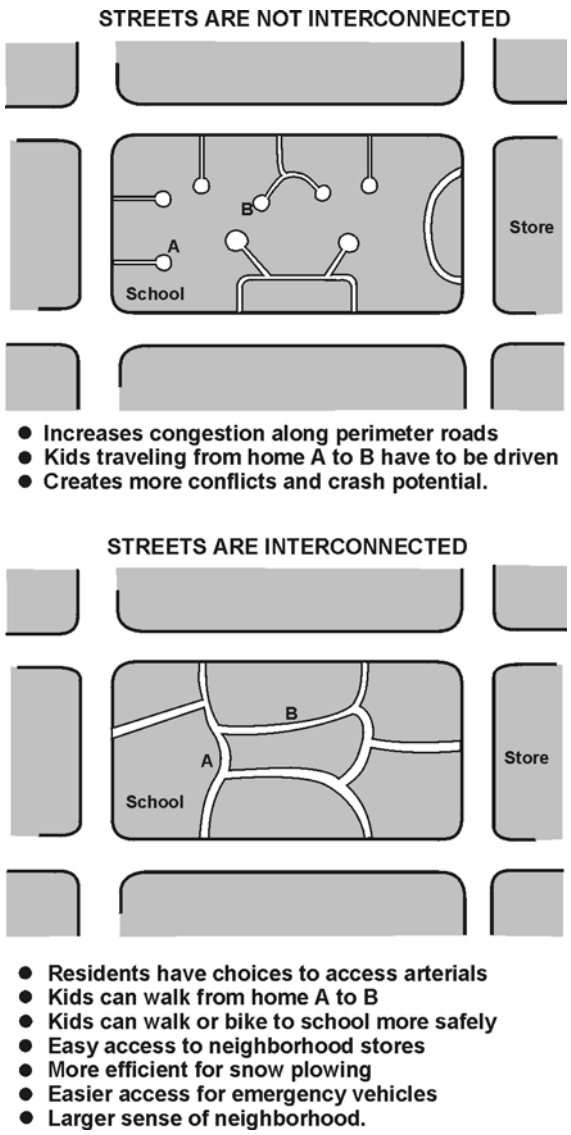
Importance of an Interconnected Street System

An interconnected street system is important in maintaining safe and efficient traffic flow. The road networks that work the best are those with the most options for traffic movement that do not diminish the function of each of the roads in the network. Most Michigan cities were originally designed and then built with interconnected street systems. As each new subdivision was platted and built, its streets connected with the streets in abutting subdivisions. This provided businesses and homeowners with multiple street options for travel. This is especially important when a particular street is being repaired or is blocked for a period of time (storm damage, funeral procession, parade, etc).

However today, many suburban and rural communities are allowing new subdivisions and condominium developments to be built without interconnected streets. In addition to the problems this presents when repairs are needed or when an emergency vehicle cannot travel to a burning home because of a downed tree, it also puts unnecessary pressure on the arterial system. When subdivisions are not interconnected, then every resident must drive out to the perimeter arterial in order to go any direction. This results in more driving, and more traffic on fewer roads. The resulting congestion on the "mile roads" is often extreme. In contrast, older city streets usually had collectors at 1/4 and 1/2 mile intervals. This dramatically reduces the amount of traffic being channeled to the arterials. This design is inherently safer and more efficient over time. Figure 2-4 illustrates the differences between subdivisions with interconnected streets and those without.

The traditional urban interconnected street system has been supplemented with alternative access roads in contemporary access management plans. Front access or frontage roads and rear access or service roads are especially important in this regard. These roads connect abutting property and often run parallel to a connector, arterial or freeway. They take slower moving traffic off these main roads and dramatically cut down on turning movements from the main road. They also permit easy connection between abutting property, making it much easier for customers and delivery trucks to move between them without getting back on the main road. (See Technique #19 in Chapter 3 for examples). The historic form of rear access roads are known as an alleys. While alleys can be a major public service burden during periods of heavy snow, they perform a useful function and are making a comeback in many "new urbanist" and “neotraditional” town designs. However, they are a supplementary form of access and are not designed to carry significant traffic volumes. In contrast, contemporary rear access roads often carry a large number of vehicles.

Figure 2-4 Interconnected Streets



Graphic prepared by John Warbach, Planning and Zoning Center, Inc.

Chapter 3
DESIGN TECHNIQUES TO SOLVE COMMON TRAFFIC PROBLEMS

Most of the techniques presented in this Chapter are focused on design. They should be considered when designing solutions to congestion and traffic safety problems and when developing an access management program. Some are best used to prevent potential traffic problems. Others can be used to remediate an existing situation. A number of these techniques will often be needed in combination to achieve the best results. For example, a community may strongly promote driveway consolidation and also reconfigure some arterial streets with medians. The 27 techniques in this chapter are organized under three major categories: driveway and related techniques; traffic control devices and related techniques, and bicycle, pedestrian and bus access techniques. Seven principles help to further focus and organize the techniques. The Bibliography has a list of documents and web sites that provide more detailed information on many of these techniques.

DRIVEWAYS AND RELATED TECHNIQUES

Three key principles provide the foundation for the driveway and related techniques that follow. These principles are as follows:

- Limit the number of driveways and conflict points
- Separate driveways and other conflict points
- Improve driveway operation (ingress and egress) by fitting the best design to the need.

Even if none of the other techniques in this guidebook were implemented except those in this section, a community could make substantial progress in achieving many access management goals. The most effective way to integrate the techniques in this Chapter is to link them with land use planning and promote commercial nodes rather than strips along main arterials. Similarly, promoting more mixed and shared uses through planned unit developments (PUDs) and other flexible zoning techniques can be very effective at achieving access management goals and improved living options. The next page explains and illustrates how these three principles and the associated flexible zoning techniques can be achieved through commercial nodes and mixed use rather than strip development.

Distance Between Driveways and Safety: Recent Research Results

"Access Spacing and Safety" by Jerome Gluck and Herbert Levinson synthesizes more than 20 studies over the past 40 years which focused on whether crash rates increase as access spacing decreases. Included in the analysis were recent studies from the National Cooperative Research Program Report (NCHRP) 420. Also studied were a comparative analysis of crash rates versus access spacing rates within Minnesota, a crash model for Indiana and a conceptual analysis based on traffic volumes.

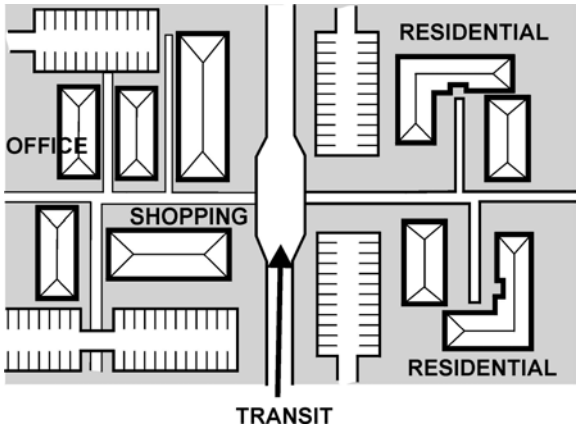
The report conclusions include *"a doubling of access density from 10 to 20 access points per mile could result in a 40% increase in the expected crash rates; an increase to 40 (access points) results in about a two time increase. The 'square root rule'--in which crash rates rise with the square root of the ratio of the increase in access density provides a close approximation of reported rates, especially where access densities are less than 50 access points per mile."*

Stated more simply, a doubling of access points (mostly driveways) from 20 to 40 per mile could result in twice as many crashes. This is strong research support for the safety benefits of restricting the number of access points per mile.

Promote Mixed-Use Development

Mixed-use development has been promoted in association with increased walking, biking, transit use and creating more "livable" communities. Proponents of access management strategies have also promoted combining uses into one building or one development because by linking land uses motorists can also link trips (see Figure 3-1). For example, if a person needs to run daily errands to the post office, the grocery store and the bank, instead of needing to travel to three different locations for each activity, a mixed-use development could accommodate all of these trips. By linking these trips into one, travel miles, time and energy are saved and the number of potential conflicts at multiple driveways is greatly reduced. Mixed use developments have fewer and better managed driveways than the same number of establishments on a commercial strip.

Figure 3-1



Graphic prepared by John Warbach, Planning & Zoning Center, Inc.

Mixed-use development might link residential uses with commercial, so that people do not need to use their car to go shopping. Mixed-use development could also provide office buildings with restaurants and shopping so workers could link potential lunchtime or after work trips. Linking day care establishments with office developments have been popular mixed-use developments which allows children to be near parents and reduces two daily trips from the roadway.

Mixed-use developments have been implemented in many communities through flexible zoning practices, such as planned unit developments (PUD). The range of permitted uses in a PUD is established in the zoning ordinance. Some communities provide higher residential density as an incentive for mixed-use developments.

Promote Commercial Nodes Instead of Strip Commercial Development

Typical strip commercial development is characterized by a long row of separate narrow lots with individual driveways to each business. This maximizes the number of conflict points and results in congestion and increased traffic crashes.

Another option to prevent the problems of strip commercial development is the provision of commercial nodes that link land uses and reduces the necessity to access an arterial road. A shopping mall with or without stores around perimeter arterials is a commercial node. By planning and zoning for node development, and limiting driveways on arterials, commercial development can be accommodated without the attendant access management problems of strip commercial development. Similar benefits can be achieved by other forms of node development, especially when land uses are mixed. Photo 3-1 illustrates a typical commercial node, which links shopping uses and only requires one driveway on the arterial.

Photo 3-1

Photo by Michele Manning, Planning and Zoning Center, Inc

Limit the Number of Driveways and Other Conflict Points

The most basic fact associated with access related traffic crashes is that more driveways along a roadway result in more crashes. Similarly, more street intersections along a roadway result in more potential for crashes. This is because both driveway and street intersections create conflicts between vehicles on the roadway and vehicles entering or leaving the roadway. A conflict point is a point where the travel paths on a roadway and a driveway meet (or where two roadways meet). Where a two-lane roadway crosses a four-lane roadway, as shown on Figure 3-2, there are 36 conflict points. Where a simple driveway intersects a two-lane roadway, as shown on Figure 3-3, there are 9 conflict points. Case studies show a direct relationship between reducing conflict points and reducing the crash rate. Construction of a median restricting access is one option to effectively reduce the number of conflict points. See Figure 3-4 and 3-5.

Figure 3-2

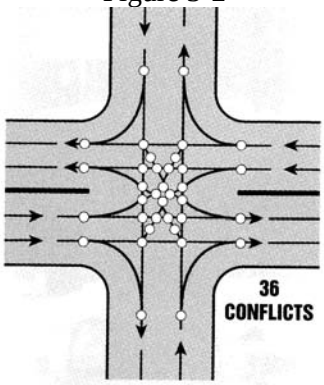


Figure 3-3

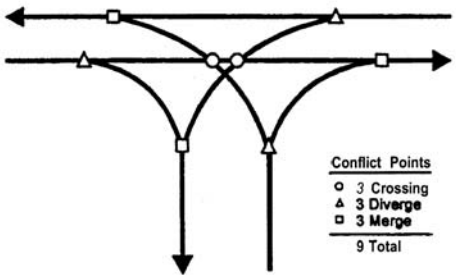


Figure 3-4

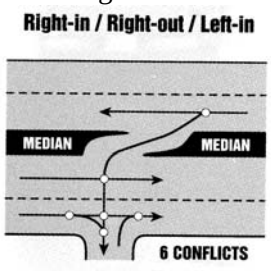


Figure 3-5

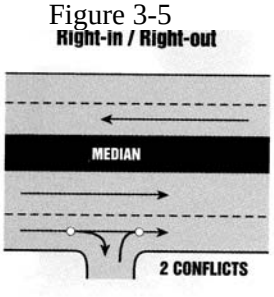


Figure 3-2, 3-4 and 3-5 Source: Michigan Department of Transportation, *Improving Driveways and Access Management in Michigan*, 1996, p. 4.
Figure 3-3 Source: National Highway Institute, Course 15255, FHWA, 1998, p. 4-8.

The following four techniques can be used to reduce the number of conflict points, thereby reducing the number of crashes.

Technique #1
Restrict the Number of Driveways per Lot

Density of driveways or number of driveways per linear distance on both sides of the road is important because crash rates increase dramatically as the number of driveways per mile increase. If lots are narrow and each lot has one driveway, the driveway density can get very high, over 60 driveways per mile with lot widths of 165 feet (see Table 3.1 below). With 66' lot widths the number of driveways balloons to 160 per mile (on both sides) if each lot has one driveway. If some lots have more than one driveway, the number of conflict points is even more dramatic. Figure 3-6 illustrates the number of lots associated with various lot widths. Table 3-2 illustrates the rapid increase in crash rates as the number of driveways increases.

Table 3-1
Number of Lots Per Mile at Varying Lot Widths

Lot Width (in feet)	Number of Lots Per Mile	
	one side of the road	both sides of the road
400	13	26
330	16	32
300	17	34
220	24	48
200	26	52
165	32	64
100	52	104
80	66	132
66	80	160
60	88	176
40	132	264
(rounded to the nearest whole lot)		

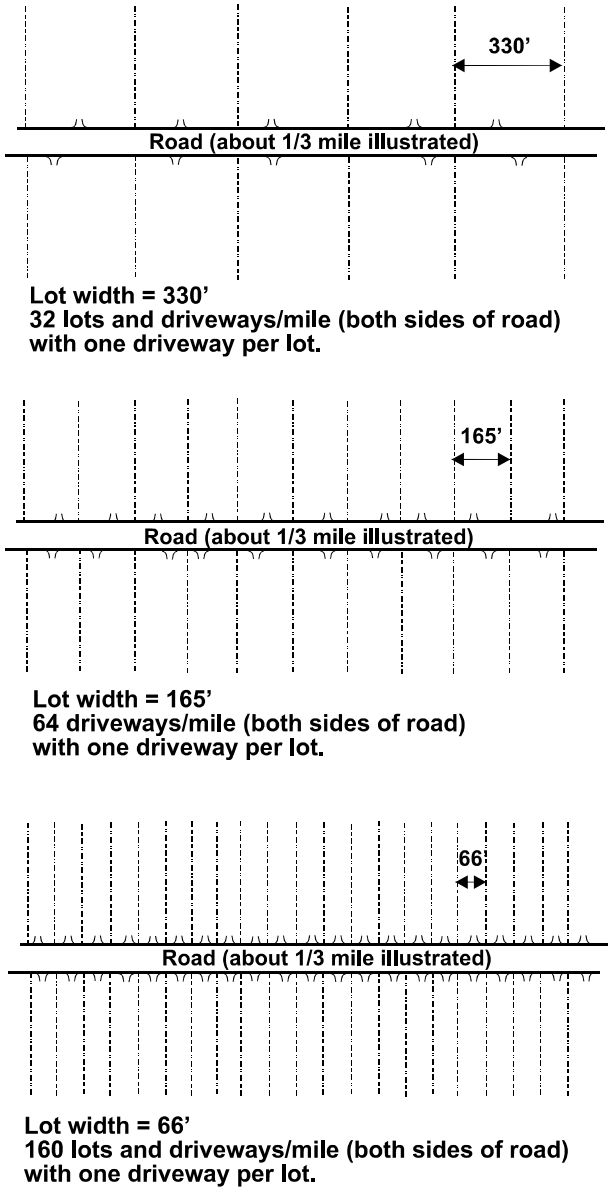
The number of driveways allowed per lot is established by local government regulations, and/or at the discretion of state or county road authorities. Whenever possible, communities and road authorities should limit the number of driveways per lot. This can be done through restrictions within the zoning ordinance and by using other techniques like shared access, or frontage or rear access drives. The starting point should be not more than one driveway per parcel and indirect access from a side street should be encouraged whenever possible for lots fronting on major arterials.

Table 3-2
Relationship of Driveway Density to Crash Rates

Driveways per Mile	Approximate Number of Driveways per 500-foot City Block	Representative Crash Rate for a Multilane, Undivided Roadway	Increase in Crashes Associated with Higher Driveway Density
Under 20	Under 2	3.4	-
20 to 40	2 to 4	5.9	+74%
40 to 60	4 to 6	7.4	+118%
Over 60	Over 6	9.2	+171%

Source: National Cooperative Highway Research Program Report 420, 1998.

Figure 3-6 Relation of Lot Width and Driveways



Graphic by John Warbach, Planning and Zoning Center, Inc.

In urban and suburban areas, most land is divided into narrow lots and driveways have been built already. Reducing the number of driveways is necessary to reduce crash numbers. This may be possible through driveway consolidation (see Technique #4). In rural areas, longer spacing between driveways is advised because travel speeds are typically high and adequate stopping sight distances are long (see Techniques #3 and #6). Hilly terrain and curving roads may restrict the number and location of driveways even further. Every effort should be made to limit the number of access points to an arterial or other "major" roadway.

Technique #2
Restrict the Number of Lots

Increasing the frontage for undeveloped land along an arterial is one option to reduce future driveway density. Bigger lots provide the opportunity to spread out the number of allowed driveways (see Table 3-1). Increasing the minimum lot frontage would be accomplished through the local zoning ordinance. As an option, allow narrower lots if they are accessed by a service road instead of the arterial.

However, it should be noted that in areas that are already developed, increasing the minimum lot frontage is not likely to help because of existing smaller lots. For these areas, look into techniques to consolidate driveways with shared access or use interconnected parking lots. (See Techniques #3 and #17)

Technique #3
Regulate the Location, Spacing and Design of Driveways

Limiting conflict points through the location, spacing and design of driveways can be done by establishing standards and criteria through a local ordinance to reduce congestion. In locating a driveway, the following factors should be carefully considered:

- Topographic features (slope at street and elevation changes nearby)
- Clear vision (adequate sight distance)
- Distance from nearby intersections, bridges, driveways, railroad tracks, bus stops, parking, pedestrian or bike crossings
- Drainage (so water runs off the drive but not into the street)
- Relationship to the parking lot and internal site circulation
- Abutting land uses
- Other related features.

Adequate spacing of driveways is an important factor to ensure safe stopping distances, clear vision and adequate room for acceleration and deceleration. Adequate spacing of driveways is also an important factor in maintaining steady traffic flow.

The following factors are also important when designing a driveway:

- Amount and type of vehicle traffic to be generated by the site, by type and time of day or week
- Likely volume and origin of incoming traffic
- Likely volume and destination of outgoing traffic
- Speed of traffic on abutting roadway
- Functional classification and traffic characteristics.

This information will be used to establish the number, direction and design of lanes of incoming and outgoing traffic, the location of the driveway, opportunities for shared access or alternative access, whether directional curbing or other channelizing devices are needed, the amount of stacking space needed and related concerns. See also Techniques #7 and #11.

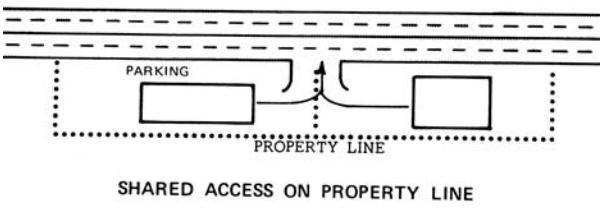
Traffic generation and impact analysis is often highly technical. The Tri-County Regional Planning Commission in cooperation with the Michigan Department of Transportation has prepared a guidebook with standards and a model ordinance to help local officials with traffic impact analysis. The guidebook is called **Evaluating Traffic Impact Studies** and information on its availability is found in Appendix C.

Technique #4
Encourage Shared Access to Parcels and Consolidate Driveways Where Possible

Two or more adjacent properties can often share driveways and limit access points to an arterial. Sharing driveways is particularly valuable when lot frontages are narrow and alternative access is not available. In newer commercial developments, shared driveways are very common. Shopping plazas often provide one or two driveways for all the stores within them. Abutting shopping plazas can also often be linked together so that drivers can avoid exiting onto main arterials when going to adjacent properties.

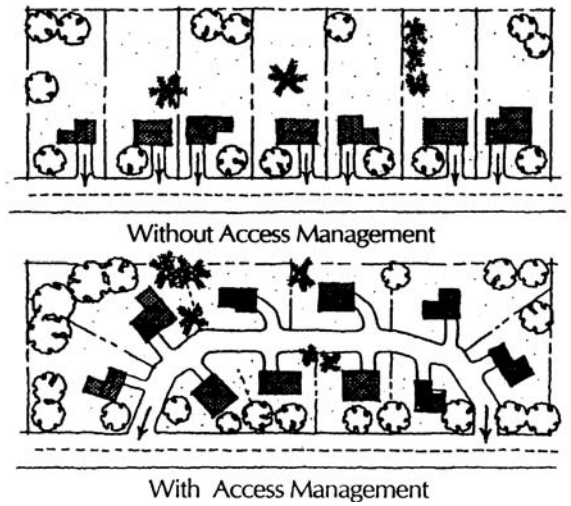
There are many different ways that access can be shared. Figure 3-7 illustrates shared access along the common property line. Figure 3-8 illustrates one form of shared residential access. Figure 3-9 illustrates shared commercial access. Communities can have an attorney draft a sample reciprocal driveway access agreement which communities can hand out to adjacent property owners which is designed to address property owners' concerns with shared access (maintenance, liability, signage, etc.) For a sample of shared access agreements between properties see Appendix B.

Figure 3-7



Source: *Arterial Street Access Control Study*, Tri County Regional Planning Commission, 1981, p.25.

Figure 3-8 Residential Lot Design

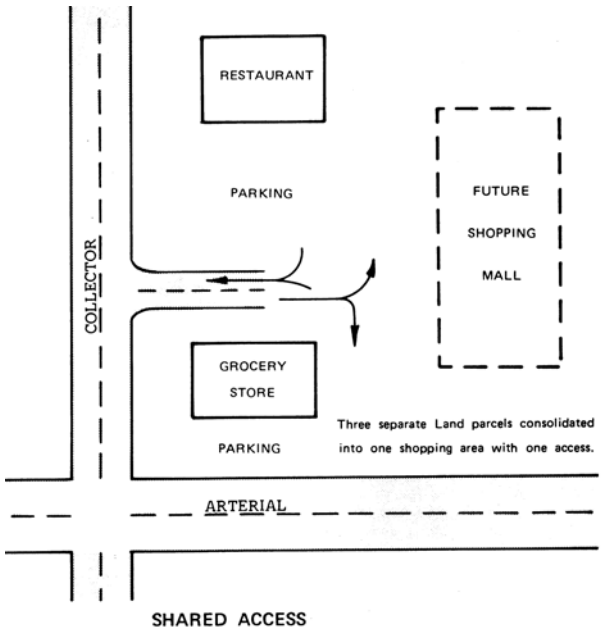


Source: Center for Urban Transportation Research, "*Ten Ways to Manage Roadway Access in Your Community*", 1997.

Consolidation of driveways on an individual property or between adjacent properties can greatly improve ease of ingress and egress for customers, employees and emergency vehicles as well as for delivery trucks by making it easier and safer to find the right driveway. Consolidating driveways also improves safety by reducing the number of conflict points along a roadway. It usually also offers more space for more parking or site circulation or for improved landscaping and sign consolidation, so the aesthetic appearance of a roadway and property are also improved.

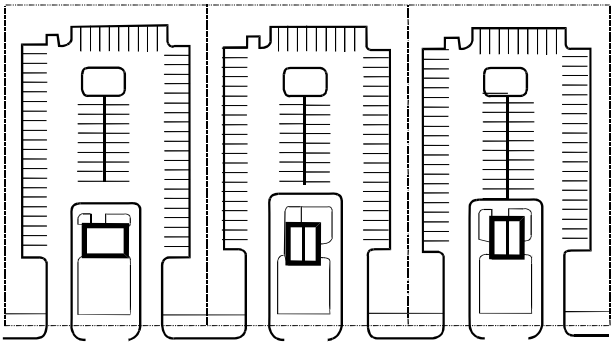
Figure 3-10 illustrates a typical site layout with separate in and out driveways. Figure 3-11 illustrates how the in and out driveways can be consolidated into a single, two-way driveway. This reduces the total number of driveways in half, from 6 to 3. Figure 3-12 goes one step further by consolidating not only the driveways from 6 to 2, but also linking the parking lots for easy cross access. Figure 3-13 shows how consolidation of driveways and construction of a frontage road also permits sign consolidation. See also Technique #19.

Figure 3-9



Source: *Arterial Street Access Control Study*, Tri-County Regional Planning Commission, 1981, p.24.

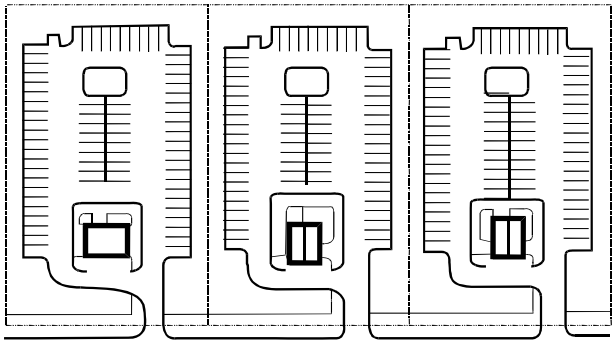
Figure 3-10 Typical Driveway Pattern



A typical pattern with separate in and out driveways.

Original Situation

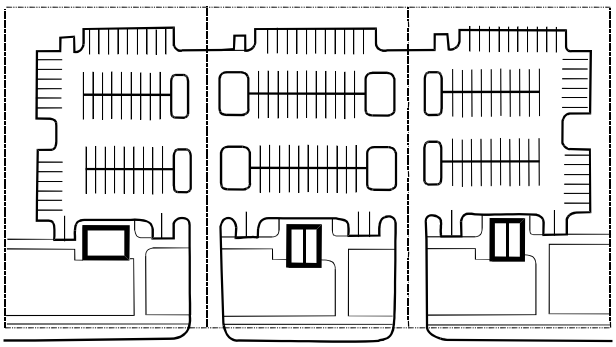
Figure 3-11 Improvement to Consolidate In and Out Movements



An improvement where each site has but one two-way driveway.

Driveway Consolidation

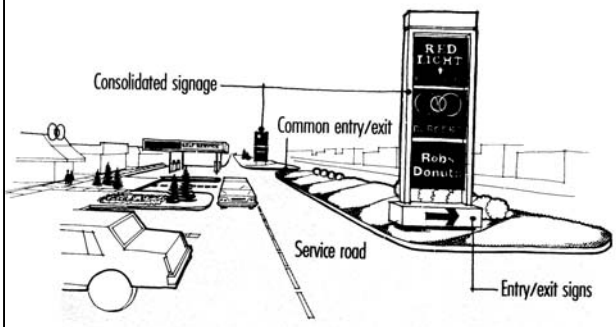
Figure 3-12 Shared Driveways



Shared driveways and rear yard parking provides fewer curb cuts and greater tree planting opportunities which will positively alter a commercial zone of influence.

Shared Driveways

Figure 3-13



Source: Ontario Ministry of Municipal Affairs, *Design Guidelines for Highways and Commercial Areas*, 1985, p.23.

Consolidated signage is often possible with shared driveways and service roads.

Sign Consolidation

Figure 3-10 through 3-12: Adapted by John Warbach, Planning and Zoning Center, Inc. from PACE, *Development Guidelines*, 1995.

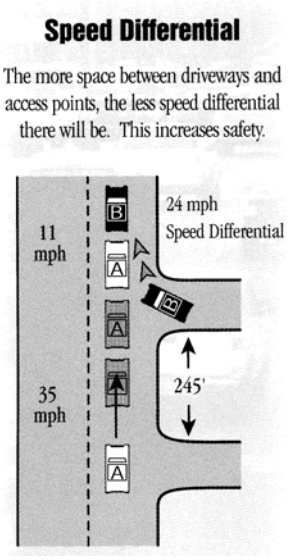
Separate Driveways and Other Conflict Points

The last section introduced the idea of driveway spacing. This section expands on the concept of driveway spacing and presents specific techniques for separation distances between driveways and intersections, other driveways, and other transportation corridors. Intersections should also be properly spaced (see Technique #12). Proper driveway spacing improves safety and traveling efficiency because it provides adequate distance for vehicles to slow down, or speed up without a collision. It also permits a longer, less cluttered sight distance for the motorist, which also increases traffic safety.

Cars entering the roadway from driveways are usually traveling at a slower speed than the rest of the traffic. This difference is called the speed differential and is illustrated in Figure 3-14.

A speed differential of not more than 10 mph is desirable to give motorists adequate time to react and decelerate to avoid collision. In part, to achieve this goal, minimum separations are established between driveways. Higher traffic speed requires greater driveway separation. For example, MDOT driveway separation guidelines are 245 feet on roads with 35 mph speed limits, 300 feet on roads with 40 mph speed limits and 350 feet when the speed limit is 45 mph. (See Table 3-5 and MDOT *Traffic & Safety Division Note #7.9* in Appendix D).

Figure 3-14



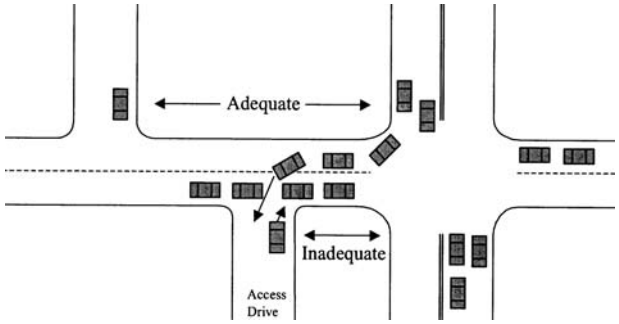
Source: Michigan Department of Transportation, *Improving Driveways and Access Management in Michigan*, 1996, p. 6.

The following techniques give an overview of how improved driveway separation is achieved.

Technique #5
Locate Driveways Away From Intersections (Corner Clearance)

Corner clearance refers to the distance between an intersection and the first point of ingress or egress to a corner property (i.e. the location of the driveway(s)). The objective is to ensure adequate stacking space for vehicles at the intersection without blocking a driveway. Adequate distance is determined by examining present and projected traffic volume, speed, signal timing, number of lanes, permitted turns and roadway width. Inadequate corner clearance often contributes to high intersection crash rates and congestion.[1] Figure 3-15 illustrates the difference between adequate and inadequate corner clearance.

Figure 3-15 Corner Clearance



Source: Center for Transportation Research and Education, Iowa State University, *Iowa Access Management Guidebook*, October 2000, p. 4.7.

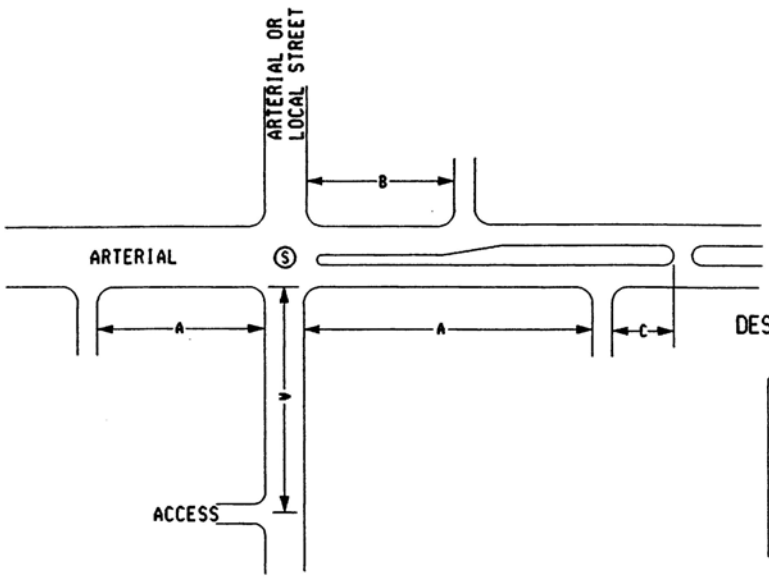
So what is a reasonable corner clearance? MDOT's guideline for corner clearance is illustrated on Figure 3-16 for signalized and unsignalized intersections with 30-35 mph posted speeds. Clearances should be doubled where posted speeds are 40 to 55 mph.

Adequate corner clearance can be achieved by creating large frontage lots at intersections, or by limiting direct access to a small corner parcel by linking access to adjacent properties. Establishing a corner clearance requirement also helps customers get in and out of businesses easily and therefore helps corner businesses.

[1] Iowa DOT, "*Access Management Handbook*", Oct 1999.

Figure 3-16

SIGNALIZED INTERSECTION CONTROL



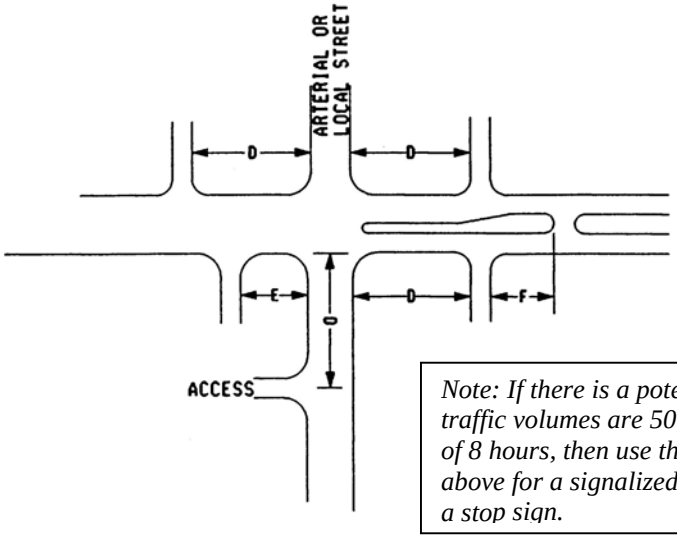
DESIRABLE CORNER CLEARANCES

ITEM	(FT)	(m)
A	230	70
B	115	35
C	75	22

THE ABOVE DIMENSIONS ASSUME A 30 TO 35 MPH POSTED SPEED. FOR A POSTED SPEED OF 40 TO 55 MPH, THESE VALUES SHOULD BE DOUBLED.

COORDINATE WITH THE LOCAL GOVERNMENT AGENCY REGARDING THE LOCAL STREET CLEARANCES.

STOP SIGN INTERSECTION CONTROL



DESIRABLE CORNER CLEARANCES

ITEM	(FT)	(m)
D	115	35
E	85	25
F	75	22

Note: If there is a potential for a traffic signal, or if traffic volumes are 50% of warranting volume for 4 out of 8 hours, then use the corner clearance dimensions above for a signalized intersection instead of these for a stop sign.

- THE ABOVE DIMENSIONS ASSUME A 30 TO 35 MPH POSTED SPEED. FOR A POSTED SPEED OF 40 TO 55 MPH, THESE VALUES SHOULD BE DOUBLED.
- COORDINATE WITH THE LOCAL GOVERNMENT AGENCY REGARDING THE LOCAL STREET CLEARANCES.

Note: See also Part 3: Driveway Design Standards, Rule 31 (3) MDOT Administrative Rules under Act number 200 of the Public Acts of 1969

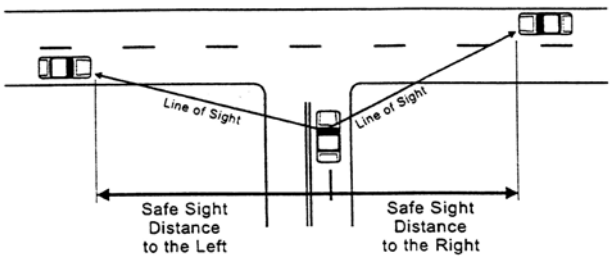
Source: MDOT, *Traffic & Safety Division Note, 7.9D*

Technique #6
Provide Adequate Sight Distance

Requirements for safe sight distance are one of the most important access management techniques. A safe sight distance is the distance needed by a driver to verify that the road is clear and to avoid conflicts with other vehicles. (See the accompanying sidebar and Figure 3-17.) Stopping sight distance reflects the minimum space needed to safely stop a vehicle, depending upon the speeds on the road (see Figure 3-18). Figure 3-19 shows how a driver's focus changes depending upon speed. Faster speeds make it harder to observe peripheral objects. Safe sight distance is used in access management to help determine driveway spacing and sign placement. Table 3-3 presents AASHTO guidelines for stopping sight distance. Table 3-4 illustrates MDOT intersection sight distance guidelines for a vehicle crossing or turning from a stopped position.

Topography, road curvature, snow storage, sign and utility placement, fence heights and vegetation all should be considered when determining adequate sight distance for a driveway. Clear sight lines should allow the driver to discern when a safe opening might occur in traffic allowing a turn. Maintaining a clear view at a street intersection is especially important. Structures should be small and limited in number and landscaping should be low to the ground and setback an adequate distance to ensure a clear view. Clear vision area requirements usually vary between communities based on roadway speed and volume, and nature and type of existing development. (See Figure 8-3 in Chapter 8.)

Figure 3-17 Sight Distance



Source: National Highway Institute Course No. 15255, *Access Management, Location and Design,* April 1998, p. 3-37.

Table 3-3: Stopping Sight Distance

Design Speed of Highway (MPH)	Stopping Sight Distance (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730

Height of Eye 3.5 Feet – Height of Object 2 Feet

Source: AASHTO, *A Policy on Geometric Design of Highways and Streets,* 2001

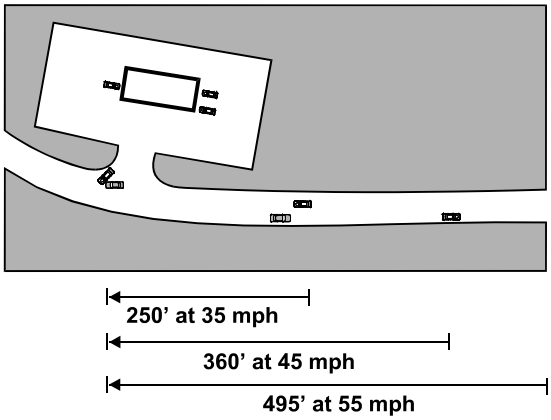
SIGHT DISTANCE

Stopping Sight Distance
The available sight distance should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. Stopping sight distance is the sum of brake reaction distance and braking distance.

Intersection Sight Distance
The sight distance provided at intersections to allow the drivers of stopped vehicles a sufficient view of the intersecting roadways to decide when to enter the intersecting roadway or to cross it. The time required is the sum of the perception reaction time plus the time to accelerate and cross or enter the major highway traffic stream.

Source: AASHTO, *A Policy on Geometric Design of Highways and Streets,* 2001.

Figure 3-18 Stopping Sight Distance



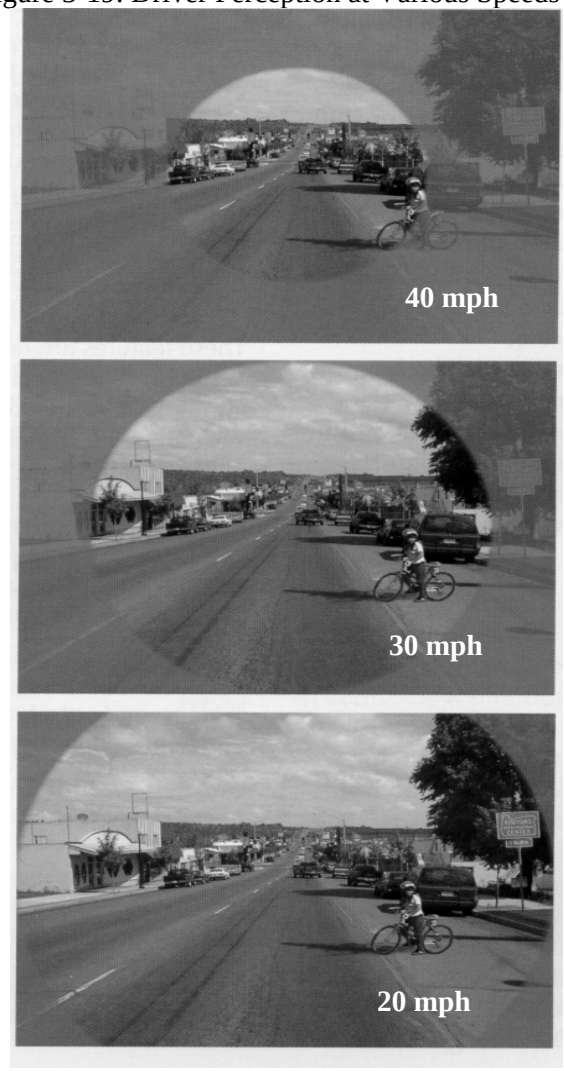
Graphic by John Warbach, Planning and Zoning Center, Inc., see Table 3-3.

Table 3-4 Intersection Sight Distance

Design Speed	MDOT Criteria 8 sec. x 1.47 x Design Speed (feet)
30	350
35	410
40	470
45	530
50	590
55	650
60	710
65	760

Note: generally 7 seconds of intersection sight distance is used in urban areas and 8 seconds in rural areas.
Source: MDOT, *Criteria for a Vehicle Crossing or Turning From Stopped Position.*

Figure 3-19: Driver Perception at Various Speeds



Source: Oregon Department of Transportation, *Main Streets: A Handbook for Oregon Communities*, Nov. 1999, p. 25.

Technique #7
Locate Driveways Away from Other Driveways

Driveway spacing specifications typically are based on posted speed limits, lot frontages, traffic volumes, the classification of the roadway and the amount of traffic generated by a development. The Michigan Department of Transportation has adopted spacing guidelines for state highways as have many county road commissions for roads under their jurisdiction. Some local units of government have adopted spacing standards for state trunklines and/or county roads as well as for local roads and streets not subject to state or county road guidelines. Sometimes local standards are more restrictive than those of state or county road authorities. On local residential streets there are no uniform standards for local driveway spacing. Table 3-5 presents MDOT guidelines for unsignalized driveway spacing. See "Spacing for Commercial Drives on Streets" in Appendix D for more details on MDOT spacing guidelines.

MDOT website: The Michigan Department of Transportation maintains many driveway and intersection geometric drawings on its website. Please visit www.mdot.state.mi.us/tands/plans.cfm and click on "Geometric Design Guides" and then on "Search," various Details/Guides will be listed. Each is in Adobe PDF format.

Table 3-5 Guideline for Unsignalized Driveway Spacing

Speed on Roadway (mph)	MDOT Spacing Guidelines (feet)
25	130
30	185
35	245
40	300
45	350
50	455
55	455+

Source: "Spacing for Commercial Drives and Streets," MDOT Traffic & Safety Division Note 7.9, Table 1.

Technique #8
Locate Driveways Away from Freeway Entrances and Exits, and RR Crossings

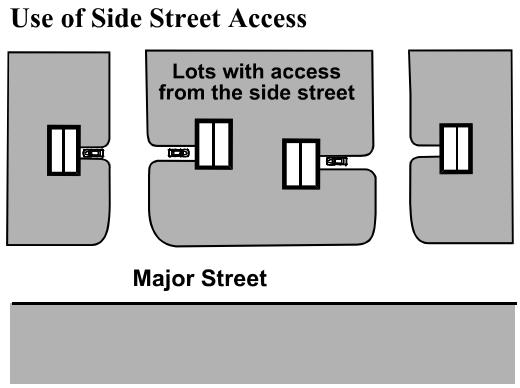
Similar to the reasons for separating driveways from intersections (see Technique #5), adequate space also needs to be provided from driveways to expressway entrances and exits, railroad crossings, alleys and other streets. MDOT guidelines suggest the following spacing for driveways (or any other access point):

- At least 100 feet from a bridge rail to the edge of a driveway (provided sight distance requirements are met)
- At least 300 feet from the point that limited access right to a freeway entrance or exit ramp (and 600 feet is much better) [SEE MDOT GEOMETRIC DESIGN GUIDE VII-300 SERIES].

Spacing of a driveway from a railroad crossing depends on a wide range of complex variables and is determined on a case-by-case basis. Restricted turns or signals may be needed if a wide separation distance is not possible.

Figure 3-20 depicts how side streets can be used to avoid driveways on an arterial. Local street access can be an effective means of reducing the number of driveways on an arterial, however, when commercial and residential land uses are abutting, local residents often oppose rear commercial access which they fear will lead to cut-through traffic.

Figure 3-20



Adapted by John Warbach, Planning and Zoning Center, Inc from CUTR, "*Access Management and Site Planning*" for the National Conference on Access Management, 1996.

Technique #9
Restrict Turning Movements Into and Out of Driveways

In order to separate conflicting turning movements into and out of property, "right-in only," "right-out only" or "left-turn only" access by channelization islands may be effective. Particularly on corner properties, allowing "right-turn only" in and out can cut down on left-turns near intersections. However, raised medians are the most effective practice to reduce conflicts associated with left-turns. The following graphics in Figure 3-21 depict some examples of limiting access through restricted turn movements.

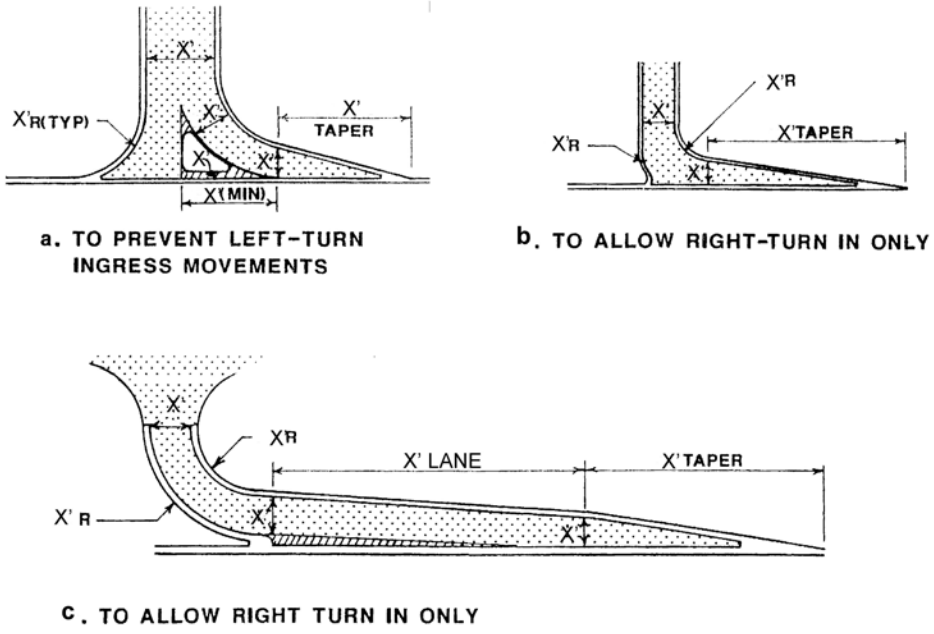
Improve Driveway Operation (Ingress and Egress) by Fitting the Best Design to the Need

Technique #10
Driveway Design for Smooth Driveway Geometrics

Following is a discussion of specific driveway characteristics known as "geometrics" to traffic engineers. More detailed specifications can be found in Appendix D. In particular, see MDOT Geometric Design Guide VII-680 and VII-650 series.

Figure 3-21

CHANNELIZATION ISLAND OPTIONS FOR CONTROLLING TURNS



a. TO PREVENT LEFT-TURN INGRESS MOVEMENTS

b. TO ALLOW RIGHT-TURN IN ONLY

c. TO ALLOW RIGHT TURN IN ONLY

Note: The dimension of X' is variable depending on site conditions, speed, number of vehicles and the design needs of the vehicles to use it.

Source: adapted from Delta Township Zoning Ordinance. See also MDOT *Geometric Design Guide VII-680 and VII-650 series* in Appendix D.

Throat Width and Length

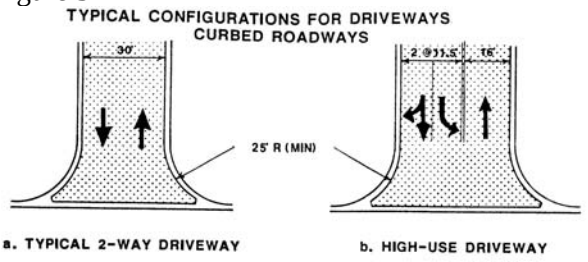
The throat width refers to the width of the driveway opening for both ingress and egress lanes. Some designers use a wide ingress width to allow vehicles to enter in an arc (especially when coming in off of a higher speed arterial) instead of at a right angle to the road (see Figure 3-22). However, a driveway that is too wide permits many cars to cross paths in an uncontrolled way whether entering or exiting and poses a hazard to pedestrians (see Figure 3-23).

Throat length (or depth) refers to the amount of driveway available for stacking incoming and outgoing vehicles or the distance between the street and the end of the driveway within the development (see Figure 3-24). When there is insufficient throat length, entering vehicles can back up into the street because there is a lack of stacking room for ingress vehicles. Exiting vehicles can also be stuck in the parking lot trying to queue to leave.

Flare/Angle

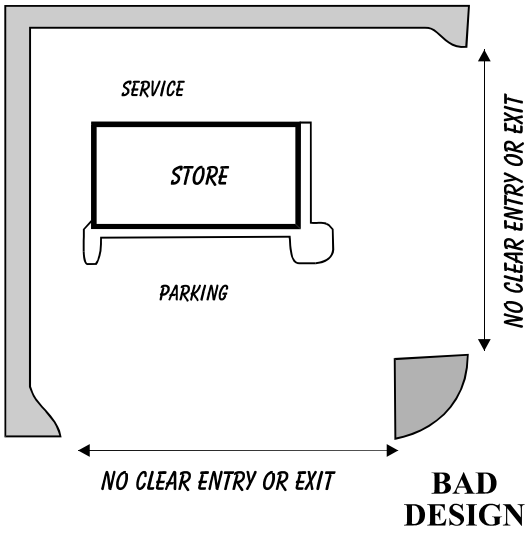
The flare or angle of ingress and egress on a driveway affects the speed at which a vehicle can enter from a roadway. The quicker the vehicle can turn off of the main road the less potential conflict with through movement vehicles on that road. However, too much angle lowers good sight lines to the left. Entry or exit with no flare or taper makes for the slowest entry and exit (right angle turn) and the greatest speed differential between the turning vehicle and vehicles already on the roadway. The fastest exit or entry has the smoothest arc (see "Radii" below), like on an entrance ramp to a freeway. A tapered acceleration lane can have the same affect. Driveway flare, turn radii and driveway width all come together to allow a smooth and safe movement onto or off of a roadway (see Figure 3-25).

Figure 3-22



Source: *Delta Township Zoning Ordinance*, 1990.

Figure 3-23

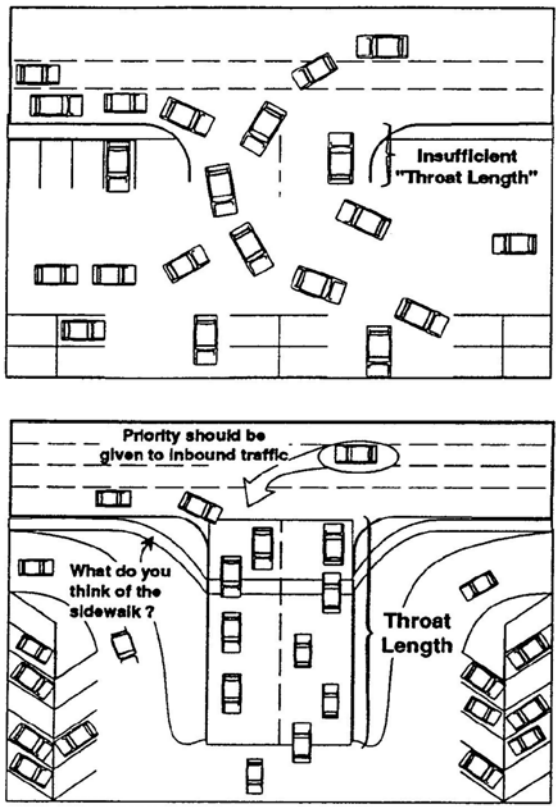


Graphic by John Warbach, Planning and Zoning Center, Inc

Radii

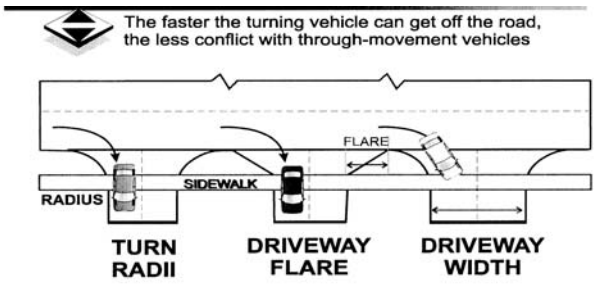
Turn radius is very important to assuring that a vehicle continues a smooth transition from the street to the driveway. Larger radii can accomplish smooth turns with fewer vehicles required to slow down (see Figure 3-26). National Cooperative Highway Research Program (NCHRP) Report 348 recommends a minimum 25-foot radius in urban settings, with larger radii to accommodate bus or truck traffic. Large radii can sometimes be difficult to accomplish in already developed areas because of the already established setbacks and right-of-way. In areas with heavy pedestrian traffic, NCHRP Report 348 recommends a tighter radius, such as 15 feet so that a driver must slow down to turn. This improves traffic safety for pedestrians.

Figure 3-24



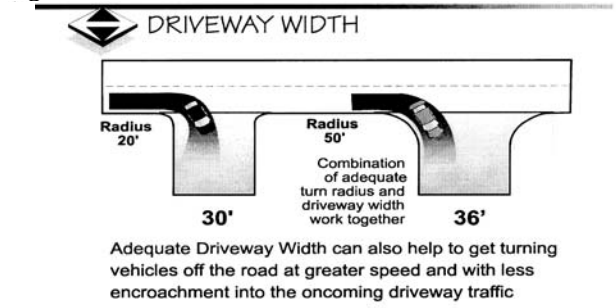
Source: FDOT, *Basic Site Planning*, 1997.

Figure 3-25



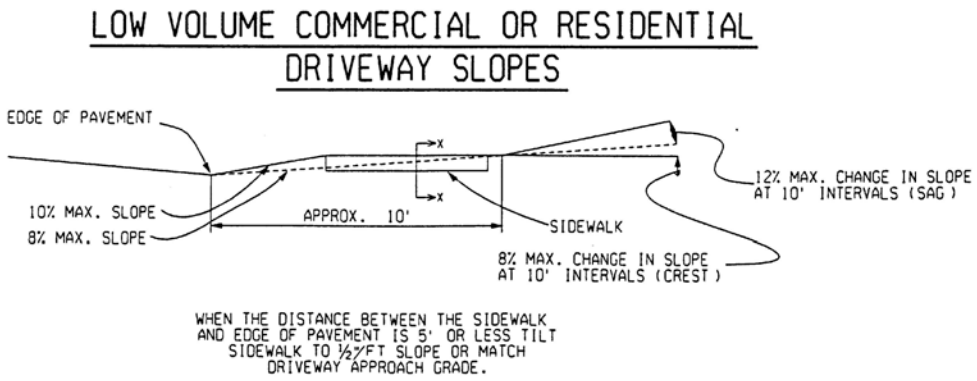
Source: FDOT, *Basic Site Planning*, 1997.

Figure 3-26



Source: FDOT, *Basic Site Planning*, 1997.

Figure 3-27



Source: MDOT, *Geometric Design Guide VII – 680A*, Sheet 3.

In commercial areas, right hand turn lanes or tapers are recommended to slow vehicles entering driveways. In suburban areas, 35 to 50 foot radii are common practice. In industrial areas too, driveways with large radii become particularly important. Often designers overlook delivery trucks and other large vehicles which can make for difficult maneuvers in a small driveway.

Slope/Grade

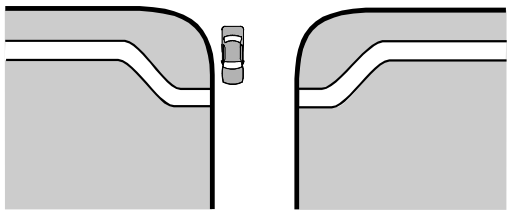
The slope or grade of a driveway should be minimal to allow drivers to pull off of the arterial without too much speed reduction. The grade of a driveway should allow for a smooth transition to and from the arterial. The speed differential between the arterial and the driveway is increased with a higher-grade change. The sharper the change between the roadway and the driveway the greater the reduction needed in speed to avoid "bottoming out" when you enter a driveway. Large changes in grade may also result in sight distance problems.

On driveways to arterials, steep grades should be particularly discouraged. On local streets, steeper grades may function adequately because of the lower volume of traffic and slower speeds. Figure 3-27 illustrates MDOT's guideline for slope on low volume commercial or residential driveways.

Pedestrian and Bicycle Crossings

Driveway designs should include consideration of the amount of pedestrian and bicycle traffic expected across a driveway. Safety precautions such as alternative crosswalks and signalized crosswalks should be considered where appropriate. Ingress and egress speeds should be considered. Right lane tapers on an ingress allow a vehicle to yield to a pedestrian without holding up traffic, while longer driveway throat lengths would allow left-turning ingress vehicles to yield to a pedestrian. See Figure 3-28. In every case, limiting the number of driveways is in the best interest of pedestrians and/or bicyclists by limiting the number of conflict points with vehicles.

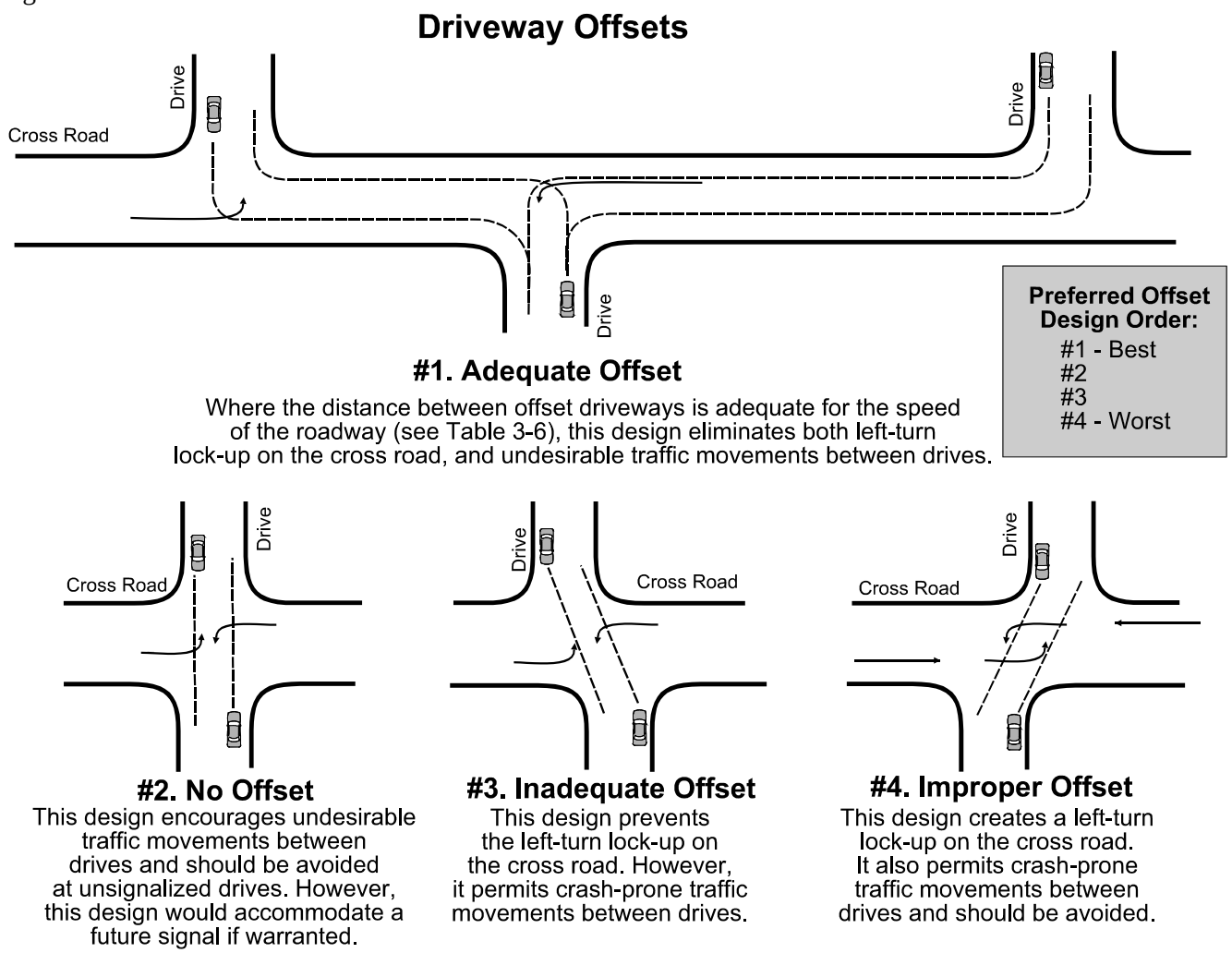
Figure 3-28



SIDEWALK SET BACK FROM MOUTH OF DRIVEWAY

Graphic by John Warbach, Planning and Zoning Center, Inc

Figure 3-29



Wide driveways, 40-60 feet or more, become less safe for pedestrians because they are exposed to ingress and egress traffic for a longer period. Crossing a 48-foot driveway is similar to crossing a four lane roadway.

Technique #11

Offset Design

Consideration should also be given to driveway alignment on both sides of the street. Where driveways are offset, vehicles may attempt a quick angled shot across the road. This can be dangerous for the driver as well as for other motorists. Poor offsets can also create left-turn lock-up situations. Some offsets are safer than others. See Figure 3-29. Even straight across driveways can be a problem. If two high-volume land uses are across from one another, unless there is a signal (when warranted), the cross traffic problem can be severe. Often, use of side streets for exiting is better in these cases. See Table 3-6 for MDOT's offset guidelines on undivided highways. See Traffic & Safety Division Notes 7.9C, Table 2 in Appendix D for more information.

Table 3-6 Desirable Driveway Offsets on Undivided Highways

Posted Speed MPH	Desirable Offset Distance Between Access Points on Opposite Sides of the Roadway Center-to-Center of Access on Undivided Highways (in Feet)
25	255
30	325
35	425
40	525
45	630
50	750

Source: MDOT, *Traffic & Safety Division Notes 7.9C*

TRAFFIC CONTROL DEVICES AND RELATED TECHNIQUES

Three key principles provide the foundation for the traffic control devices and related guidelines that follow.

These principles are as follows:

- Remove turning vehicles from through traffic lanes
- Reduce conflicting volumes
- Improve roadway operations on arterials.

Remove Turning Vehicles from Through Traffic Lanes

Several studies have focused on the nature of traffic crashes at commercial driveways. In three different communities within Illinois, studies found that left-turning vehicles are involved in the majority of driveway-related crashes and more than 40% of all the crashes at a commercial driveway involves an entering vehicle turning left (see Table 3-7). Other studies have reached similar results.

Right-turning vehicles can be removed from the arterial traffic with deceleration lanes and dedicated right-turn lanes. Left-turning vehicles are often accommodated with center turn lanes and left-turn lanes at controlled intersections. Medians, however, are often the most effective treatment because they dramatically reduce the number of conflict points. However, they may require wider rights-of-way and can be expensive. Following is a brief discussion of medians, passing lanes, right and left-turns and restricted turn lanes as effective access management techniques.

Table 3-7: Turning Movements & Crashes

Turning Movement	**Percent of Total Crashes at Commercial Driveways**
Left-turning Vehicles	
Entering business driveways	43% to 78%
Exiting business driveways	14% to 31%
Right-turning Vehicles	
Entering business driveways	6% to 15%
Exiting business driveways	2% to 15%

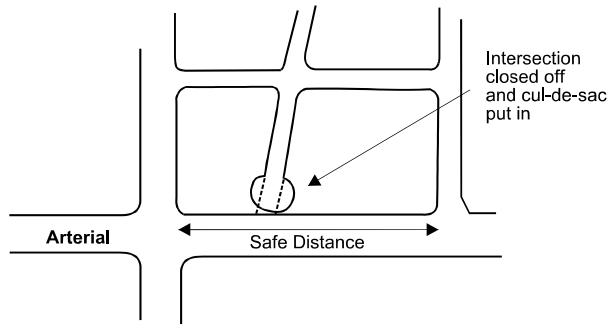
Source: Paul Box and Associates, 1998.

Technique #12
Properly Spacing Intersections and Eliminating Intersections

Intersections should be properly spaced from other intersections in order to avoid creating additional conflict points and to prevent congestion from vehicle back ups during signal changes. Proper spacing also provides options for optimum signal progression (see Technique # 22).

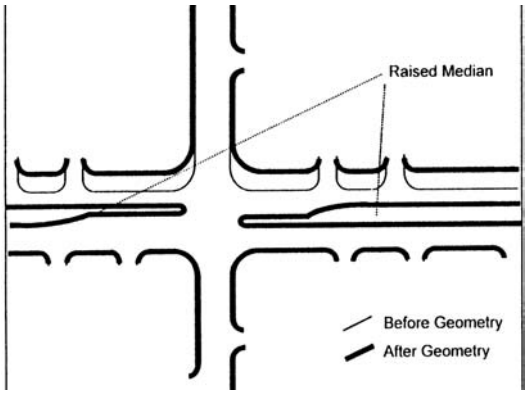
In some cases, eliminating intersections is an effective way to separate conflict points. A common example is where a residential subdivision street intersects an arterial too close to a major intersection. See Figure 3-30. Closing off the residential street and installing a cul-de-sac eliminates a conflict point and is often a traffic calming measure on the local street.

Figure 3-30



Graphic by John Warbach, Planning and Zoning Center, Inc

Figure 3-31



Source: Center for Transportation Research and Education, Iowa State University, *Iowa Access Management Guidebook*, October 2000, p. 4.27.

Technique #13
Medians

Raised medians separate opposing traffic and reduce conflict points by eliminating left-turns into and out of driveways along an arterial. Medians are also effective at intersections to guide traffic while also separating it from opposing traffic. Separation allows for quicker turns and less traffic backups. The intersection median also allows for a small pedestrian refuge (see Figure 3-31).

What are the Benefits of Medians?

- Safety
  - Fewer and less severe traffic crashes
  - Less auto/pedestrian conflict
- Efficiency
  - Greater vehicle capacity
  - Less stop and go traffic
- Aesthetics
  - More room for landscaping and pedestrians
  - More attractive corridors
  - Less roadway pavement

Source: CUTR, *Median Handbook*, 1997.

The continuous raised median also improves safety. A study conducted in 1998 by BRW for the Minnesota Department of Transportation concluded that four-lane roadways with medians were 40 percent safer than four-lane undivided roadways (see Table 3-8). NCHRP Report 3-52 identifies additional crash benefits from medians. Table 3-9 provides an assessment of advantages and disadvantages to construction of raised median arterials versus arterials designed with a center two-way left-turn lane.

Table 3-8: Average Crash Rates for Various Types of Arterials

Roadway Type	**Crash Rate***
Four lane undivided	6.75
Three lane with center turn lane	4.96
Four lane with median	4.02
*Accidents per million vehicle miles traveled	

Source: BRW, study for MnDOT, 1998.

Continuous medians are most effective on roadways with high volumes and high speeds. Medians limit direct property access, requiring U-turn movements to reach some destinations.

Table 3-9: Advantages and Disadvantages of Raised Medians Versus Two-Way Left-turn Lanes

Raised Medians	
Advantages	Disadvantages
Reduces crashes at mid-block areas	Reduces operational flexibility for emergency vehicles
Separates opposing traffic and increases road capacity	Increases left-turn volumes at median openings
Reduces number of conflicting maneuvers at driveways	Increases travel time for some motorists
Provides a pedestrian refuge	High cost to construct
If continuous, restricts access to right-turns only	Limits left-turn access to property
Two-Way Left-turn Lane (center turn lane)	
Separates opposing traffic	Encourages random access
Reduces left-turns from through lanes	Illegally used as a parking or acceleration lane
Provides operational flexibility for emergency vehicles	Offers little refuge for pedestrians
Safer than roads with no left-turn lanes or medians	Operates poorly under higher volumes of through traffic
Facilitates detours	Higher crashes overall

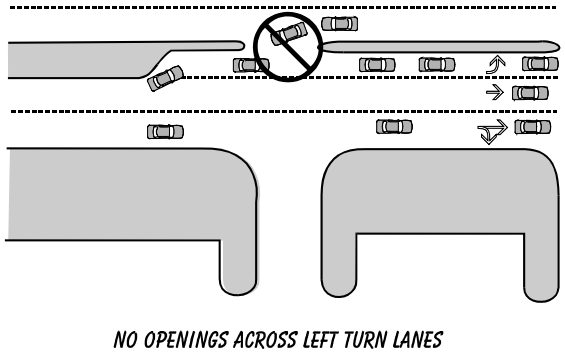
Source: Adapted from *Iowa Access Management Handbook*, 2000.

Continuous medians require a greater amount of right-of-way than undivided roadways. It may be difficult to add a median to an existing arterial with developed businesses or residences along it if adequate right-of-way is not available or is very expensive to purchase.

Speeds often increase after median implementation, due to a reduction in vehicle conflicts. Therefore, design details should be thoroughly considered. For example, designers might allow for limited breaks in the median, so there are no more than one every one-quarter mile. These turn-around breaks should never cross over another turn-lane to avoid unnecessary conflicts (see Figure 3-32). Pavement markings, channelization and signage can help to guide vehicles to the appropriate "turn-around". Pedestrian and bicycle paths should be considered across medians where appropriate. Medians also offer an opportunity for beautification of the public right-of-way.

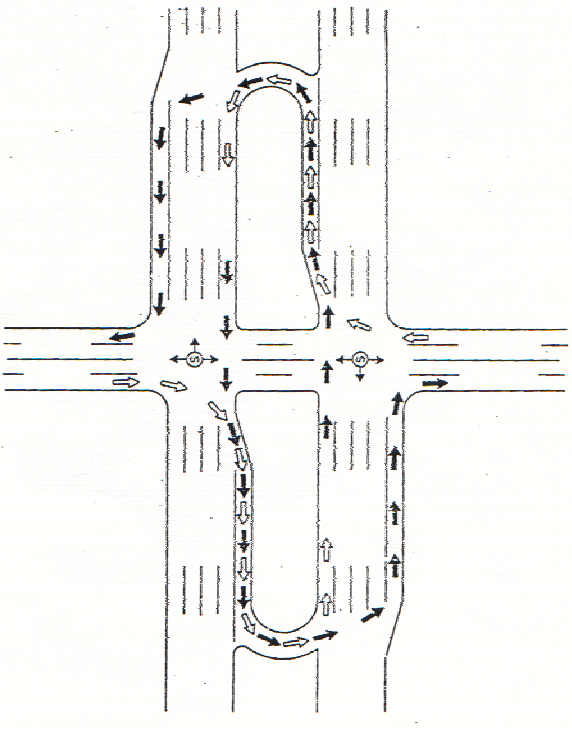
MDOT has a history of median implementation to improve safety and capacity along highways. Several highways in the Detroit area were constructed with medians. In 1996, there were 425 miles of median with directional crossovers on the state highway system. Crossovers have been constructed where the central median is at least 50-60 feet. Directional (one-way) crossovers have been utilized for left-turning vehicles; in most cases, left-turns are prohibited at the signal.

Figure 3-32



Adapted by John Warbach, Planning and Zoning Center, Inc from CUTR, "*Access Management and Site Planning*" for the National Conference on Access Management, 1996.

Figure 3-33: Indirect U-turn



Source: Levinson, Herbert, et al. "*Indirect Left-turns-The Michigan Experience*" for the 4th Access Management Conference, 2000.

The indirect turns used for median design (sometimes called the "Michigan U") coupled with the restrictions for left-turns at driveways have many benefits for traffic safety and flow (see Figure 3-33). Since left-turns are associated with a large percentage of crashes, medians that eliminate these left-turns often show decreases in crash rates, while the capacity of the highway typically increases. Appendix D presents MDOT's median guidelines (see "Directional Median Crossovers," #11.4).

Because of the limits that medians create to left-turn access to property, some businesses do not like medians because of perceived inconvenience to customers. However, various surveys have revealed customers prefer safe and smooth traffic flow over the inconvenience of medians. See for example the sidebar reporting on results from one Texas study. In addition, as Figure 2-1 revealed, market size is directly related to time of travel, so congested roads often have more of a negative impact on businesses than medians do.

Economic Impacts of Medians

"A study of the economic impacts of left-turn restrictions was conducted for the Texas Department of Transportation in the mid-1990's. The study was intended both to identify potential impacts and to establish an assessment methodology.

Due to the sensitivity of information on business activity, researchers did not ask for sales details, but for general perceptions as to whether business activity had changed over time using ranges (e.g., better/worse/same). Information on historical property values was obtained through the use of appraisal district computers or by purchasing CDs from private companies with this information. Key findings included the following:[2]

- Perceptions of business owners before a median was installed were more pessimistic than what usually happened.
- Business owners reported no change in pass-by traffic after median installations.
- Most business types (including specialty retail, fast-food restaurants and sit-down restaurants) reported increases in numbers of customers per day and gross sales, except for gasoline stations and automotive repair shops, which reported decreases in the numbers of customers per day and gross sales.
- Most adverse economic impacts were realized during the construction phase of the median installations.
- Employment within the corridors experienced upward trends overall, with some exceptions during construction phases.
- When asked what factors were important to attracting customers, business owners generally ranked "accessibility to store" lower than customer service, product quality and product price, and ahead of store hours and distance to travel.
- About 94% of business owners reported that their regular customers were at least as likely or more likely to continue patronizing their business after the median installation.
- Along corridors where property values were studied, the vast majority of land values stayed the same or increased, with very few exceptions."

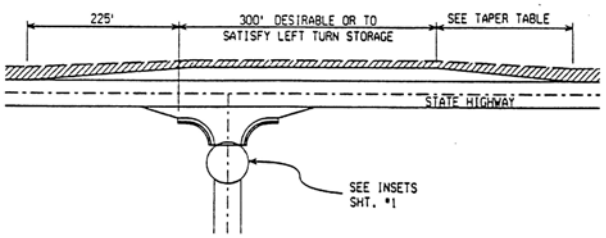
2. Eisele, W.L., W.F. Frawley, "*A Methodology for Determining Economic Impacts of Raised Medians: Data Analysis on Additional Case Studies*." Research Report 3904-3, Texas Transportation Institute, College Station, Texas, October 1999.

Excerpt from a presentation entitled "*Economic Impacts of Access Management*" prepared by Kristine M. Williams, AICP, Center for Urban Transportation Research, University of South Florida, Tampa, January 28, 2000 for 2000 Access Management Conference.

Technique #14
Passing Lanes or Flares

Passing lanes or flares (sometimes referred to as bypass lanes) can be constructed to facilitate traffic flow, particularly in rural areas, where there is no need for added through lanes. Passing lanes allow traffic to flow around left-turning vehicles without significantly reducing speed on the main roadway. See Figure 3-34. Passing lanes can reduce maintenance costs and vehicle damage on rural roads, where motorists may pass left-turning vehicles even though there is no passing lane.

Figure 3-34
Plan View of Typical T Intersection with Bypass Lane



Source: MDOT, *Geometric Design Guide VII-650C*, Sheet 2.

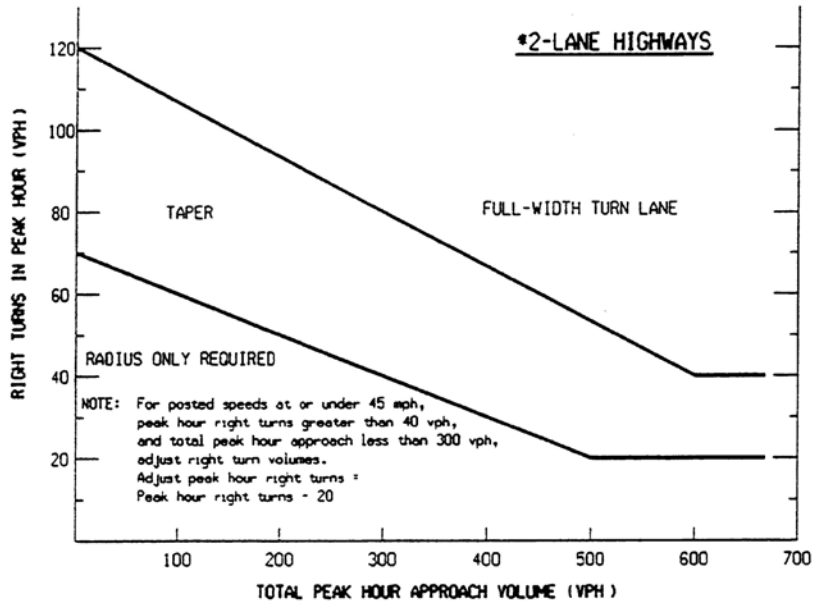
Technique #15
Right-turn Lanes and Left-turn Lanes

Figure 3-35 displays MDOT traffic volume guidelines for right-turn lanes and tapers on 2-lane and 4-lane highways. The guidelines are based on right-turns within the peak hour as a percent of the total peak hour volume on the highway. MDOT guidelines suggest the use of right-turn lanes at any intersection where a capacity analysis determines a right-turn lane is necessary to meet a desired level of service. See "Flares and Intersection Details" VII-650C in Appendix D for specific MDOT guidelines for the design of right-turn and left-turn lanes.

Right-turn lanes can also be effective mid-block for high volume land uses like shopping centers, discount stores or factories. Right-turn lanes or tapers can also be effective for retrofitting properties with poor internal site design causing

Figure 3-35

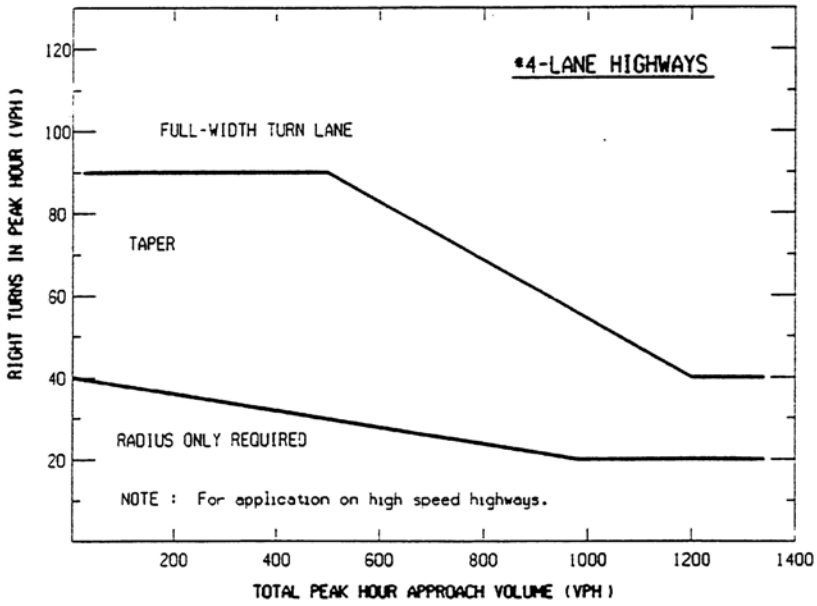
Traffic Volume Guidelines for Design of Right-Turn Lanes or Tapers



Example:
Design Speed = 55 mph
Peak Hour Approach Volume = 300 vph
Right Turns in Peak Hour = 100 vph

Problem:
Determine if a right turn lane is recommend

Solution:
Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus, a right-turn lane may be recommended.



*If a center left-turn lane exists (i.e. 3 or 5 lane highway), subtract the number of left turns in approach volume from the total approach volume to get an adjusted total approach volume.

Source: MDOT, Traffic & Safety Division Note, *Traffic Volume Guidelines for Right-turn Lanes and Tapers, #7.5*. See also *Traffic Volume Guidelines for Left-turn Lanes and Passing Flares at Unsignalized Locations, #7.6*.

traffic backups. See Figure 3-21 for taper examples.

Continuous right-turn lanes, as shown in Fig 3-36, should only be used after very careful study. Some drivers get confused and use them as through lanes and traffic that enters them too soon can prevent other vehicles from properly exiting properties along the right-turn lane.

Left-turn lanes can be designed only at intersections or can be continuous. In general, left-turn lanes have been a huge improvement to traffic safety. However, continuous two-way left-turn lanes, also known as center lanes, can be problematic in areas with frequent driveways. What happens is "left-turn lock-up" when a driver enters a left-turn lane too soon and encounters another vehicle going the opposite way that must turn left in front of him. Each has to wait until the traffic clears before proceeding. Other cars desiring to turn left can compound the problem and must be considered when determining driveway spacing along with driveway offsets. Medians are an effective solution to left-turn lockup.

Generally, after volumes on a roadway reach a level higher than 10,000 vehicles per day, a continuous left-turn lane (LTL) is warranted. Two-way LTLs (TWLTL) are not recommended where there are more than four through lanes, as crash rates increase dramatically. It is best if roadways with volumes higher than 25,000-30,000 vehicles per day are designed with a raised median. TWLTLs begin to develop significant problems as their turn volumes increase. Table 3-10 provides a cross tabulation of results on crash rates on a variety of roadways. Medians provide significant relief in many cases.

Table 3-10: Crash Rates for Various Road Designs

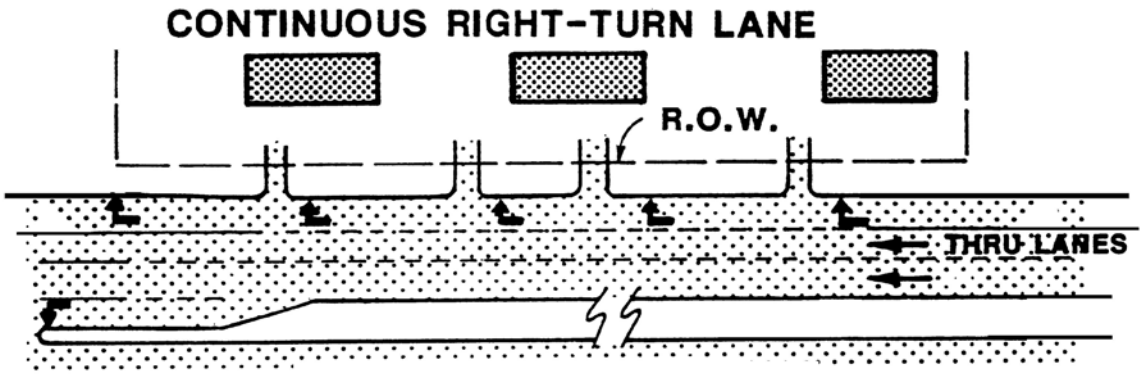
Access Points per mile	Undivided Roadway	Two-way lane LTL	Median	Crash Rate Reduction (if TWLTL is replaced by a median)
Less than 20	3.8	3.4	2.9	-0.5
20 – 40	7.3	5.9	5.1	-0.8
40 – 60	9.4	7.4	6.5	-0.9
Over 60	10.6	9.2	8.2	-1.0

Source: National Cooperative Highway Research Program Report 3-52, 1998.

Technique #16
Restricted Turns on the Roadway

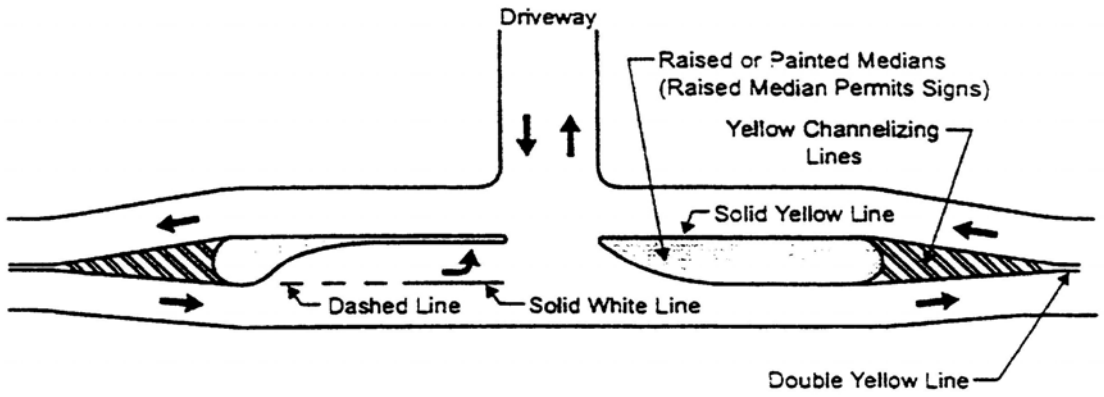
As noted in Technique #9 restricted turns from driveways can improve traffic safety. Restricting turns on the roadway itself can also help traffic flow significantly. Roadways without dedicated left-turn lanes or where traffic is so heavy that adequate breaks in traffic flow cannot be expected, may be candidates for restricted turns. These are usually accomplished by signs, pavement marking and modest traffic barriers (like traffic islands). Figure 3-37 illustrates a common one.

Figure 3-36



[ADAPTED FROM DELTA TOWNSHIP, MICHIGAN.]

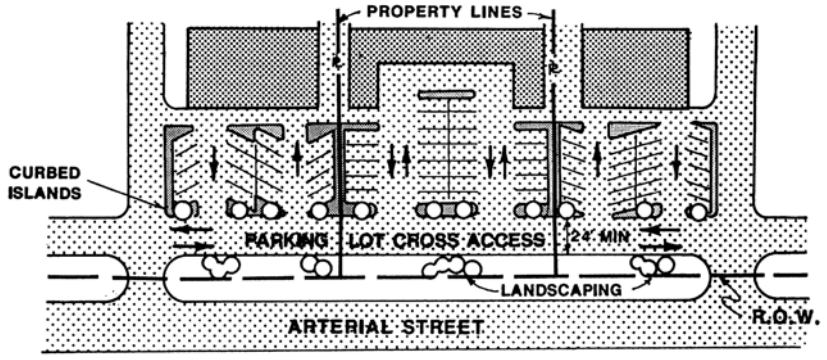
Figure 3-37



Isolated Left-Turn Bay

Source: National Highway Institute Course No. 15255, *Access Management, Location and Design*, June 1998, p. 3-86.

Figure 3-38 Parking Lot Cross Access



Source: *Delta Township Zoning Ordinance*, 1990.

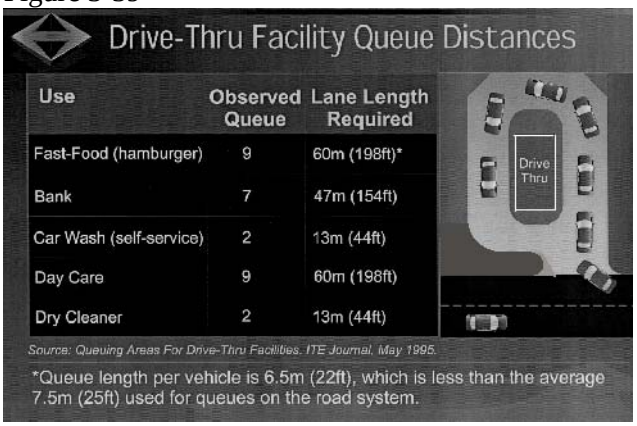
Reduce Conflicting Volumes

The following five techniques help prevent traffic congestion and improve safety by reducing conflicting volumes.

Technique #17
Provide Connection Between Adjacent Parcels

Technique #4 presented the importance of driveway consolidation and shared access to limit and separate conflicts. Similarly, shared parking lots and access links between lots can help to reduce conflicting traffic volumes from neighborhood streets and reduce the need for customers to go out on the main roadway to access abutting properties. See Figure 3-38. This is a simple concept that is easy to include in local zoning ordinances (not always easy to administer however). It is implemented through traditional site plan review standards. See Appendix B for a sample shared access agreement.

Figure 3-39



Adapted from: CUTR, "*Access Management and Site Planning*" for the National Conference on Access Management, 1996.

Technique #18
Require Unified Internal Circulation

The best way to provide adequate internal circulation is to work through design of the parking lots, loading areas, trash pick-up areas and access drives when the site plan is being reviewed for zoning compliance. The goal should be the safest, most functional design for both vehicles and pedestrians. Internal circulation should be smooth so that it does not hinder traffic entering or exiting the site, or moving around the site. A driveway that is long enough and wide enough for the level of traffic expected can help ensure that ingress vehicles have enough room to pull out of traffic to enter the property (see Technique #10). This is particularly important when accommodating long queues at drive-thru establishments. See Figure 3-39. Drive-thru establishments need adequate internal queue lengths to prevent backups onto the street. In some cases developers believe they need additional access points to accommodate trucks but often the internal design can be changed, rather than adding more driveways. This technique works well on shopping centers and out-parcels too.

Technique #19
Provide Alternative Access: Front and Rear Access Drives

Frontage roads, service drives and rear access drives (sometimes called "backage roads") can eliminate the need for multiple driveways and offer safe and efficient access between parcels. Frontage and rear access drives reduce the number of conflict points on the arterial and preserve the capacity of the arterial (Figure 3-40a). Frontage roads or service drives can be built to accommodate principally commercial, residential or mixed-use traffic (Figure 3-40b). Rear access or service roads are advantageous to move truck traffic around

Front and Rear Access Drives
Figure 3-40a

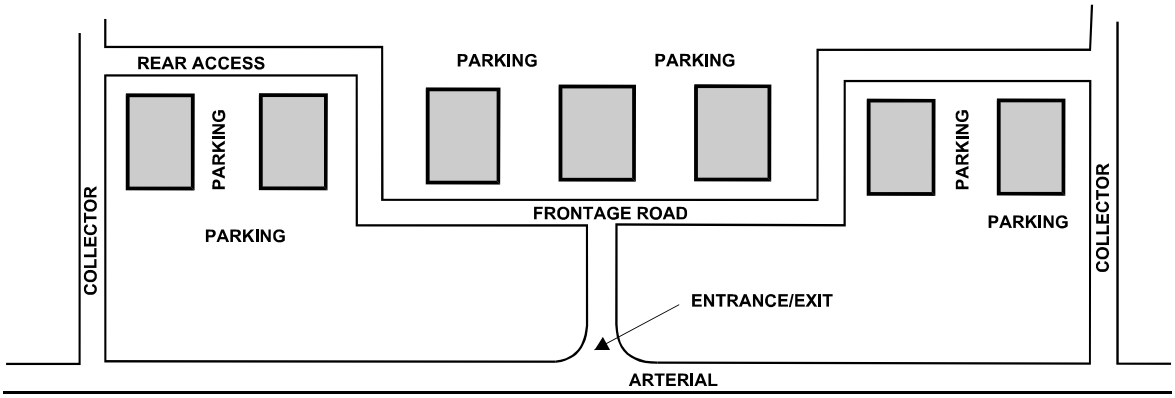
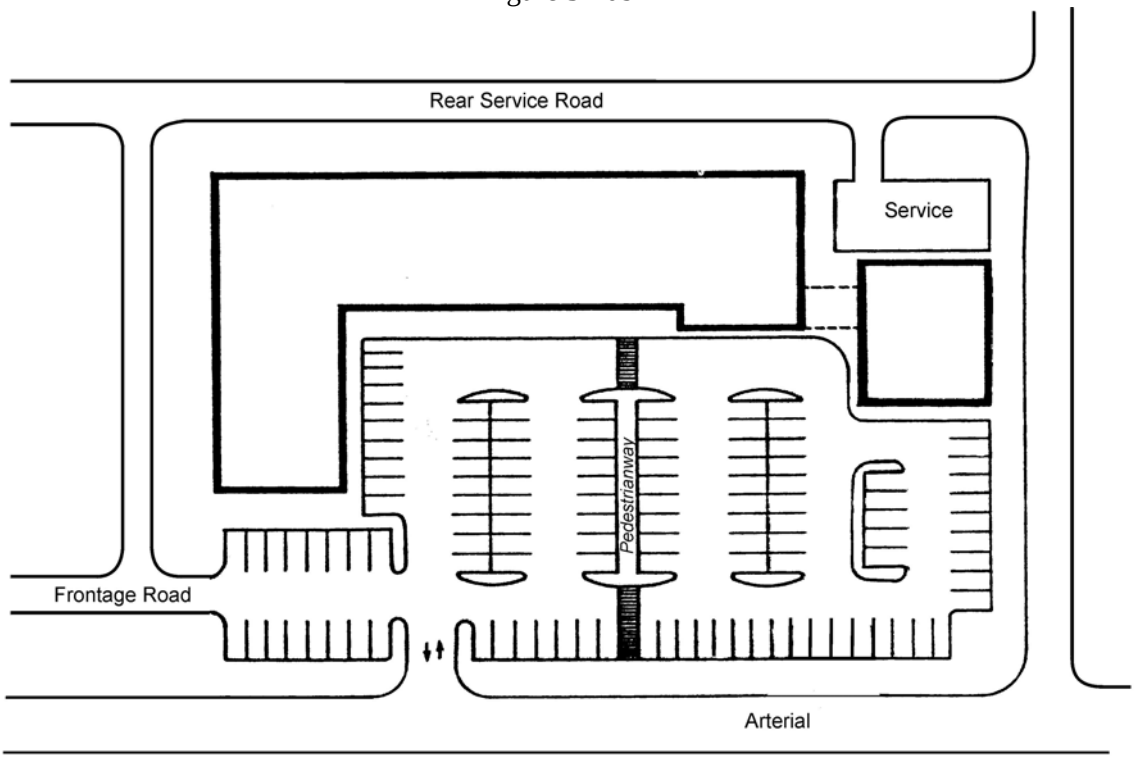


Figure 3-40b



Note: Rear access roads are usually safer and more effective than frontage roads and should be used whenever possible. Frontage roads should not be too close to the roadway or used where the volume of traffic is too great for safe vehicle use.

Graphic by John Warbach, Planning & Zoning Center, Inc.

commercial developments without requiring a great deal of turning movements. However, they may also be the best way for customer traffic to safely enter a site and move between businesses.

Photo 3-2

Photo by Michele Manning, Planning and Zoning Center, Inc.

Frontage roads have come under some scrutiny by the jurisdictions which implemented them because they can create confusing turning movements, especially when connected too close to road intersections. Many communities in Florida implemented frontage roads in the 1980's but they have not performed as expected in areas with high traffic generators, such as commercial or office development. Frontage roads can be utilized well in association with low traffic generators such as residential and small office uses. Rear service roads do not present the same problems.

Front and rear access roads are usually identified in a corridor or access management plan (or the transportation portion of the local master or comprehensive plan). They are usually created via zoning standards that are implemented through the site plan review process.

Circulation for pedestrians and disabled persons should also be considered on service drives or frontage roads to ensure safe access between developments without having to walk in the road. Photo 3-2 illustrates a disabled person attempting to travel along a frontage road to get between shopping establishments.

Technique #20
Provide a Supporting Circulation System

Secondary streets should support the arterial system by providing through points for vehicles from neighborhoods to shopping areas. Subdivisions should allow for connections between local streets, instead of disconnected cul-de-sac developments (see Figure 3-41). Cul-de-sacs can be used to reduce direct access to the arterial but should not reduce the internal connections within the local street system. Multiple means of access is safer for emergency vehicles and when roads need repair. It also keeps more neighborhood traffic off arterial streets. Most local subdivision regulations require interconnected street systems (both within and between subdivisions), but many communities waive, or don't enforce these provisions without adequately contemplating the long-term implications of the action. Lack of good internal circulation through the subdivision requires residents to use high-volume, high-speed arterial streets for short neighborhood trips. Staying on local streets is safer for motorists.

Pedestrian, bicycle and transit links must also play a part in this overall circulation system, if it is to be convenient to take alternative transportation.

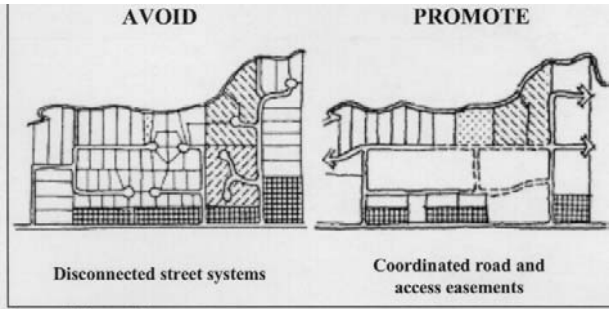
Technique #21
Links to Local Streets

It is much safer to have cars backing out onto a local street rather than a busy arterial. See Figure 3-42. Providing links to local streets instead of having driveways empty onto an arterial maintains speeds on the arterial and reduces crash potential. This is especially true with residential development.

Improve Roadway Operations on Arterials

Following is a list of roadway operation techniques that should be considered as part of an overall access management strategy. Improving roadway operations on an arterial is a desirable goal, but not at the expense of other concerns, such as pedestrian and bicycle safety. Balancing these

Figure 3-41



Source: Center for Transportation Research and Education, Iowa State University, *Iowa Access Management Guidebook*, October 2000, p. 4.32.

interests is a major challenge, but essential to the success of an access management program.

The accompanying sidebar on the next page presents basic information on the importance of careful traffic signal placement. For further information, obtain the MDOT publication "Traffic Signals" from your local MDOT Transportation Service Center.

Technique #22
Spacing Between Signal Locations

Poorly spaced signals hamper traffic progression. At least one-half mile between signals is typically desirable. Where they are that close together, the distance should not vary by more than 10%. It is also difficult to provide good access to properties without proper signal spacing. Signals can provide the necessary break in traffic flow to permit vehicles to egress from properties lining the arterial. If signals are located too close, unnecessary traffic congestion can occur from through traffic which competes for road space with vehicles exiting driveways between signals. Irregularly spaced signals destroy the signal progression and therefore hamper traffic flow by increasing travel time and reducing capacity.

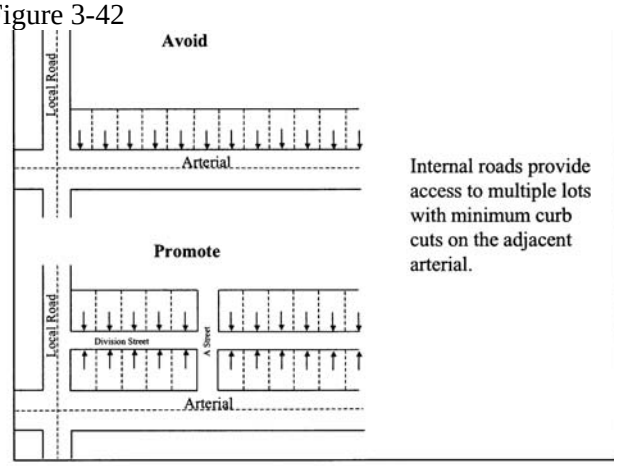
Technique #23
Signal Timing

Proper signal timing or signal progression of traffic signals can allow traffic to move most efficiently. Exclusive left-turn signals and right-turn lanes can also help traffic progression, where traffic volumes warrant. Signal timing in non-peak hours can maximize street operation. However, even the best timing programs cannot overcome the difficulty of irregular spaced signals. That is why it is so important to properly space signals.

Technique #24
Adding Lanes

Adding lanes is a traditional solution implemented by many local governments and road agencies facing traffic congestion. However, implementing access management strategies is often more cost effective than adding lanes due to the extremely high cost of purchasing additional right-of-way, moving utilities, and relocating parking, signs and any structures. Widening often also results in businesses and homes being very close to the new lanes. However, where traffic volumes warrant widening a road and adding lanes, the investment will be maximized by also consolidating driveways, installing access roads, and implementing other appropriate access management techniques as a part of the widening project.

Figure 3-42



Source: Center for Transportation Research and Education, Iowa State University, *Iowa Access Management Guidebook*, October 2000, p. 41.

TRAFFIC SIGNALS MUST BE CAREFULLY DETERMINED

A signal request often results when people feel inconvenienced waiting to enter a highway at "their" access point. Naturally, once they are "on" and moving they do not want to be delayed by a signal along the route. A very chaotic situation would result on our roadways if signals were installed at all of the locations where requests are received. It is for this reason their use must be carefully considered by traffic engineers who have at their disposal data necessary to determine exactly what the problem is, along with the most desirable solution.

Properly used, traffic signals help reduce a certain type of crash, provide gaps in the traffic stream benefiting other access points further "downstream", and provide right-of-way changes for traffic at intersections.

However, poorly designed, ineffectively placed, or improperly operated signals perform just the opposite of what is expected of them. Intersections become clogged with cars, and motorist delay and crash potential is increased. Entire street systems can become creeping parking lots, particularly during rush hours.

Traffic engineers know there are reasons why some signals work while others do not. They are aware a set of guidelines, based on these experiences, has been developed to aid in deciding whether to signalize or seek other measures to alleviate intersection problems.

These guidelines were formulated into a set of "warrants", a list of circumstances under which signals may function properly and provide the motoring public and pedestrians the most benefit. The "warrants" are used by traffic engineers nationally to evaluate the need for stop and go traffic signals.

The satisfaction of a traffic signal warrant or warrants does not in itself require the installation of a traffic control signal. There are several warrants which can be found in the latest edition of the Michigan Manual of Uniform Traffic Control Devices. These warrants are used as part of an engineering study of the traffic condition, pedestrian characteristics and physical characteristics of the location to determine whether the installation of a traffic signal is justified and would improve the operation and safety at a particular location.

Source: *"Traffic Signals: A Guide for Their Proper Use,"* MDOT, Traffic and Safety Division, September 4, 1997. Note: The current set of warrants are under federal review and new warrant criteria are expected to be published by the Federal Highway Administration in 2002.

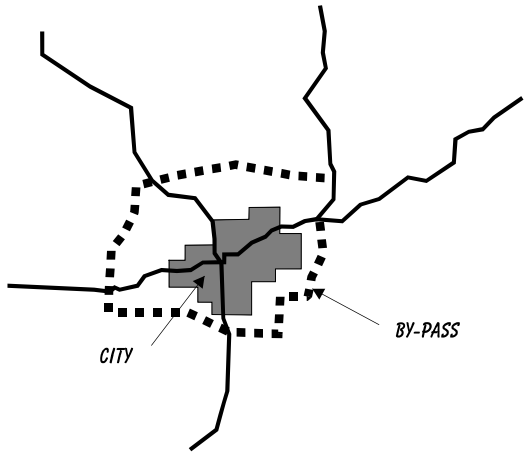
Technique #25
Convert Parallel Streets to One-Way Pair

In some cases in the past, paired one-way streets have been presented as an option for improving traffic flow as an alternative to major improvements to existing arterials. While one-way streets may allow for higher average speeds and accommodate large volumes of traffic, they have often proved to be detrimental to neighborhood and downtown development. This is usually because of reduced ease of access, increased noise and in some cases, the loss of on-street parking. One area that sometimes benefits from the conversion of one-way streets is industrial development when the streets converted are not lined with residences or commercial businesses. When deciding on one-way vs. two-way traffic, the community should evaluate a wide variety of factors including: resultant operations; time and distance of resultant travel; the amount of new delay at intersections, resultant speeds, safety, and related issues.

Technique #26
Construct a Bypass

Constructing a bypass to improve traffic flow around a congested area is often a last resort. Not only are bypasses very costly to construct and a new long-term maintenance burden on the community, they are often raise social, economic and environmental concerns (see Figure 3-43). However, if a bypass is to be built, the most effective way to ensure its traffic moving function is retained, is to allow no or extremely limited access, and to build it to parkway or freeway standards. Purchase of conservation easements on abutting property, if feasible, will also ensure it retains a natural landscaped character.

Figure 3-43



Graphic by John Warbach, Planning and Zoning Center, Inc.

Technique #27
Prohibit On-Street Parking

MDOT and local jurisdictions often prohibit on-street parking on those arterials with high traffic volumes. This keeps lanes open to move more vehicles efficiently and facilitates snow removal. It also improves safety since slow moving vehicles pulling out of parking spots do not present a danger to vehicles traveling in through lanes. In addition, drivers of standard size vehicles that try to enter an arterial from a driveway where there is parking permitted along the arterial, often have their sight distance restricted by larger SUVs and pickup trucks that park along the street. Under these circumstances the potential for crashes may be increased.

Parked vehicles block through lanes for a brief period reducing capacity by at least 10%. However, many communities allow vehicles to park along their arterials in downtown areas because it is an asset to businesses. This is usually in slow speed zones. On-street parking adds more potential conflict points, and reduces sight distance, but also slows traffic.

Relationship to Roundabouts

Roundabouts can be used at some intersections as an alternative to signalization. They are designed to handle traffic without signals by filtering traffic through a circle with yield signs at entry points. This allows traffic to flow around the circle. Roundabouts significantly reduce the crash rate and also reduce delay.

Driveways need to be located a safe distance from a roundabout with adequate signage. Driveways should not be located within a roundabout.

Relationship to Traffic Calming Measures

Many of the concepts presented in this guidebook suggest larger curve radii, easier vehicle exits, etc. which may give the perception that access management is in conflict with accepted traffic calming measures which often recommend tighter curves and narrower roads in an attempt to slow traffic. But actually, these techniques are complementary. Access management principally focuses on arterials trying to achieve safer and more efficient traffic flow. If successful, these measures usually take traffic pressure off adjacent residential streets, where traffic calming can be more effective.

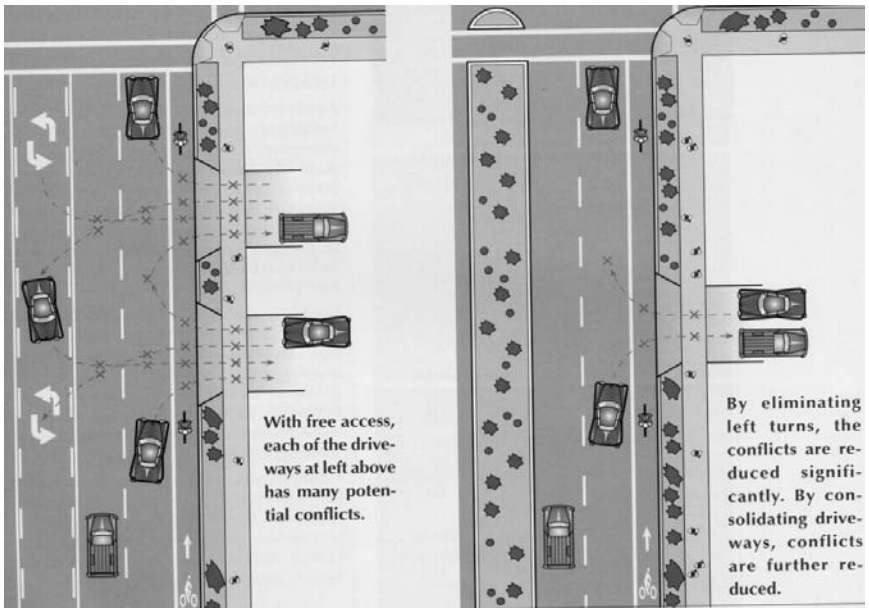
Engineers and planners need to take care in determining which local roads should be calmed for pedestrian and residential traffic and which arterial roads should have access management to allow for safe and efficient traffic flow.

In some instances, arterials are home to both pedestrians and vehicles and these areas are often the biggest challenges for designers. It is necessary to keep the traffic moving, but it is also necessary to allow for safe pedestrian use. Consolidating driveways is one measure that makes both vehicles and pedestrians safer because it is removing the conflict points for both.

BICYCLE, PEDESTRIAN AND BUS ACCESS TECHNIQUES

Pedestrians along major arterials often feel unsafe when there is a lack of pedestrian facilities. According to the Surface Transportation Policy Project study “Mean Streets 2000”, in 59% of pedestrian fatalities; crash victims were without a

Figure 3-44

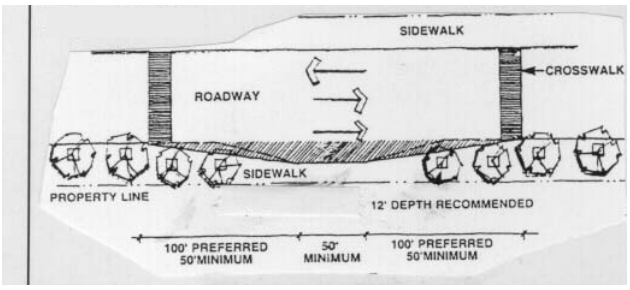


Source: Oregon Department of Transportation, *Main Streets: A Handbook for Oregon Communities*, Nov. 1999, p. 60.

crosswalk.[2] Numerous driveways intersecting the sidewalk along these arterials present a hazard for pedestrian and bicyclists. Local jurisdictions should consider likely pedestrian paths and try to limit pedestrian conflict points with cars. Figure 3-44 illustrates how reducing the number of driveways reduces the pedestrian and bicycle conflicts.

Because many major attractions (shopping, workplaces) are located along arterials it becomes necessary for fixed-route buses to service arterials.

Figure 3-45: Bus Pullout Lane



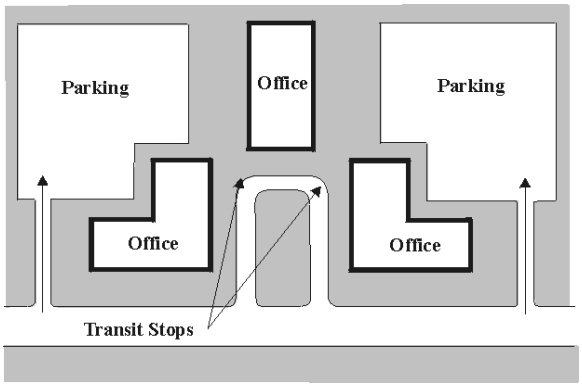
Source: Williams, K. and Forrester, J, NCHRP, Synthesis 233, "*Land Development Regulations that Promote Access Management*", 1996, p. 19.

It is not economically feasible for these routes to enter and exit individual parking lots. Most experts recommend implementing bus pullout lanes where possible in areas with high levels of passenger loading to allow traffic to pass around the fixed-route bus. (See Figure 3-45)

For bus transportation, safety and access to the pedestrian is a key factor. Local government officials can adopt site design procedures to ensure that pedestrians have a safe path to the bus stop or safe, convenient paths to adjacent locations. Figure 3-46 shows a sample site plan that improves pedestrian and transit rider convenience by bringing transit riders closer to the destination and providing pedestrian linkages to each activity.

This is common in Europe and Canada. Communities in Florida, California, Oregon and other states are increasingly recognizing the benefits of this building pattern.

Figure 3-46



Graphic by John Warbach, Planning and Zoning Center, Inc.

[2] Surface Transportation Policy Project, "Mean Streets" Washington DC, 2000.

Chapter 4
LOCAL REGULATORY TECHNIQUES TO SOLVE COMMON TRAFFIC PROBLEMS

This chapter lays the foundation for the access management principle that relates to local regulations.

- Many access management techniques are best implemented through local zoning regulations and others through local lot split, subdivision, condominium, and private road regulations.

Lot split, subdivision and condominium regulations are discussed first because these are "front line" ordinances that come into play when lots are first being designed. This is the best time to prevent common access problems. Zoning is the principal tool used to guide the design of new development or redevelopment on individual lots. It is often limited by the existing lot and street pattern. The access issues of lot split, subdivision, condominium and zoning decisions need to be coordinated with county road commissions and MDOT, when a state highway is involved. Chapter 5 presents an effective process for this coordination. The regulatory options presented within this chapter would be adopted at the end of an access management planning process, once problems and appropriate solutions are identified. Chapter 6 will lead readers through a model access management planning process. Chapter 7 presents model access management plan elements. Sample access management zoning regulations are presented in Chapter 8.

LOT SPLIT ORDINANCES

Description of a Lot Split Ordinance

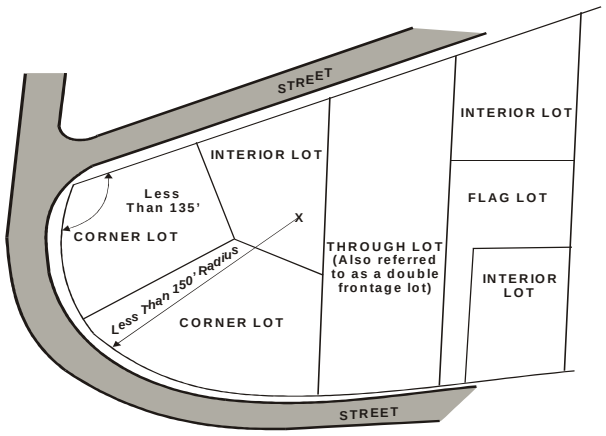
Lot split regulations establish procedures for divisions of land that are not subject to platting under the Land Division Act, 1967 PA 288, as amended. They are usually contained in a separate lot split ordinance which includes: application requirements, a review schedule, regulations regarding the number, size and shape of parcels being created, special provisions for small or irregular parcels, provisions for enforcement of the ordinance and penalties for violating the ordinance. Local government review of lot splits helps ensure that lots being created are "buildable" under current regulations. It also helps prevent inefficient land patterns and irregularly shaped parcels, and helps ensure proper access to roadways. Proposed land divisions are also reviewed for consistency with the zoning ordinance, private road ordinance, and any other pertinent regulations.

The Land Division Act requires a review of every land division which is less than forty acres in size. A property owner who proposes a land division that is consistent with the Land Division Act, but not with applicable local ordinances would likely receive conditional approval. The condition would specify how the lot split did not conform with local zoning or related ordinances. This means that a subsequent owner of a new lot with such a condition, would not likely receive a permit to build. Lots with such qualifications are often recorded with the Register of Deeds so that future prospective purchasers will be aware of the problem. The Land Division Act has been a source of controversy and confusion for many municipalities.

However, the Land Division Act has two major benefits over its predecessor, the Subdivision Control Act. First, nearly all land divisions are now subject to local government review prior to being recorded and marketed. Many poorly designed splits, and lots without adequate access are identified and corrected before being approved. Second, while limited, there are minimum uniform state standards being applied to each proposed lot

regarding minimum dimensions and width-to-depth ratios. These standards help prevent more long narrow lots, irregularly shaped lots and inadequately sized lots from being created. In addition, there are incentives for sharing a common driveway and for preserving at least 60% of a parcel in open space. These incentives are substantial (two extra lots) and should, over time, reduce the number of new driveways that otherwise would be established along our roadways.

Figure 4-1: Lot Types



Graphic by John Warbach, Planning & Zoning Center, Inc.

To take advantage of the shared driveway provisions, the community must include driveway standards in its zoning ordinance and/or private road ordinance. Sample standards are listed in Chapter 8. [SEE ALSO TECHNIQUES #1-3 IN CHAPTER 3].

Lots That May Cause Problems

As proposed lots are being evaluated, it is especially important to look closely at narrow interior lots, flag lots, corner lots and double frontage (or through) lots. See Figure 4-1. Driveways on these lots are most likely to create the most problems for safe and efficient traffic flow. Regulations to minimize access management problems on these lots are included in the zoning ordinance, but may also be found in lot split, subdivision, condominium or private road regulations.

"Locking In" the Number of Driveways Before Development Occurs

One effective way to prevent a proliferation of new driveways is to limit the number of new access points to existing parcels before extensive land division occurs. This is most effective in suburban and rural areas before large parcels are fragmented into many smaller ones. It is accomplished by adding a short provision to the zoning ordinance that effectively limits to one, all future driveways in the area identified. As smaller lots are created, common driveways, access easements, or service drives are required to provide access to any new parcels. Figure 4-2a illustrates an existing condition. Figure 4-2b illustrates a typical lot split pattern where each owner maximizes the number of lots with frontage by creating lots that meet the minimum lot frontage requirements. Figure 4-2c illustrates how land division can occur without any new driveways, thereby reducing new conflict points along the roadway. This occurs only if the community adopts an ordinance provision "locking in" new driveways along key corridors likely to or planned to experience significant new development. Chapter 8 includes sample ordinance language to "lock in" driveways along a corridor. Along rural roads, a very wide lot width can be effective. [SEE ALSO TECHNIQUES #1-3 IN CHAPTER 3.]

Any lot split, private drive and subdivision ordinance should also be coordinated with this provision.

Figure 4-2

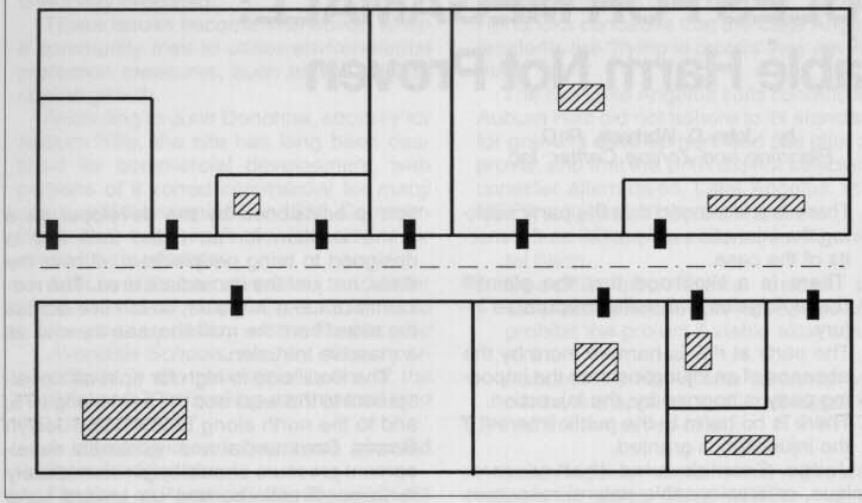


Figure A: Represents an arterial highway in a semi-rural area; one which still has rural characteristics, but is experiencing development pressures. The large parcels present numerous opportunities for careless land divisions;long, narrow lots with minimal road frontage will likely be created, and each will have its own driveway. There are some commercial land uses and a few driveways onto the roadway, but they are not substantial enough to inhibit traffic movement and safety.

10 driveways for 10 lots

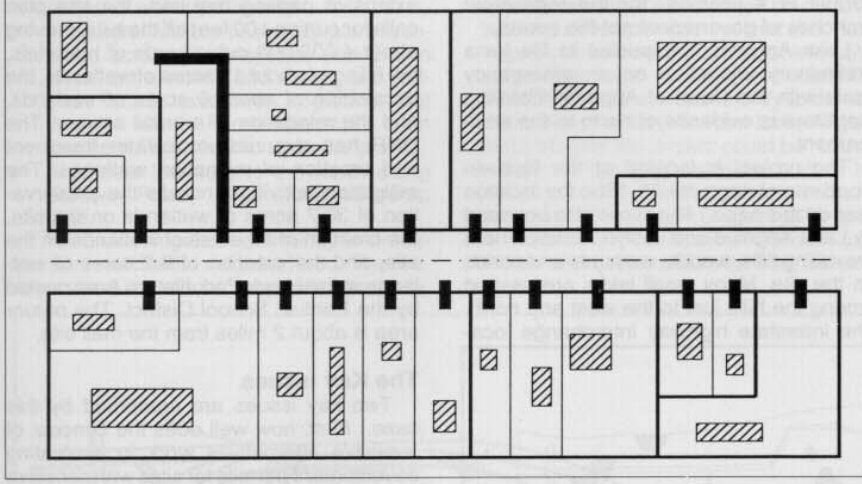


Figure B: This is the same arterial after typical commercial strip development. Misguided development and unregulated land divisions have led to too many long, narrow lots and "flag" lots and consequently, too many driveways. Numerous driveways substantially increase the number of turning, accelerating and decelerating cars, which serves to undermine the traffic movement function of the roadway and pose traffic safety hazards.

23 driveways for 28 lots

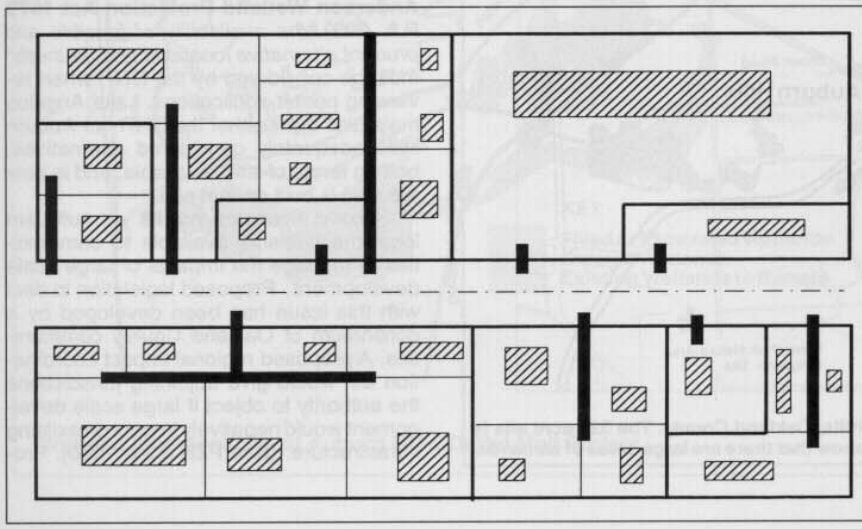


Figure C: This is the same strip after development with controlled land division and access. All of the original parcels were allowed one driveway each onto the roadway. All subsequently created lots obtained their access to the road from the single access points. Traffic congestion and hazards are minimized and the road retains its traffic movement function as an arterial.

10 driveways for 29 lots

Graphics by Tim McCauley

Source: McCauley, Tim, "Preventing Unnecessary Driveways in Strip Commercial Areas", *Planning and Zoning News*, Sept. 1990.

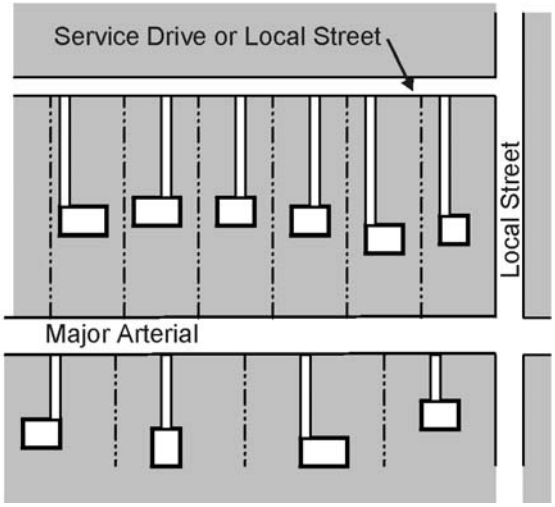
Narrow Lots

As explained in Technique #1 in Chapter 3, a proliferation of driveways along an arterial is a major access management problem. This occurs most often in areas with many narrow lots. Thus it is important to prevent the creation of narrow lots, or to provide an alternative means of access to them. If it is inappropriate in an area to require wide lots, then narrow lots should be required to have access by means of a frontage road, rear service drive, other form of shared access. If there are double frontage lots, they should be permitted access only from a service drive or a local street rather than from the arterial. See Figure 4-3.

Flag Lots

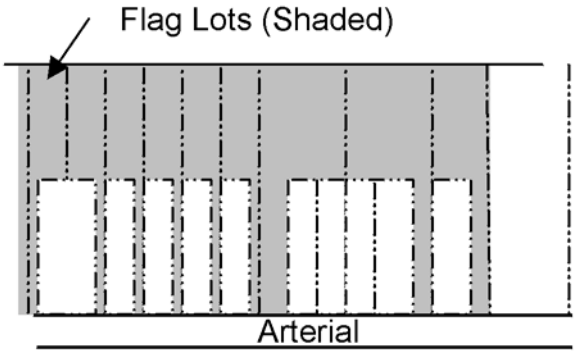
Flag lots are a regular lot with a long skinny part (pole) that provides access to a street or road. The pole could be a formal part of the lot or an access easement. It is a design that permits more intensive development of backlot areas. However, it creates access problems by significantly increasing the number of driveways, unless there is shared access. See Figure 4-4a.

Figure 4-3



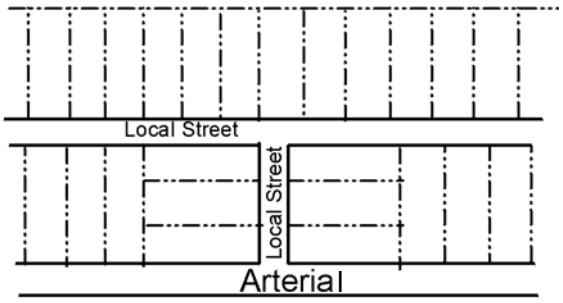
Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

Figure 4-4a



20 lots, 20 driveways
or
20 lots, 11 driveways if driveways were shared between flag lots and "regular" lots.

Figure 4-4b (Same area as above divided differently)



24 lots, 24 driveways, but all access is from a local street.

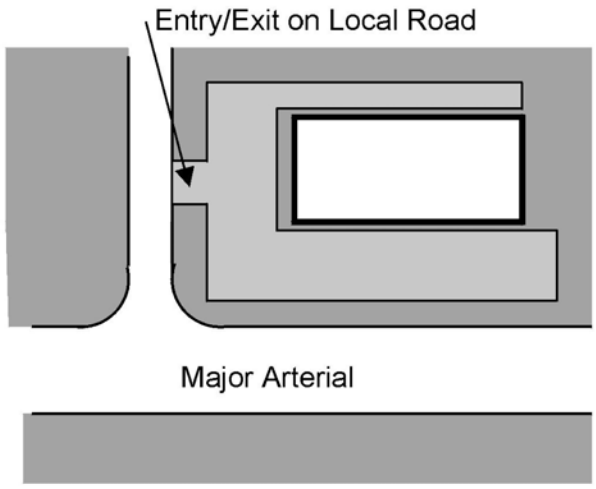
Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

For these, and other reasons, many communities do not permit flag lots. However, where permitted, some communities require shared driveways along the lot line (1/2 width of the driveway on each parcel). Sharing driveways between flag lots and the abutting "regular" lot in Figure 4-4a would cut from 20 to 11 the number of driveways along this arterial. However, a better design which reduces the number of conflict points to one (a local street) is illustrated in Figure 4-4b. This option preserves the movement function of the arterial the best.

Corner Lots

Corner lots can create congestion and traffic safety problems if there are driveways connecting to each abutting road too close to the intersection. It is best to limit corner lots to no direct access to an arterial, unless they have substantial frontage (500 feet or more). Access would instead be provided by a local road or a service road on an abutting property. See Figure 4-5. This keeps driveways away from intersections, reducing the number of conflict points and allowing more stacking room for vehicles at the intersection. Where this is not possible, then restricting access only to the abutting road with the lowest functional class (usually the one with the lowest traffic volume, often a local road or minor arterial), is often best. In many cases, restricting left-turns into and out of corner lots also reduces potential problems significantly. Right-in and right-out channelized islands are often used. [SEE TECHNIQUES #5 AND #9 IN CHAPTER 3.]

Figure 4-5

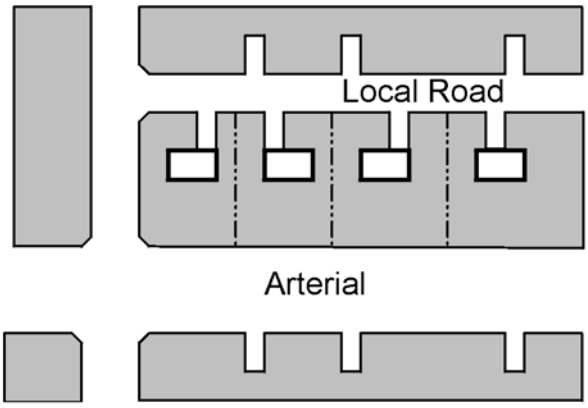


Adapted by John Warbach, Planning and Zoning Center, Inc. from CUTR "*Access Management and Site Planning*" for the National Conference on Access Management, 1996.

Double Frontage Lots

When a proposed land division would create a lot with frontage on a local road and an arterial, it is very important to make the approval conditioned upon no access to the arterial road. This would almost always be true with residential lots, but other factors concerning nonresidential lots may result in approval of a driveway on the main arterial. These factors could include: shared access or, if a frontage road were built and the local road in the back functioned as a rear service drive for delivery vehicles. See Figure 4-6.

Figure 4-6



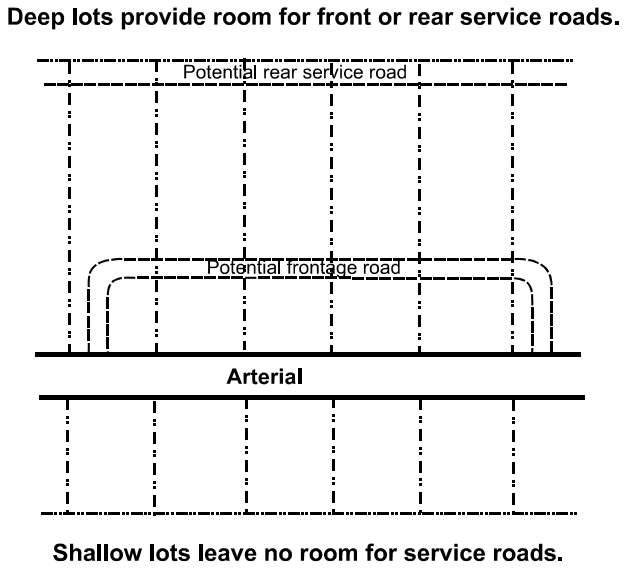
Primary access should be to local roads. Avoid driveways on arterials where local road access is available.

Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

Width-to-Depth Requirements

The Land Division Act requires that new lots not exceed a depth of four times the width, unless otherwise permitted by a local government. Except in areas experiencing significant erosion (such as along Lake Michigan), a 1:4 width to depth ratio is usually too great. Many communities require substantially less, (such as 1:2 or 1:2 ½), especially for residential lots. However, one place where deep lots are beneficial is along major arterials, because of the potential that is provided for front or rear access drives and for deep building setbacks. They also provide room for a buffer from abutting residential property. Deep lots are also advantageous if the possibility exists for future road widening. Right-of-way acquisition is often impractical or very expensive if lots are shallow or buildings are located close to the roadway. Some communities require double the minimum lot width and depth for lots along major arterials as a crude way to separate driveways and provide depth for deeper building setback. This may work effectively in rural areas with little development pressure. See Figure 4-7.

Figure 4-7



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

SUBDIVISION REGULATIONS

Subdivision regulations apply when land is divided into more lots than are permitted under the lot split provisions of the Land Division Act. Subdivision ordinances are adopted to regulate proposed subdivisions, or plats as they are often called. Subdivision regulations establish the administrative review and evaluation procedure for processing conceptual, preliminary and final plats; information that must be on the plat; design principles and standards for lots, blocks, streets, public places, pedestrian ways, and utilities; required improvements, including streets, sidewalks, water, sewer, curbs and gutters; and financing and maintenance responsibilities.

Subdivision regulations help ensure that new lots conform to zoning, streets are properly aligned, water, drainage, utilities, light, and air are adequate. Since all roads in plats are public roads, and these proposed roads must eventually be built, dedicated to the public and accepted by the appropriate road authority, the review of proposed roads and their relationship to proposed lots is a very important part of plat review. Subdivision regulations can also be used to help assure the proper size, shape and location of new lots so that future driveways and service roads can be safely established.

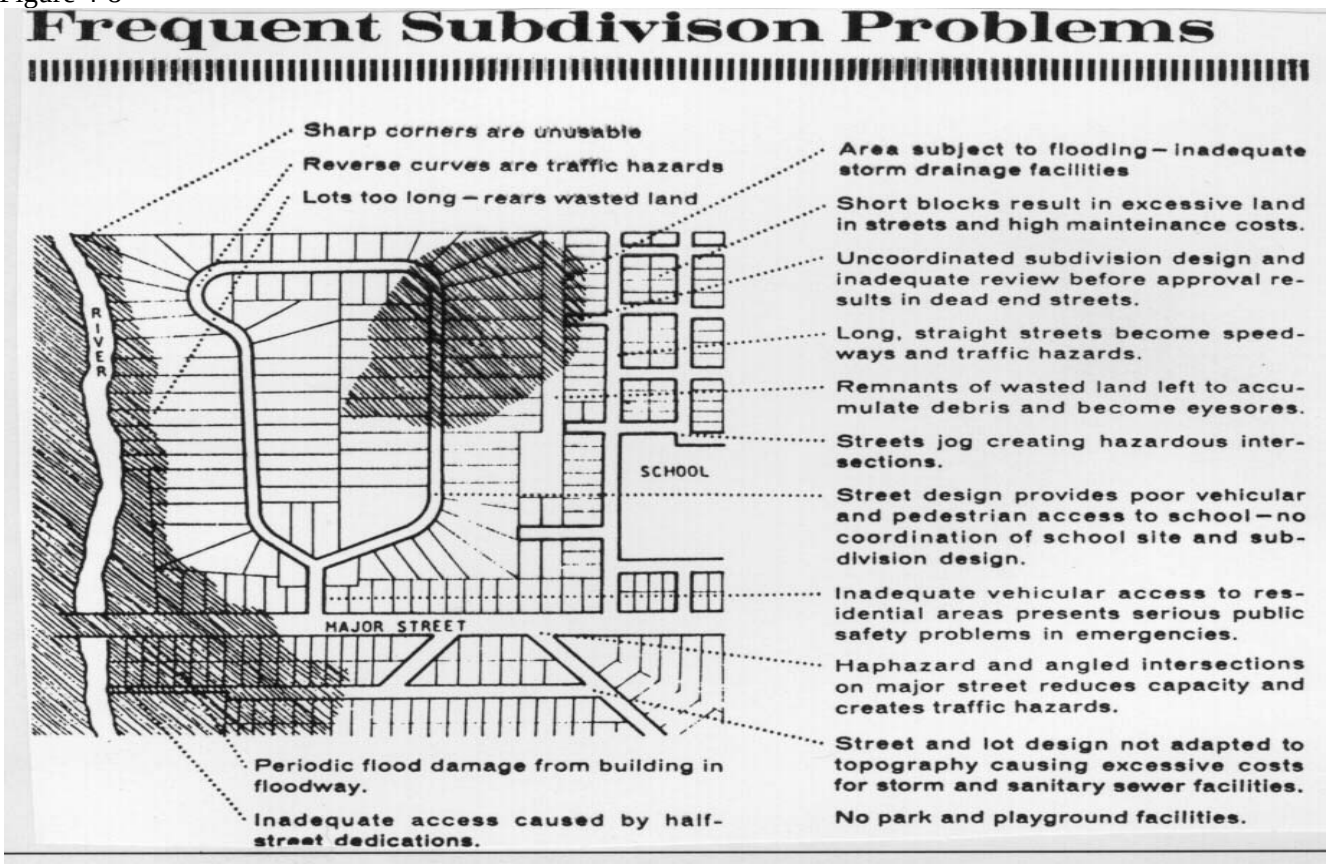
Figure 4-8 illustrates common subdivision problems (that go beyond access management issues). Preventing these problems through careful review of preliminary plats is an essential part of any effective local subdivision review program.

Some of the access related key design features to focus on during preliminary plat review include:

- Interconnectivity with the existing or planned street system (see Figure 2-4 and accompanying text).
- Ensure adequate spacing between intersections (see Technique #12)
- Avoid areas unsuitable for development (such as floodplains, wetlands, high risk erosion areas, steep slopes, etc.)
- Avoid narrow lots unless there is a front or rear access road or a local street instead of separate driveways on the main roadway (see Figure 4-3)
- Avoid double frontage lots unless access is prohibited on the arterial or collector (see Figure 4-6)
- Avoid flag lots (see Figure 4-4)
- Require wide corner lots (see Figure 4-5)
- Ensure adequate drainage at intersections and away from streets
- Pay special attention to opportunities for alternative access via a side street or service road when examining nonresidential plats.
- Determine whether additional arterial right-of-way is needed now or will be needed in the future to accommodate a road widening or whether land is needed for a deceleration or acceleration lane, for a bypass lane, or a service road. If so, be sure lots are properly sized and aligned and building setbacks are adequate to accommodate these needs.

Under the Land Division Act, communities and road authorities can only impose improvement conditions that relate to the property included within the plat. Off-site improvements (such as to improve sight distance, or for a bypass lane) may not be required under the Land Division Act. (See Arrowhead Development Co. vs. Livingston

Figure 4-8



Source: Tri-County Regional Planning Commission, *Guiding Land Subdividing Part 3-Residential Standards*, 1964.

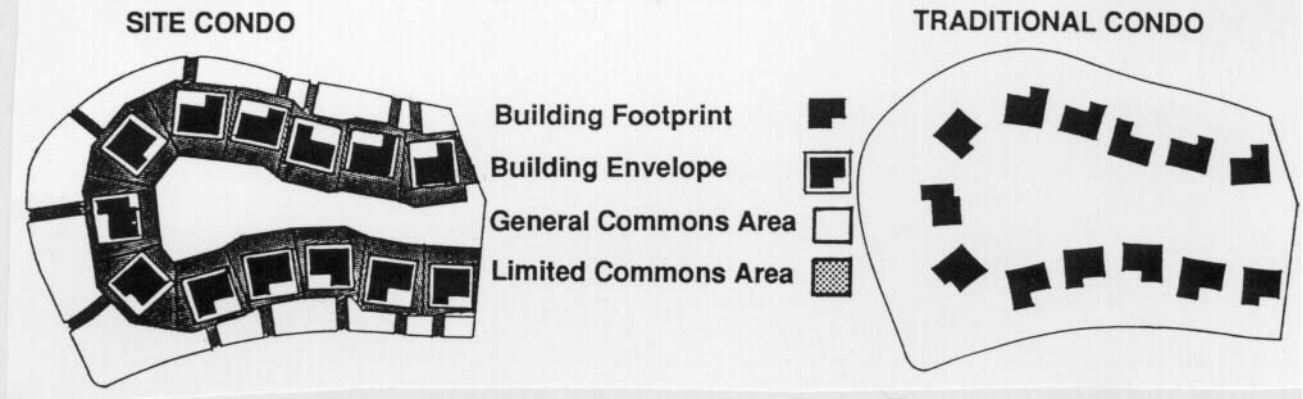
County Road Commission, 413 Mich 505, 1982). ***However, road authorities and municipalities acting under 1969 Act 200, the Driveways, Banners and Parades Act, may adopt rules that extend off-site, but at least partially within the public road right-of-way, to cover improvements such as bypass lanes, right-turn lanes, acceleration and deceleration lanes built primarily to serve an individual property, or group of properties (see Loyer Educational Trust vs. Wayne County Road Commission, 168 Mich App 587, 1988; appeal denied 431 Mich 911, 1988).*** Off-site improvements are an evolving area of law that sometimes raise constitutional takings issues. An attorney should be consulted before requiring off-site improvements.

It should also be apparent local governments need to not only coordinate local lot split, subdivision and zoning regulations internally, but also externally with the appropriate road authorities so that compatible and comprehensive regulations apply to all property in the community.

CONDOMINIUM REGULATIONS

All of the same concerns regarding lot splits and plats apply to condominium developments (especially site condos). However, because a condominium development typically only involves a single parcel of land on which there are areas of land with exclusive ownership interests (like a yard to a residence), and areas with common ownership interest (such as internal streets, tennis courts, pools and related common areas), there is only one "lot". See Figure 4-9. Condominium developments exist under the auspices of a separate statute called the Condominium Act, 1978 PA 59. Some communities have adopted separate site condo regulations. Others have incorporated special regulations for condominiums in the local zoning ordinance. With the proliferation of condominium development, it is important that communities scrutinize the access elements of a proposed condominium development with the same consistency and depth as they do lot splits, plats

Figure 4-9



Site condos are similar to platted lots. They have an area of land, shown as the limited common area above, which is like a private yard, whereas all the land in a traditional condo project is a general common area open to anyone who owns a condo. Each example is only one "lot" as it is typically defined in local zoning.
Source: Michigan Society of Planning Officials, *Community Planning Handbook*, 1992.

and site plans. Since many condominium developments rely on private roads, it is especially important that the private roads be built to construction standards that are adequate for the level of use.

ZONING ORDINANCES

Zoning is the premier local tool to guide land development as well as reuse or redevelopment. This tool is rooted in three zoning enabling acts:

- City-Village Zoning Act, 1921 PA 207
- Township Zoning Act, 1943 PA 184
- County Zoning Act, 1943 PA 183.

Zoning regulates land use, density, lot size, building height, setback, yard characteristics, lot coverage, parking, signage, landscaping, and related issues. The text of the zoning ordinance includes standards for each of the above elements and is applied through various zones or districts for major categories of land use, such as residential, commercial, industrial, office, and agricultural. These zones are depicted on a zoning map.

A zoning ordinance is a good place to include access management regulations. Many communities put all their access management standards in one section or part of the zoning ordinance. Typically when this is done, the access management standards apply to all lots on all roads and streets in the community. This helps identify all related standards for applicants and administrators. It also helps ensure consistency among the standards (as inconsistency is harder to spot when standards are scattered throughout the ordinance). Delta Township in Eaton County and Oshtemo Township in Kalamazoo County are examples of communities with separate sections of the zoning ordinance dedicated to access management. The model ordinance language in Chapter 8 presents a variety of access management standards that can be included in a zoning ordinance.

Overlay Zones

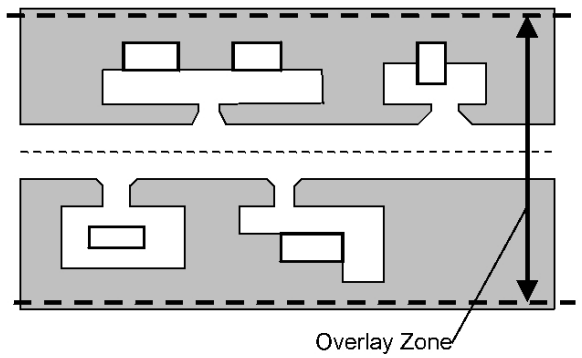
Instead of access standards that apply to all lots, an overlay zone usually applies to lots along one or a few corridors in the community. Overlay zones are another method for managing access. All proposed land uses within the defined corridor(s) are reviewed to ensure consistency with the access standards as well as with all requirements of the underlying zone. See Figure 4-10. The overlay zone technique is often used along commercial and industrial corridors for which a separate access management, or corridor management plan has been prepared (see Chapter 6 and 7). Typically an access management overlay zone will provide more detailed, or refined access regulations that are specific to a particular corridor, than those in other regulatory text that apply to all development in the

community. In many communities, the overlay zone is separately depicted on the Zoning Map.

Overlay zones are often used where there is political support for access regulations on busy commercial corridors, but not along other roadways in the community. An overlay zone is also a desirable approach when a corridor with similar characteristics extends across several jurisdictions. An overlay zone can cross jurisdiction borders, but each community along the corridor needs to adopt the same provisions (for the portion of the corridor within their borders) to get the desired uniformity. Seven communities along Tittabawassee Road in Saginaw County have adopted the same access management overlay zone requirements.

Figure 4-10

The overlay zone applies special access management standards to all properties within the overlay zone (which usually covers a single corridor and may cross jurisdiction borders).



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

Key Zoning Processes

The most important opportunities to implement access management objectives occur when processing zoning requests for the following:

- Zoning permits
- Site plan review
- Rezoning
- Special land uses
- Planned unit developments
- Change to a nonconforming use
- Variances.

In each case, an applicant wants approval of a request in order to make a land use change, and/or make substantial changes to a building. All applicable ordinance requirements must be met in order to obtain zoning approval. If the zoning ordinance has a set of access management standards, then this is when the zoning administrator needs to ensure they are being met.

Zoning Permits

Before a particular land use or structure can be constructed on a lot, approval is necessary from the local zoning administrator. This is usually signified by a zoning permit (sometimes called a "land use permit" or a "certificate of zoning compliance"). For land uses permitted "by right" in a particular zone, this is often a simple process that is readily completed by analysis of a scaled plot plan showing the proposed location of the principal building and all accessory structures (such as driveways and garages) on the lot. It is easiest to complete for residential dwellings on platted lots.

Site Plan Review

However, where a commercial, office or industrial use, or a use requiring special review and approval (like a conditional use, or special land use) is proposed, then the submittal, review and approval requirements are more rigorous. In most cases, a site plan is used as the vehicle to ensure that what is proposed conforms with all ordinance requirements. A site plan is a drawing and accompanying documents that show all proposed principal and accessory structures, their size and location on the lot, as well as their relationship to buildings on abutting properties. Driveways, utility lines, parking, signs, landscaping, various dimensions and related information is detailed on the site plan. See Figure 4-11 for an example.

Site plan review is the process followed to review development and redevelopment proposals and ensure conformance with ordinance regulations. It is well suited to ensure conformance with access standards included in the zoning ordinance for all nonresidential developments, because these uses are usually required to go through site plan review.

The following list of information and questions looks at potential problems that planners should

consider when reviewing a proposed site plan to ensure proper conformance to access management standards.

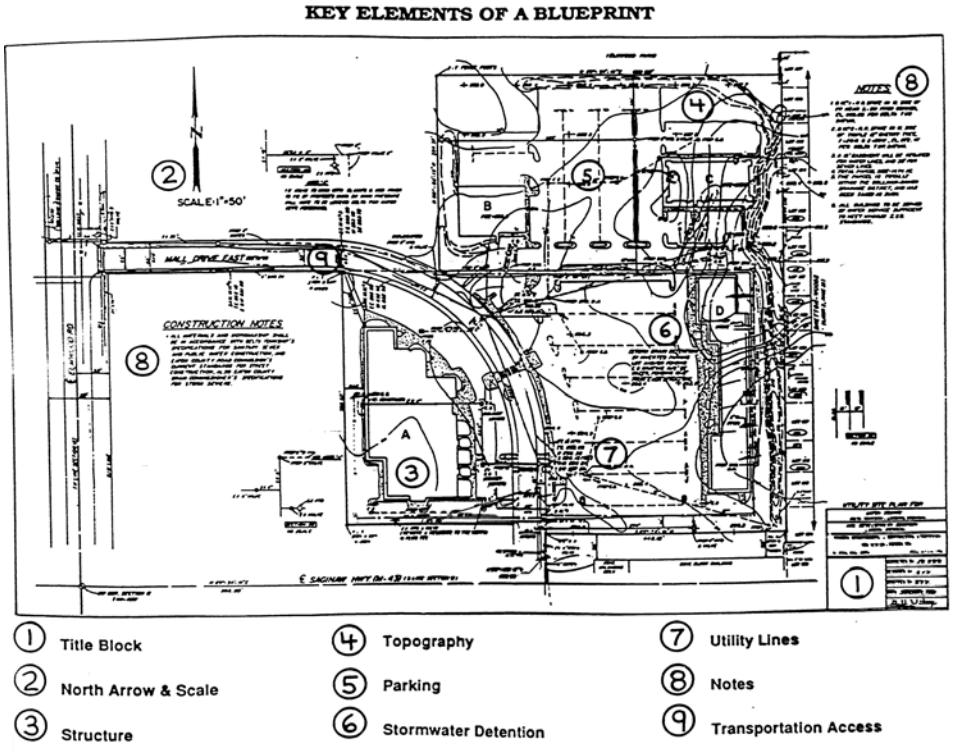
Key Information to Examine:

- Location of existing and proposed property lines, right-of-way, and use and ownership of abutting properties
- Location of all access points (driveways) on the property and on abutting property on both sides of the road (use of an aerial photo is extremely helpful).
- Distances to neighboring driveways, median openings, traffic signals, intersections, and other transportation features on all sides of the property.
- Number and direction of lanes to be constructed on the driveway plus proposed striping plans
- All planned transportation features for each transport mode (cars, delivery trucks, bicycles, bus, pedestrian)
- Trip generation data or appropriate traffic studies (which should project and analyze traffic at opening, in 5 years and in 20 years relative to other projected volume increases at each point in time).
- Parking and internal circulation plans.
- Detailed description of any needed variances.

Key Questions:

- Is the existing public road system able to meet the projected traffic demand of the proposed project and is the internal road network adequate for safe and efficient vehicular movement?
- Is automobile movement within the site and to adjacent property provided without having to use the peripheral public road network?
- Can the site be accessed via a side street, a service drive or an adjacent property instead of an arterial?
- Can driveways be consolidated with adjacent properties? Is there an opportunity for sign consolidation with new consolidated access drives? Signage should

Figure 4-11

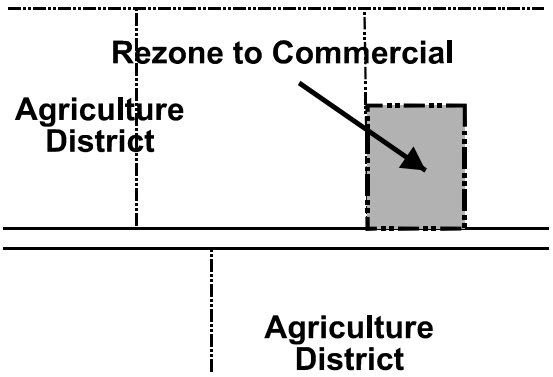


Source: Michigan Society of Planning Officials, *Site Plan Review*, 1988.

clearly indicate main and alternative entrances.

- Is parking combined or linked with parking on abutting lots where feasible?
- Does the internal road network follow the natural topography and preserve natural features of the site as much as possible? Have alignments been planned so that grading requirements are minimized? Does drainage flow away from driveways and intersections?
- Are driveways properly placed in relation to sight distance, driveway spacing and other related considerations, including opportunities for joint and cross access? Are entry roads clearly visible from the major arterials?
- Is the driveway properly designed to accommodate the size, type and amount of traffic expected? Depending upon expected conditions review of driveway width for ingress and egress, throat width and length, driveway radii, flare, and slope.
- Do projected vehicular volumes and types of vehicles warrant review for a bypass lane, acceleration or deceleration lanes?
- If it is a corner business, are driveways adequately spaced from the intersection? Have turning movements been restricted if traffic volumes warrant?
- Do dwelling units front on residential access streets rather than arterials or collectors?
- Does the driveway and road system provide adequate access to buildings for residents, visitors, deliveries, emergency vehicles, and garbage collection?
- Are the edges of the roadways adequately and properly landscaped? If sidewalks are provided alongside the road, have they been setback sufficiently from the road, and has a landscaped planting strip between the road and the sidewalk been provided? Will the landscaping in any way interfere with safe sight distance?
- For drive-through establishments, is there adequate space on site to accommodate expected traffic queues?
- Does the pedestrian path system safely link buildings with parking areas, entrances to the development, open space and recreational and other community facilities?
- Are additional lanes or a median likely in the future? If so, are lots large enough to accommodate the proposed uses and future property loss due to right-of-way expansion?

Figure 4-12



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

Rezoning

Rezoning is the process used to change the zoning classification of property from one zone to another (such as from agricultural to commercial). See Figure 4-12. Any of the uses proposed in the new zone can be established, so the range and intensity of permitted uses in the new zone, compared to those allowed in the present zone is usually the focus of the review. The more intensive the range of permitted uses, the greater the concern over access should be. Where safe and efficient access is already a problem, such as on corner property, concern should be very great. While it is not appropriate to require a site plan when a rezoning is proposed, many developers will provide a conceptual plan for a proposed use in order to help the community better understand what is proposed. Attention should focus on the degree of consistency (or inconsistency) of the proposed rezoning with the adopted future land use plan for the area, and with any transportation or other capital improvements proposed for the area. Before rezoning is approved, there should be a good understanding of where on the property the principal access will be located for any of the class

of uses most likely to be located on the property. Since there is no statutory authority to impose conditions on a rezoning (unless it is a PUD), the community needs to be very clear with the landowner and developer, where permissible access to the property would come from if the rezoning were or were not approved, and whether it would be required to be shared with an abutting property as part of a future site plan review (when conditions can be imposed).

High intensity land uses should not be approved on properties with inadequate access for the traffic volume to be created. A traffic impact study is an excellent way to evaluate these concerns when large projects are proposed.

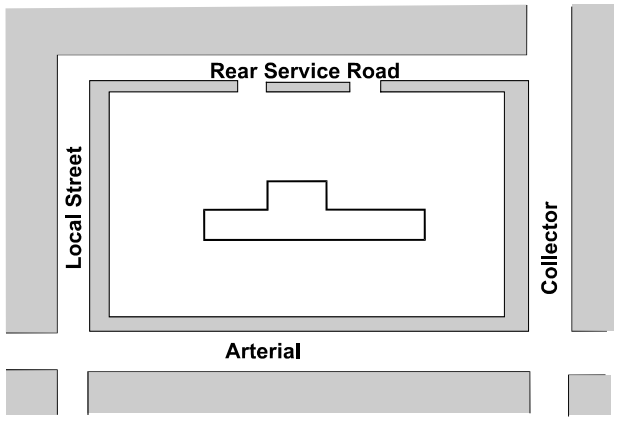
The Michigan Department of Transportation sponsored a publication entitled **Evaluating Traffic Impact Studies,** which provides model ordinance language on when to require a traffic impact study and what it should contain. See Appendix C for information on obtaining a copy.

A traffic impact study can be required of the developer if included in the submittal requirements of the zoning ordinance for a rezoning or site plan review. The developer must hire a qualified firm to perform the study and must pay for it. A community should coordinate traffic impact studies with applicable road authorities so that only one study is prepared that meets the needs of the community and the road authorities.

Special Land Use

Special land uses (also known as conditional uses and special exception uses) are uses of land that are permitted to be established in a particular zone if standards particular to that use, in that location, can be met. Junkyards, airports, shopping centers, drive-through establishments and day care centers are common special land uses. A site plan is required to be submitted for every proposed special land use. Special land uses can be required to meet special access management standards. For example, a shopping center larger than a certain size can be required to have its principal means of access from a minor arterial, and have a separate access road that principally serves delivery trucks. Such standards must be written into the zoning ordinance in order to be enforceable. See Figure 4-13.

Figure 4-13



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

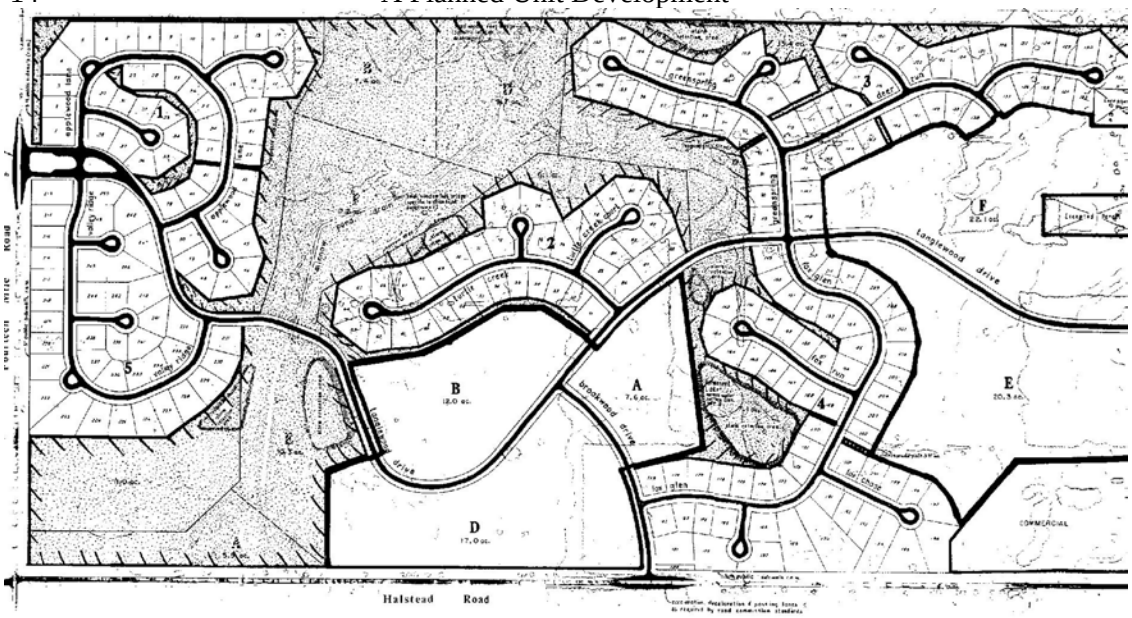
Planned Unit Development (PUD)

Traffic volumes and choices of travel mode are influenced by the location, parking, density and mix of land uses. Separating land uses often reinforces driving as the only realistic mode of choice. Land use planning and transportation can work together to create a worse situation or a better solution. Implementing mixed use and more compact density permits linking trips so citizens can be less automobile reliant. This takes pressure off our overcrowded roads and parking lots.

Many communities within Michigan have begun to experiment with mixed uses through PUD zoning. Mixed uses combine complementary land uses within the same development. PUD zoning allows a range of options for developers.

A PUD is commonly mixed use development that integrates land uses with the natural characteristics of the site in ways which preserve natural features and/or open space to benefit future users of the property. Golf course communities with a range of residential dwelling types, or mixed commercial-

Figure 4-14 A Planned Unit Development



Source: City of Farmington Hills, Planned Unit Development, 1985.

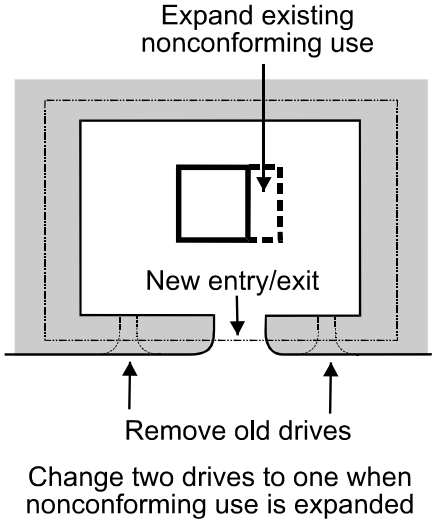
office developments are common examples of a PUD. Site plan review is a required element of PUD approval processes. Very particular standards, similar to those of special land uses, can also be established. Some communities require a rezoning into a PUD zone as well. If a rezoning is required this is the only time a site plan can be required as part of a rezoning application. Access issues are often a significant part of the review of a proposed PUD. Conditions on access can be imposed as part of an approved PUD. See Figure 4-14.

Change to a Nonconforming Use

A nonconforming use is one which preexisted the zoning ordinance, or the district in which it is located. Some people refer to these as "grandparented" land uses. They are allowed to continue in the future in the same manner and to the same extent as they existed at the time they became nonconforming. One of the most common opportunities to consolidate or share driveways on older properties arises when a proposal to change a nonconforming use is submitted. The proposal could be to expand a nonconforming structure, to change from one nonconforming use to another or to reconstruct a damaged nonconforming use. In each case, the zoning ordinance must prescribe standards to guide the change, and these standards must be adhered to.

Many communities severely restrict nonconforming uses under the premise that what is best for the community over time, is a use that conforms with or more nearly conforms to the zoning district in which it is located. Where the nonconforming use is proposed for expansion, or use substitution is proposed, then a review of existing access to the site is in order. If there are two driveways, where one better designed and

Figure 4-15



Graphic prepared by: John Warbach, Planning and Zoning Center, Inc.

located would more nearly conform to ordinance requirements and be safer, then it can generally be required as a condition of approval, if the community has zoning standards requiring consolidated access. See Figure 4-15.

Where a nonconforming use is proposed for expansion, or a damaged nonconforming use is being reconstructed or repaired, it may not always be feasible to require improving the access. However, the community should still consult the landowner, who may voluntarily choose to make such an improvement. This is most likely where the benefits are clear and the costs are manageable. Over time, improved access management along corridors with many nonconforming uses can make a huge difference in the appearance and function of the roadway. It is well worth the effort, even though progress may be measured in decades.

RELATIONSHIP TO BUILDING CODES

Building codes and building permits do not have any standards that directly relate to access management. However, building permits (and associated plumbing, electrical and mechanical permits) are usually the last permits obtained before construction activity is initiated on a property. Once a building is under way, options for access, site circulation, parking and related issues are sharply limited. It is therefore, very important that building permits NOT be issued until all driveway and access related concerns have been resolved. This should be ensured by ordinance language that restates this caveat, as well as by administrative procedures that are binding upon planning, zoning and building permit staff. A building permit prematurely issued that results in an inappropriate or unsafe driveway location is both an embarrassment to the community and a potential legal liability for the property owner and the community. It is often difficult to get the driveway changed after building construction has started under a validly issued building permit. However, that should not stop the responsible road authority from trying. It does however, give further support for the need for close communication and cooperation between local government officials and personnel of the responsible road authority.

PRIVATE ROAD ORDINANCES

Private roads are built and maintained at private expense. However, they are often not maintained as well as public roads and can create problems for emergency vehicles, delivery trucks and waste disposal vehicles which must travel over them.

Private roads are most often used for access to small residential developments within rural areas, to condominium projects, multi-family developments and to some commercial and industrial developments. Typically, they provide access to lots that are not subject to subdivision regulations (which require public roads).

Private roads create the same access management issues as public roads when it comes to their location and design. They should be located and spaced according to the same standards as public roads. They should be designed to conform with the same access management standards as public roads. They create additional issues with regard to their long term maintenance. As a result, communities that allow private roads regulate most aspects of their design and maintenance, require performance guarantees and maintenance agreements, and require they meet all other access management standards in the zoning ordinance.

Private road ordinances should be firmly supported within the comprehensive plan and should be recognized within and coordinated with subdivision, condominium and zoning regulations. Private road and driveway regulations can be easily confused and should be distinguished within the definitions in the ordinance.

PROFESSIONAL ASSISTANCE

Developing, adapting and implementing any of the regulations described in this chapter requires assistance from trained professionals with expertise in planning, engineering, code administration, and law. Access management is no different. If a community does not have appropriate expertise

within existing staff then it should hire it (in-house or via consultants). Often access management expertise is most affordable when working in partnership with other communities, such as those along a major trunkline. Resources can also often be stretched by involving personnel from the affected road authorities early and often. The next chapter presents model procedures to follow to effectively coordinate planning and implementation of access management regulations.

Chapter 5
COORDINATING PERMIT & ACCESS MANAGEMENT DECISIONS BETWEEN STATE, COUNTY & LOCAL AGENCIES

This chapter explores one very important access management principle:

- To optimize the benefits of access management, multi-jurisdictional coordination with all appropriate transportation agencies is essential when applying access management standards on driveway permit, lot split, subdivision, site plan and other local zoning reviews. This is best accomplished through coordinated permit review and approval procedures involving local governments and road authorities.

When local governments approve development or redevelopment on a site without considering access issues typically addressed by road authorities during the driveway permit process, unnecessary conflict and project delays can occur. The same problem can arise if a road authority issues a driveway permit without local input. Access management is best achieved when state, regional, county and local units of government cooperate in land use and transportation management decisions. There are a growing number of good examples of access management cooperation between state and local governments in Michigan, and opportunities exist for even greater cooperation.

To best understand how state, county and local governments can cooperate on access management decisions, it is important to be familiar with MDOT's driveway permit program, and similar county road commission programs. It is also important to understand how the permit review process can be coordinated with local land use decisions.

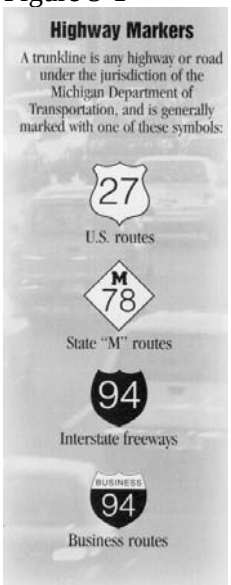
MDOT DRIVEWAY PERMIT PROGRAM

By law (1969 PA 200), property owners must obtain permission to connect a driveway to a public road or highway from the authority with jurisdiction over the road or highway. Administrative rules adopted for Act 200 establish procedures and restrictions for connecting driveways to state highways. State trunklines, which total about 9,300 miles, are generally marked with the symbols in Figure 5-1.

Property owners seeking a permit to connect a driveway to a state trunkline must apply for a permit at one of MDOT's Transportation Service Centers (TSCs). MDOT has seven regional offices and twenty-six TSCs throughout the state. See Figure 5-2 for a map of the regions and Appendix A for the address and other contact information. TSCs are responsible for accepting, reviewing and issuing driveway permits. A driveway permit application must be accompanied by a drawing or plan showing the proposed driveway's location, dimensions and surface type. Drainage design for stormwater runoff from the parcel of land is also an integral part of the driveway design and must be addressed as part of the driveway permit application.

MDOT's review process depends on the character of development, where the driveway is to be placed, and the type of highway involved. Land uses which will generate high traffic volumes result in more complicated driveway permit requests and require a longer time to review because they will more significantly impact the capacity and flow of vehicles on the highway. MDOT encourages

Figure 5-1



Source: Michigan Department of Transportation, *Improving Driveways and Access Management in Michigan*, 1996, p. 7.

Figure 5-2: MDOT Regions

permit applicants for large developments to consult the appropriate TSC for driveway design and geometric details at the earliest possible date. A traffic impact study may be required to be submitted. Local governments will benefit from the 1994 report titled **Evaluating Traffic Impact Studies, a Recommended Practice for Michigan Communities,** produced by the Tri-County Regional Planning Commission (in Lansing), the Southeast Michigan Council of Governments (in Detroit), and MDOT (see Appendix C for more information).

The driveway permit application process generally is as follows:

- A property owner or developer applies for a driveway permit using the appropriate permit application form. [SEE APPENDIX D.] The application includes a preliminary site plan indicating the proposed driveway locations, original ground elevations, and if determined necessary by the TSC, a trip generation and traffic impact study.
- The permit application and site plan are reviewed for:
  - required information,
  - potential environmental conflicts,
  - geometric design (engineering details of the driveway such as width, slope, curb radius, cross-section, etc.), safe sight distance, and provisions for traffic control during construction,
  - drainage design (both within and from the site) and any long-term effects on maintenance operations,
  - impact of the work proposed in the permit application on any proposed MDOT project in the same area, and
  - compliance with the permit fee schedule, bond and insurance requirements.
- MDOT determines if advance and/or final inspections are needed. If needed, MDOT will request that a five-day notice be given to the permit officer in writing, before permit work begins. If an inspection is needed, the permit applicant may be required to pay the cost.
- The application is approved or approved with conditions and a permit is issued, or the application is denied.

MDOT may stop any driveway construction for which a permit is required if the provisions of the permit are not satisfied, or if an individual fails to obtain the proper permit. Permit applicants may be liable for any costs incurred by MDOT while correcting a failure to comply with the terms and conditions of a permit, or failure to obtain a permit.

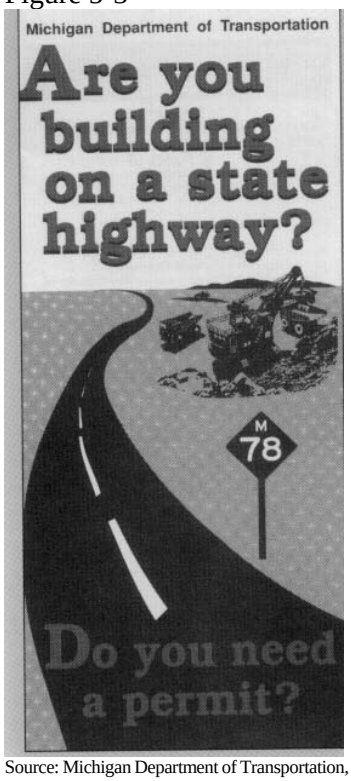
Some very large developments require the involvement of MDOT staff in Lansing. In those instances, the final decision regarding design and permit reviews are made jointly by MDOT's Lansing office and the local TSC. Permit enforcement, while typically the responsibility of local MDOT offices, may also involve the state Attorney General's (AG's) office.

The MDOT brochure illustrated in Figure 5-3 describes the driveway permit program. For a copy, please contact the TSC located near you.

COUNTY DRIVEWAY PERMIT PROGRAMS

Michigan's county road commissions maintain more than 85,000 miles of roads. Most county road commissions also administer driveway permit programs similar to MDOT's, for all county roads within their county. These permit programs are also based on authority in Public Act 200 of 1969

Figure 5-3



Source: Michigan Department of Transportation, *Improving Driveways and Access Management in Michigan*, 1996, p. 8.

and on rules adopted by county road commissions under the Act.

Driveway permits are usually issued from the county road commission main office. Permit review focuses on driveway design, drainage and sight distance. Some county road commissions also apply driveway separation, number of driveways, and other access management techniques addressed in this guidebook. More county road commissions are considering adopting access management standards. Appendix A includes address and other contact information for all county road commissions in Michigan.

LOCAL ACCESS MANAGEMENT PROGRAMS

Several dozen local governments in Michigan are administering access management regulations and more are considering adopting them. Most local access management regulations are embodied in local zoning ordinances and are based on corridor plans or access management plans. Chapters 6 and 7 present information on preparing local access management plans and Chapter 8 includes sample local access management regulations. An access management program includes a plan, applicable regulations, an action mechanism and adequate political commitment to see it successfully implemented.

The best access management programs are launched before problems develop, thereby preventing traffic crashes and preserving existing road capacity. Local access management programs range in sophistication from simple standards that separate and reduce the number of new driveways, to requirements for shared driveways and frontage roads, to remediation programs in already developed areas where access-related problems are severe (see techniques in Chapter 3).

Relationship to Local Land Development Approval Procedures

A critical part of successful access management is understanding the different orientation, responsibility and authority of Michigan's road authorities and local units of government as relates to land development adjacent to public roads and highways. While MDOT and county road commissions are responsible for most roads and streets, and all highways, land use decisions are most often made by local governments. Road authorities are responsible for activity within the right-of-way and for connections to public roads, highways and rights-of-way.

In contrast, local planning, zoning and elected officials are the principal community land use decision-makers. They are responsible for administering zoning and other land use regulations outside of public rights-of-way. Local officials are responsible for ensuring new development is consistent with local land use (or master) plans, is compatible with other land uses in the community and is in compliance with local regulations. These local officials are responsible for assessing the affects of land use decisions within their community's borders, but not beyond. The local development review process and driveway permit process are often independently performed. In other words, local officials often review proposed development and redevelopment plans without consulting the road agency (city, county or state) responsible for managing roadways adjacent to proposed development and vice versa.

Through zoning, subdivision regulations, condominium regulations, private road regulations, and building codes, local governments can approve proposed development or redevelopment projects with or without considering the impact on access.

Very often communities that don't administer access management regulations fail to consider the impacts of development on the road system. Similarly, road authorities sometimes fail to anticipate how certain driveway locations could undermine local land use objectives. Even though local officials and staff of road authorities often examine the very same site plans as part of their respective permit procedures, because they are concerned about different impacts, they often look at or for different things.

Sometimes a local government may assume the road authority is reviewing a site plan for some issues (e.g., internal vehicular circulation) when the road authority assumes the local government is doing that. In other cases, both the local government and the road authority are looking at the same element of a site plan in different ways (e.g., conformance with different driveway spacing standards).

Some local governments may not be well informed about MDOT's driveway permitting requirements or those of the county road commission. They also may know little about how development decisions affect the safety and function of state highways and county roads. Moreover, the process of driveway permitting often does not occur until after the final land use decision is made. As a result, road agencies often have little, if any, input into the land use decisions. This can result in frustration among all participants if project design changes are needed – after the final land use decision is made – to obtain a driveway permit. If access problems are identified too late in the process, some solutions that may have worked earlier in the design stage may no longer be options. Similarly, if the road authority issues a driveway permit before the local government has completed site plan review, the permit holder often tries to pressure the local government into approval of the site plan which reflects the approved driveway permit. This is problematic when the site plan doesn't comply with the communities' zoning standards.

Simply involving MDOT or the local road agency early in the process of planning and reviewing a proposed development or redevelopment project can produce many benefits. Access related issues can be raised earlier and solutions more easily found without any party going back to square one and starting over again. It all starts with open communication between local governments and road authorities on access management issues.

No laws or regulations require local planning, zoning and building permitting agencies to coordinate their efforts with MDOT and/or county road commissions. Some local governments have worked out informal procedures with MDOT offices or county road commissions. In these instances, it is usually because the local government has professional staff or consultants able and available to coordinate the process. Professionals in all organizations report these informal procedures have greatly improved the quality and in most cases, the efficiency of permit decisions.

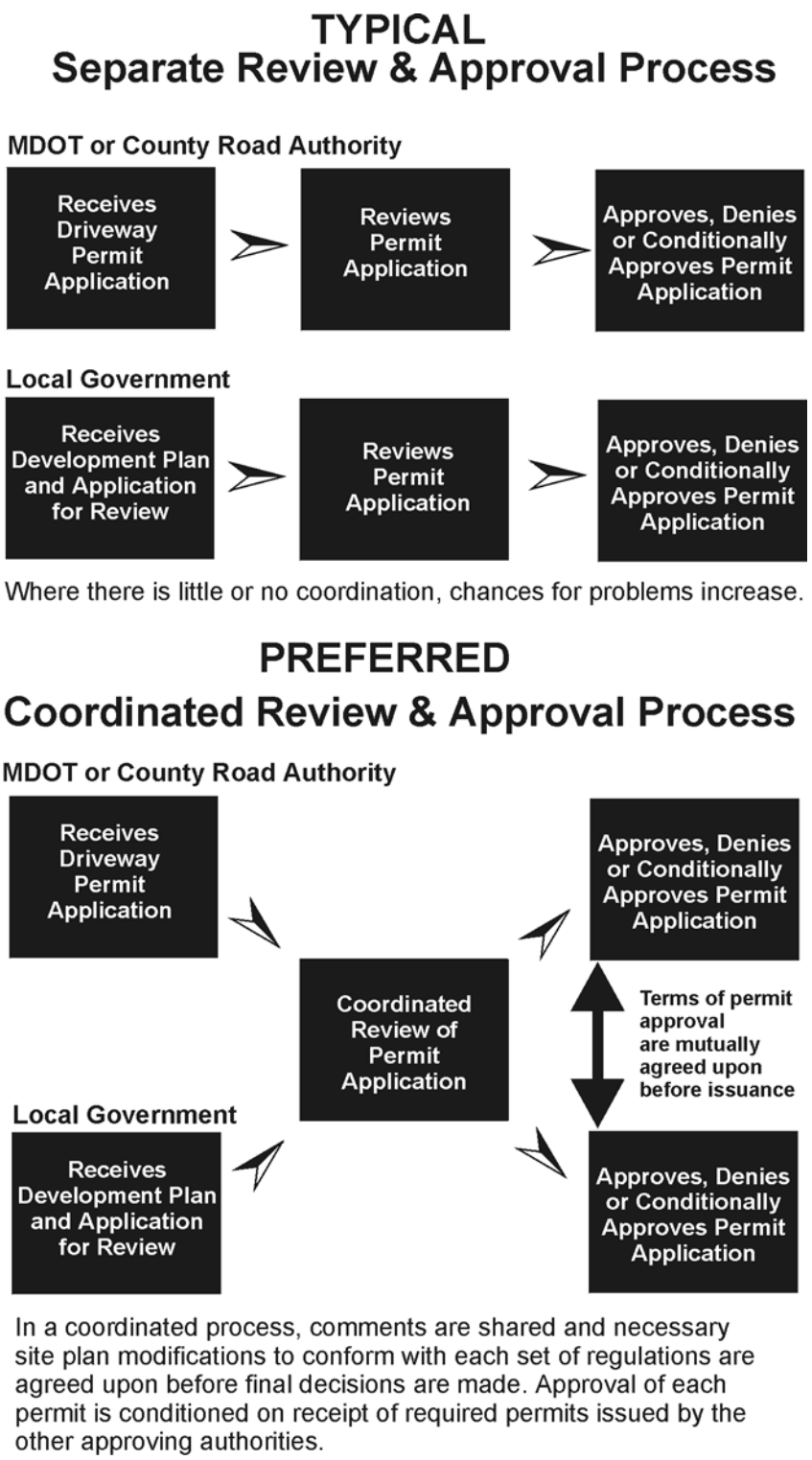
Some local governments specify within their zoning ordinance that coordination with and between the developer, local agency and the local road authority is required and that site plan approval is not granted until there is written agreement on driveway number, location, spacing and other key access considerations.

The top half of Figure 5-4 shows the typical separate project review procedures used by local governments and road agencies. The bottom half presents an alternative procedure used in some communities that coordinate development reviews with road authorities. This approach helps guarantee achievement of the objectives of all parties involved. This procedure works best when everyone understands that <u>both</u> site plans and driveway permit approvals <u>are required</u> before a developer can begin development or redevelopment activity.

OPPORTUNITIES FOR COORDINATED ACCESS MANAGEMENT

Better project review coordination between state, county and local governments leads to better access management. Better access management allows motorists to safely and conveniently access their homes and local businesses with fewer delays.

Figure 5-4



Adapted from: Michigan Department of Transportation, *Improving Driveways and Access Management in Michigan*, 1996, p. 9.

If local permit procedures were coordinated with MDOT and county road commission driveway permit procedures, many access conflicts and project delays could be avoided.

Benefits of Coordinated Decision Making

Coordinated land use and access management decision-making can:

- Prevent conflicts involving the community, developer, and a road authority created because: 1) a driveway permit was issued by MDOT or a road commission before local site plan review has been completed; 2) the community approved a site plan or building permit before determining if a driveway permit has been issued by MDOT or the county road authority.
- Build a professional relationship based on a common understanding of local road issues, which in turn can improve cooperation and mutual support on future maintenance, remedial and/or improvement projects.
- Prevent unnecessary redesign and delay, which typically results in higher costs for the developer.

Basic Elements of Coordinated Decision Making

The key elements of coordinated decision making are:

- All relevant government agencies review proposed projects at the same time, and share concerns with each other prior to commenting to the applicant,
- Compatible requirements and procedures, and
- Approval of each permit is conditioned on receipt of required permits issued by other approving authorities.

Coordinated decision-making requires MDOT or county road commission review of proposed site plans for most projects at the same time as they are being reviewed by local zoning authorities. Very large projects should go through a two-step review process, where the developer meets with the road authorities and local government officials early in the project design process. At the discretion of local officials, these preliminary site plan review meetings should be conducted together with the appropriate road authorities.

If local zoning authorities have no access management requirements, compatibility is not an issue. But if there are local access management regulations, and they conflict with the road agency's requirements, then in most cases, the applicant must comply with the most stringent regulations of both the community and the road agency. If the applicant does not meet both sets of requirements, then the applicant cannot begin development. If the responsible road authority is not aware of local regulations, it could issue a driveway permit that is inconsistent with local requirements.

By conditioning local site plan approval on receipt of required permits from the responsible road authority, the local government will assure compliance of the project with state and/or county road regulations. Similarly, MDOT and county road commissions that condition approval of their permits with local land use standards will help assure new development does not violate local zoning and related requirements.

One of the best ways to build a solid relationship for coordinated permit reviews is to work together when developing a local corridor plan or access management plan. When local governments in abutting jurisdictions along the same corridor work cooperatively with MDOT and county road authorities, everyone has the opportunity to develop a shared vision and reach consensus on access management requirements and review procedures that will work effectively. The chance for inconsistency, confusion and conflict can be nearly eliminated when local governments adopt local access management standards consistent with the elements of and access management plan that was cooperatively prepared with involvement of all affected local governments and road authorities. Chapter 6 describes a model planning process to achieve this end; and Chapter 7 presents model plan elements to include in an access management or corridor management plan.

Coordination between road authorities and local land use authorities is also the best way to ensure that future land use decisions protect motorists and the public's investment in Michigan's highways. Coordinated access management reduces traffic crashes and congestion, provides people easy access to and from homes and businesses, allows roads to carry the volume of traffic they were designed for, and helps communities grow and prosper.

Memorandum of Understanding (MOU)

Coordination between two government agencies is usually smoothest when each agency clearly understands the roles, responsibilities and expectations of the other and both agencies agree on the procedures to be followed. This is even more important when multiple jurisdictions along the same corridor share similar interests. One effective way to ensure coordination is through a memorandum of understanding.

A memorandum of understanding on access management would include the following:

- The entities and agencies that are covered by the agreement.
- The scope of the agreement:

- cooperation in development, review and joint approval of a multi-jurisdictional access management plan and/or corridor management plan,
- cooperation in development, review and joint approval of local access management regulations,
- cooperation in development, review and joint approval of procedures for review and approval of local land development applications (lot splits, plats, rezonings, special land uses, PUDs, site plans and some variances) on driveway permit decisions of road authorities,
- cooperation in review of specific applications for a development or driveway permit that coordinates the decision so there is assurance the regulations of all applicable entities are met prior to permit issuance by any one entity, including methods for conditioning approval of one permit upon receipt of a permit from another entity.

Appendix B includes a sample access management MOU that can be used jointly by road authorities and local governments. It is based on MOUs presently used by MDOT and some units of local government in Michigan, as well as on MOUs being used in other parts of the country.

Chapter 6
A MODEL PLANNING PROCESS FOR DEVELOPING AN ACCESS MANAGEMENT PROGRAM

This Chapter and Chapter 7 provide a basis for three principles that relate to development of a coordinated access management program. These principles are:

- Lay the foundation for correcting existing access management problems and preventing future ones in the local comprehensive plan and/or an access or corridor management plan.
- To optimize the benefits of access management, multi-jurisdictional coordination with all appropriate transportation agencies is essential when preparing access management plans, design techniques and the elements of local access management regulations.
- Educate the public about the benefits of access management and involve them in development of access management plans and implementation activities.

An access management program is a coordinated set of plans, regulations, capital improvements, and other actions necessary to achieve identified access management objectives in one or more units of local government. An access management program is developed by local governments, in cooperation with the road authorities with jurisdiction over the roads or corridors included in the program. The specific elements of a local access management program are defined in an access management plan, or a corridor management plan that has an access management component. This chapter presents a process for developing an access management program. Chapter 7 presents the specific elements that are typically included in an access management plan or a corridor management plan with an access management component. An access management or corridor management plan can be an important legal basis for local lot split, subdivision, condominium, zoning and any engineering standards applicable to roads and streets.

Steps in a model planning process for developing a local access management program are illustrated in Figure 6-1. The left column of Figure 6-1 illustrates the general steps in the planning process. The right column lists key steps that should be inserted in appropriate places, depending on local circumstances and desires of the local advisory committee. All steps are described in the remainder of this chapter, but local officials will need to mix elements in ways that best fit local needs. Communities that do not participate on a multi-jurisdictional corridor planning process, or which have a very limited need for access management regulations, should follow all steps in Figure 6-1 in an abbreviated fashion and only gather and analyze that data which is critical to better understanding the access management problems it wishes to solve. Communities with a need for an access management plan, but with few financial resources and/or professional staff or consultant assistance should review the last section of this chapter on funding assistance.

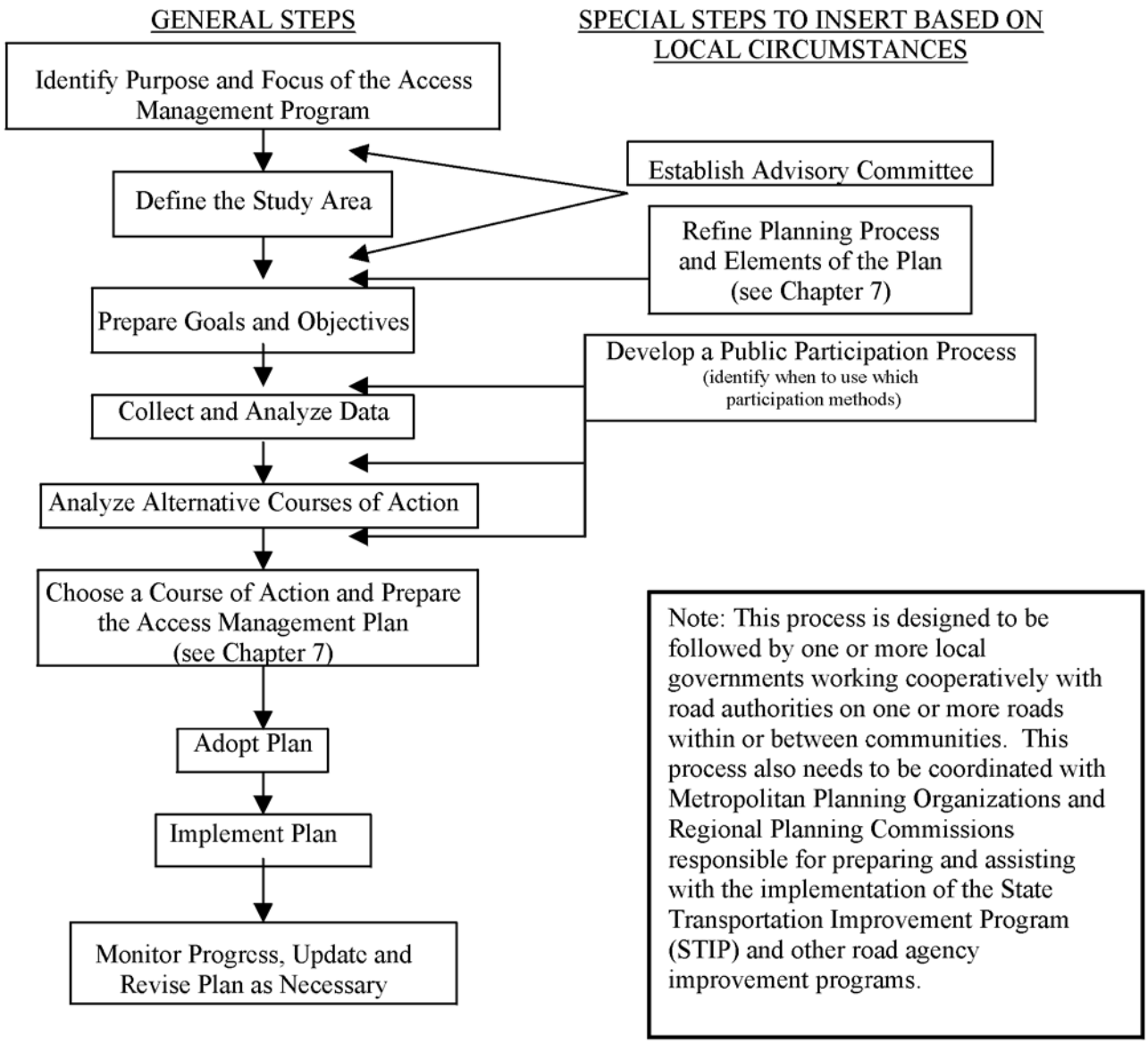
IDENTIFY THE PURPOSE AND FOCUS OF THE ACCESS MANAGEMENT PROGRAM

Identifying the purpose of the access management program will significantly guide whether to prepare an access management plan or a corridor management plan, and which techniques to use. Typical purposes of an access management program include:

- Improve the overall safety of the transportation system,
- Reduce congestion on designated arterials,
- Reduce traffic crashes in certain locations,
- Improve traffic flow throughout the road network,
- Target improvements to stretch available resources,
- Preserve the investment in roads in areas where significant improvements were recently made,

Figure 6-1

ACCESS MANAGEMENT PLANNING PROCESS



Prepared by Michele Manning, Planning & Zoning Center, Inc.

- Improve the visual appearance of land uses in an area.

Many of these purposes fall into two categories of activities:

- remedial, or
- preventive.

Strategies for remedial and preventive access management are different, so a community should identify which category (perhaps both) applies.

Remedial

Remedial access management focuses on reducing congestion, improving safety (and often aesthetic) conditions on arterials that already have developed into the familiar strip pattern with numerous separate driveways. These techniques focus on retrofitting solutions that are often accomplished as the opportunity presents itself. For example, a street resurfacing is an opportunity to close excess driveways. The addition of more parking to accommodate an office expansion is an opportunity to consolidate and redesign driveways and internal site circulation. Other techniques that are often opportunistic to apply include creating frontage or rear access roads, linking adjacent parking lots with easements, and installing right- or left-turn lanes. Older strips may take a long time to retrofit, but if the local zoning ordinance requires access improvements as rehabilitation and redevelopment takes place, over time there will be improvement. Strip commercial areas with high traffic volumes often have surprisingly high business changes – each of which may present an opportunity for improving access management. Fast food restaurant buildings, in particular, have a useful life of 12-20 years. Each time a major upgrade, or complete teardown and rebuild occurs is a chance to improve access management on the site.

Preventive

Preventive access management focuses on protecting the functional (vehicle carrying) integrity of the existing corridor from a future with too many driveways. Preventive access management can begin with targeting areas for larger lot sizes, "locking in" or restricting the number of future driveways on the arterial and planning for commercial nodes rather than commercial strips. Preventive techniques might also include creating land use plans with more attention to mixed use and flexible zoning.

Both remedial and preventive situations can easily occur within the same community, sometimes even on the same arterial. A community dealing with both of these situations should use techniques specifically geared toward each of the situations. One set of solutions may not accommodate both of these situations. For example, a corridor may have a stretch of commercial development with little driveway separation. Further down the road there may be undeveloped land. The community may utilize retrofitting solutions for the developed areas and use preventive solutions in the undeveloped area.

Identify Whether to Take an Area Wide Approach or Corridor Approach

Once a community articulates the purposes for which an access management program is being prepared and the degree to which the focus is remedial, preventive or both, then it needs to decide whether to focus on particular corridors or whether to take a community-wide approach.

If the community has significant amounts of undeveloped land, is in the path of development and/or expects to grow substantially in the next two decades, and significant portions of the community are or will develop in nonresidential uses, then a community-wide access management program is best. Many fully developed urban communities also choose to develop a community-wide program because access management problems are pervasive. In contrast, if the community only has a few non-local streets or is primarily agricultural and/or forested and unlikely to have much pressure for more intensive uses, then a corridor specific approach is often the best approach.

For communities that fall in between, then the approach should meld appropriate elements from both the community-wide and corridor approaches. This may involve identifying the most common access management problems and adopting a basic set of access management regulations that include provisions to address the common problems. These efforts would be supplemented with corridor specific plans, overlay regulations and other improvement activities on specific corridors as necessary.

In townships with one or two state trunklines, the best approach is often developing access management plans for the trunklines in cooperation with MDOT and local regulations for the trunkline based on the samples in Chapter 8. The townships should also assist with the development of a contemporary set of access management regulations in cooperation with and for adoption by the County Road Commission. That way all county roads and state trunklines in the township are covered.

DEFINE THE STUDY AREA

Once the purpose and focus of the access management program are established, then the beginning and ending points of the corridor(s) to be studied must be delineated. (Unless a community-wide approach is to be used, in which case the study area is the entire community).

Obvious choices for corridors to be studied are corridors with high crash rates coupled with numerous curb cuts. The community should also study any corridor where sanitary sewer and/or water lines are proposed to be extended, any interchange areas or any roads with pressure to develop in a strip or linear fashion.

Roads of a higher functional classification (see Chapter 2) should usually be priority corridors for study. Arterials that are experiencing significant increases in traffic or those determined to be functioning poorly may also be candidates for access management. Traffic flow can often be improved through the implementation of access management techniques (left-turn lanes, medians, consolidated driveways, etc.). Where traffic flow is diminishing and there is evidence poor access management is a part of the reason, these corridors should be targeted for study.

FORM ADVISORY COMMITTEE

Whether the community prepares a corridor management plan with an access management component, or an access management plan, it is important that an advisory committee be created. The committee should help ensure a comprehensive and coordinated approach. It is important that the committee have a range of experiences, viewpoints and expertise, but should not be dominated by any one group of interests. The task of preparing an access management plan is a responsibility with a fundamental purpose to advance and protect present and future public interests. The impact on private interests in general, and affected property owners in particular is critical, but neither should dominate the committee representatives nor meeting participation. Neither should local government officials or road agency personnel be dominant members or participants. In the end, success of the plan will be measured by how well it advanced short and long term public and private interests. The typical composition of an access management advisory committee includes persons from the following groups (the first two groups are critical members). If the corridor runs through more than one jurisdiction, be sure each jurisdiction is equally represented.

Include representatives of:

- Local road authorities (e.g. public works/ streets dept., county road commission, regional planning commission or metropolitan planning organization)
- Michigan Department of Transportation (where a state highway is involved)
- Public safety authorities (police, fire, etc.)
- Planning commission
- Governing body
- Business organizations along corridor
- Neighborhood organizations along corridor
- Local transit providers (particularly where there are bus stops along the studied corridors)
- Other interested parties (usually other landowners along the corridor).

Involving those that may be unfamiliar with access management, but have much to gain from preserved traffic flow and improved traffic safety, such as businesses along a corridor, provides an opportunity for dialogue and education that can lead to consensus and acceptance of the plan. Not involving all the major interested and affected parties only breeds opposition which may be hard to stop if the general citizenry believes the input was unfair or under-represented.

Importance of Inter-jurisdictional Involvement

It is not uncommon for a road corridor to cross through numerous jurisdictions. In order to have the most effective access management plan, communities should involve all affected jurisdictions in the access management process. Involving surrounding jurisdictions will result in

better coordinated recommendations, more uniform regulations and often in an improved appearance along the whole corridor.

Regional government entities such as a Metropolitan Planning Organization (MPO) or Council of Governments (COG) can be the best entity to guide an access management effort, particularly if qualified staff is available. They are usually considered a neutral broker which has close working relationships with all the affected road authorities. The MPO may also provide a forum for jurisdictions to work out concerns on an even playing field. (See sidebar on successful regional cooperation for access management in the Grand Rapids area.)

NORTH EAST BELTLINE JOINT DEVELOPMENT PLAN

This plan was coordinated by the Grand Valley Metro Council and adopted in 1998 by the North East Beltline Joint Planning Board with representatives from Plainfield Charter Township, Grand Rapids Charter Township and the City of Grand Rapids. The plan utilizes land use to focus emerging development at nodes, rather than along the corridor. The nodes would contain a mix of land uses to allow for minimum travel out onto the arterial. The nodes would also encourage cross easements between properties to minimize the driveways on the East Beltline.

This plan was developed to preserve the functional capacity of the East Beltline with increased growth planned for the area. The limited number of driveways and mix of land uses should lead to less traffic congestion associated with the land uses along this corridor.

REFINE PLANNING PROCESS

If the access management planning process only involves a single jurisdiction, it will probably be led by a single entity, such as the municipal streets department or planning department and the model planning process proposed in this chapter will probably be adequate. However, if it is a multi-jurisdictional plan, then the advisory committee will probably be sharing major responsibility for the project and it will likely be necessary to get the concurrence of all jurisdictions in the planning process being followed. The group may decide to vary from the model process presented here.

DEVELOP PUBLIC PARTICIPATION PROCESS

One of the first tasks after assembling the advisory committee will be to develop a public participation process for input into the access management plan. Public participation can come in the form of focus groups, surveys, interviews, town meetings, workshops, public hearings, and other means. The process selected should identify the points at which public input would be sought and the means to be used.

Public participation early in the study can provide a means of collecting important information about access issues, such as safety perceptions of various roads or local developments. Also the public is often aware of access problems that may not have previously been reported.

Public participation is also necessary as the plan is developing. Once alternative or proposed strategies for access management have been prepared, the public should be invited to voice their opinions on the proposals.

Effective public input is always preceded by dissemination of appropriate educational or background materials so the public is adequately informed about proposals before being asked to express opinions on them. Sometimes a series of community forums are held. Other times summary materials are mailed to landowners along the corridor or inserted in a local newspaper. Increasingly, websites are being used. Where public opinion on specific options is sought, surveys are often used. It is unwise to assume that the public in general, or businesses and other land owners along congested corridors in particular, will

oppose access management options, like consolidating driveways, without asking them. Where the benefits of options are clearly presented (especially relative to the costs and time associated with other options), they are often welcomed. While some feedback on options should first be gathered in person, more opinions can be systematically obtained by means of a survey.

Surveys should measure citizen and business responses separately to better understand public opinion. The community should also not assume that businesses oppose access management techniques. Table 6-1 indicates the high approval of businesses in a 1987 survey in Flint Township to consolidating driveways as an important way to improve the quality of access along the main shopping arterial in the Township. Over 98% of business respondents in a survey of three townships along Tittabawassee Road near Saginaw recognized that people will avoid a business that is hard to access. Sixty-four percent recognized that fewer and more clearly marked driveways leading to businesses would improve the overall traffic flow. Table 6-2 presents more results from this survey.

Table 6-1: Flint Township Survey of Businesses about Driveway Consolidation

	Retail Sales	**Industrial**	**Personal Services**	**Commercial Services**
Favor	89%	65%	85%	80%
Oppose	2%	19%	11%	7%
Don't Know	9%	16%	5%	13%

Source: *Flint Township*, Widgery & Associates, 1987.

PREPARE GOALS AND OBJECTIVES

The advisory committee should determine goals and objectives specific to the corridor(s) under study, or to the community. For example, if the primary concern of the community and the committee is safety on a particular corridor, then goals and objectives that reflect that concern need to be adopted so that the plan will address them. In most cases, goals and objectives will attempt to achieve multiple benefits. Typical benefits of access management are listed in the accompanying sidebar on page 6-7.

Table 6-2: Business and Citizen Survey Responses on Traffic & Corridor Appearance Issues

Question	**% Businesses Agreeing**	**% Residents Agreeing**
People will avoid a business that is difficult to access	98%	54%
Right-turn lanes on Tittabawassee Road at entrances to business would improve traffic flow	90%	94%
Fewer and more clearly marked driveways leading to businesses would improve the overall traffic flow of Tittabawassee road	64%	69%
Townships that border Tittabawassee road should encourage businesses to develop shared driveways	69%	83%
Service drives that link one business to another should be encouraged	Not asked	96%
Standards should be in place to encourage the development of landscaped area for all communities that border Tittabawassee Road	64%	75%
Signs advertising or showing the location of businesses should be uniform in size and height	54%	73%
The communities that border Tittabawassee should have similar ordinances to maintain similar rules and appearance among communities.	79%	81%

Source: *Saginaw Charter, Kochville and Tittabawassee Townships Opinion Survey, Tittabawassee Road Corridor Study*, 1999.

COLLECT AND ANALYZE DATA

Collecting pertinent traffic data is a very important step within the planning process. Data that is specific to the corridors under study will give an idea of the problems and priorities for access management. The data should provide support for subsequent community actions. For example, if data shows that the primary problem with an arterial is the lack of safe left-turn movements out of a shopping center, the data can be a significant piece of evidence for developing and selecting among alternative proposed access management improvements.

Benefits of Access Management For Rural Areas

- Can help to maintain or enhance the existing character of the community.
- Decrease crashes, increase safety for vehicles and pedestrians.
- Prevent future access-related congestion problems and perhaps costly future road widening or other improvements.
- Maintain traffic flow and travel time.
- Preserve public investment in roadway.
- Maintain emergency response times.
- Improve quality of life.

Benefits of Access Management For Urban and Suburban Areas

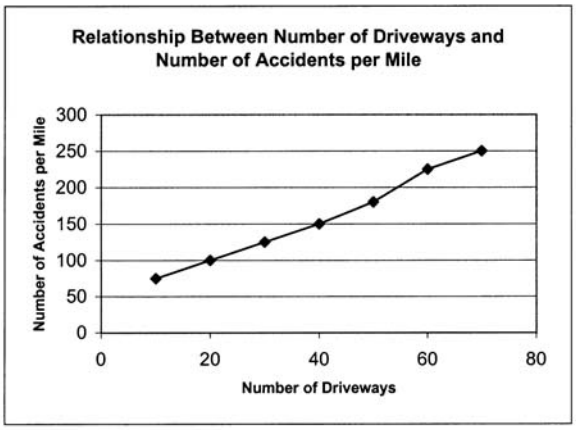
- Can help to maintain or enhance the existing character of the community.
- Decrease crashes, increase safety for vehicles and pedestrians.
- Prevent future access related congestion problems and perhaps costly future road widening or other improvements.
- Maintain or improve traffic flow and travel time.
- Preserve public investment in roadway.
- Reduces pressure for neighborhood "cut-through" traffic and with it a key cause of "road rage".
- Decrease congestion.
- May assist in obtaining funding for other road improvements.
- Improve economic stability of a commercial corridor.
- Improve emergency response times.
- Improve quality of life.

Crash Data

Identify High Crash and Potential Problem Locations

Where crash data are easily available, it can be an important element in developing an access management plan. Very often, high crash areas are associated with poor access design. Figure 6-3 depicts the relationship between curb cuts and crashes per mile. Studies from across the nation have confirmed that fewer access points, better driveway spacing and improved driveway design significantly reduce crash potential.[1] Where crash data is not easily available, information on travel delays and congestion may be easier to obtain and are often easier for motorists to associate with. This can be gathered by comparing traffic count data at different times of the day with similar periods a few years earlier, or counting the number of signal changes motorists sit through during peak times at congested intersections.

Figure 6-3



Source: Urbitran, 1996.

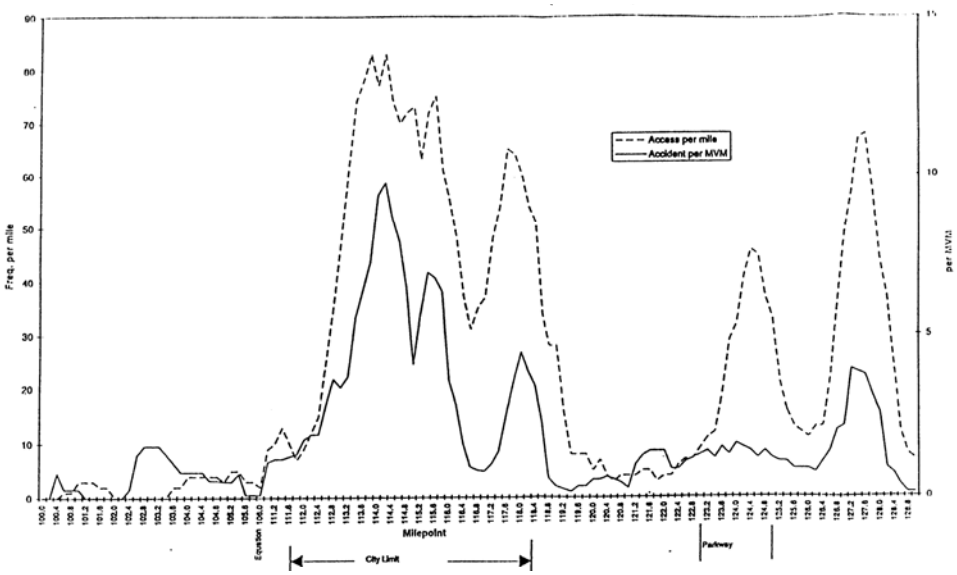
Identify Crash Patterns

Crash patterns show the breakdown of crashes per mile, quarter mile, or whatever unit detailed records will depict. The more detail, the more easily crash

[1] National Highway Institute Access Management Course 15255, 1998.

Figure 6-4

Relationship Between Accident Rates and Number of Access Points Per Mile on US 101, Oregon



Source: Portland State University for Oregon DOT, *Traffic Safety and Parkway Development—Assessment and Evaluation*, 1995

patterns can be linked with the probable causes for the crash.

Crash patterns can tell a significant story of their own, but when related to the number of access points on the road, the cause of the crashes becomes more easily interpreted. In Figure 6-4, the Oregon Department of Transportation analyzed the correlation of crash rates and number of access points at various mile markers. The graph shows a clear connection between crashes and access points, within the city limits, but notice how much lower crash rates are where traffic is separated by a median in a parkway.

The cause of crashes can be determined through expert analysis using techniques such as crash diagram analysis. Appendix C presents a standard methodology for performing crash diagram analysis. A qualified professional should be consulted to ensure proper interpretation of crash diagram analysis. Various design issues can be significant factors. For example, tight curves, closely spaced driveways, or obstructed sight lines can be very important. Weather or the affects of weather can also play a significant factor. Photos 6-1 and 6-2 illustrate the contrast between winter and spring driveway conditions along a major arterial.

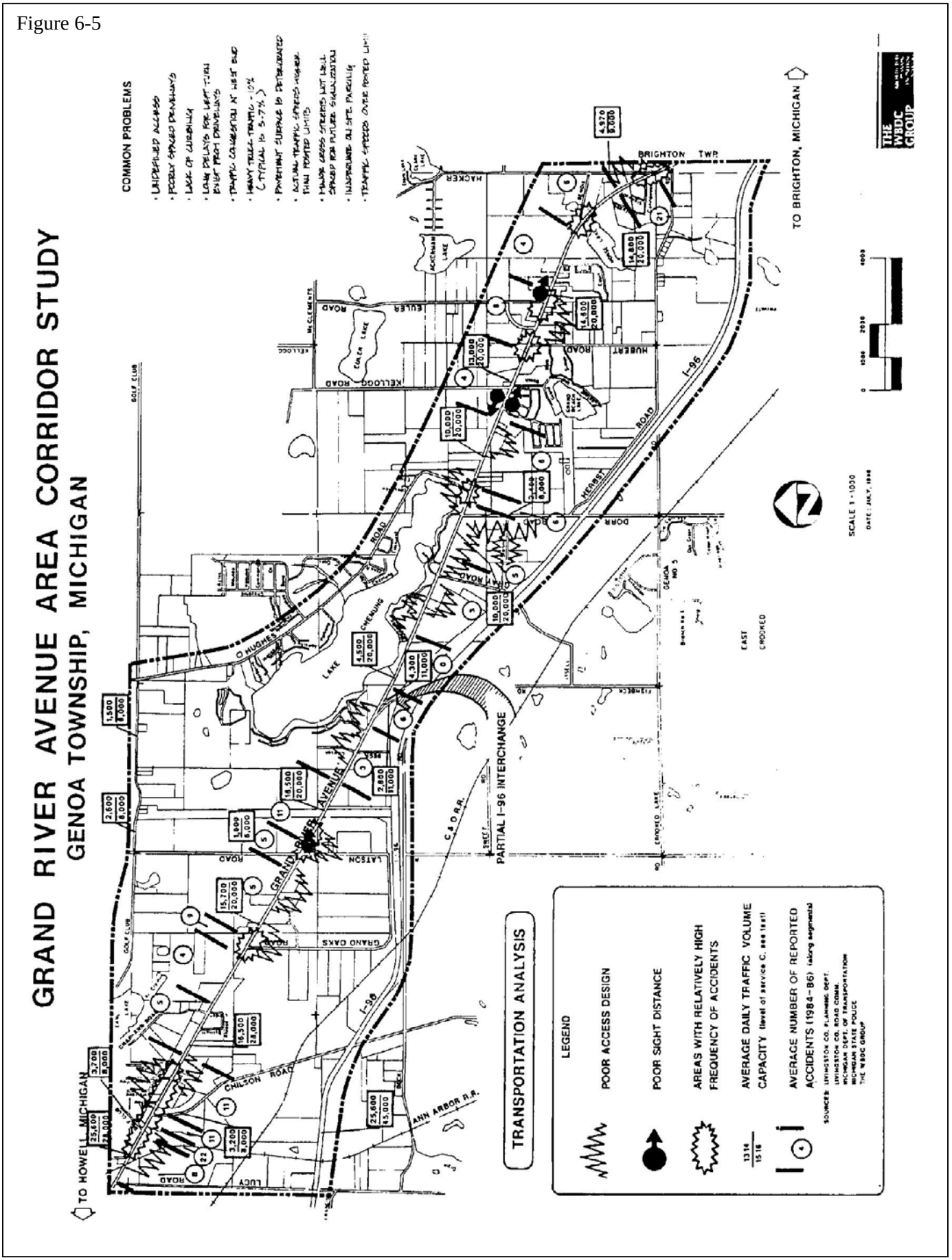
Figure 6-5 graphically displays problem locations with poor access and high accidents on Grand River Avenue within Genoa Township (July 1988). This

Photo 6-1

Photo 6-2

Photos by Michele Manning and Mark Wyckoff, Planning & Zoning Center, Inc.

Figure 6-5


GRAND RIVER AVENUE AREA CORRIDOR STUDY
GENOA TOWNSHIP, MICHIGAN
COMMON PROBLEMS
TRANSPORTATION ANALYSIS
LEGEND
POOR ACCESS DESIGN
POOR SIGHT DISTANCE
AREAS WITH RELATIVELY HIGH FREQUENCY OF ACCIDENTS
AVERAGE DAILY TRAFFIC VOLUME
AVERAGE NUMBER OF REPORTED ACCIDENTS (1984-86)
TO HOWELL, MICHIGAN
TO BRIGHTON, MICHIGAN
BRIGHTON TWP.
PARTIAL I-96 INTERCHANGE
GRAND RIVER AVENUE
CHILSON ROAD
LATSON ROAD
GRAND OAKS
KELLOGG ROAD
HUBERT ROAD
DORR ROAD
I-96
C & O R.R.
ANN ARBOR R.R.
THE WBDC GROUP

type of illustration can be very effective in educating decision makers about important problem locations.

Begin to Identify Possible Remedial Access Management Actions

At this point in the process, access problems may begin to become apparent. However, do not rush to a solution without considering land use trends and future traffic demands. While the current situation may indicate that driveway design improvements are needed, study of the land use trends and future demand may lead to larger or more comprehensive actions, perhaps a median or turn lane or service road. Preliminarily, discussions can begin to identify possible remedial access management actions based on techniques in Chapter 3. Later within this Chapter and in Chapter 7 the actual development of the access management plan will be discussed and that is the appropriate time to decide on the appropriate course of action, after public and affected property owner input.

Other Data

Traffic Analysis

A traffic analysis study detailing peak hour volumes and existing and potential areas of traffic congestion should be conducted regularly to determine traffic flow and rate of traffic increases or decreases over time. Travel time delays at busy intersections during peak periods is also useful information to gather.

More comprehensive traffic impact analysis may be warranted where high traffic land uses are expected. Typically uses that generate over 750 trips per day or over 100 trips during the peak hour would warrant a traffic impact analysis. Traffic impact analysis allows a community to evaluate a project based on new traffic expected and allows for potential access problems to be addressed early. See Appendix C for information on obtaining the MDOT sponsored guidebook **Evaluating Traffic Impact.**

Road Geometry

Road geometry, some curves and grades along a corridor, can have important implications for safety planning and driveway placement. Road geometry data should be collected and considered while considering access management techniques, because they can have direct implications on the design. For example, driveways along a curve may be targeted for consolidation to avoid dangerous access points.

Map Driveways

Often the most important piece of information is the specific location of existing (and approved but not yet constructed) driveways. Count the number of driveways on each side of the road and map their location. This data is often easiest to use if the driveway map can be overlaid on an aerial photo (of the same scale). Principal and accessory buildings, parking, driveways, loading docks, intersections, etc. are all easy to see relative to mapped property lines and driveways. Driveway consolidation options are most evident from such maps. Aerial photos should be updated every five years and should have a scale of 1"=50' or less to easily spot changes. Digital aerial photos can be overlaid with parcel information on a computerized geographic information system (GIS) to enhance analysis.

Map Parcel Frontage, Depth and Use

Mapped parcel boundary lines and land use are important in the analysis of existing problems and potential solutions. These maps will become the basis for any future plans for service drives, establishing easements between properties, installing turn lanes, etc. Again, GIS maps can be extremely valuable in this analysis.

Road Right-of-Way

An accurate map of the road right-of-way relative to parcel lines and driveways should also be maintained to best analyze potential solutions. Future turn lanes, medians, and intersection improvements all require adequate right-of-way. These solutions can be analyzed more quickly and efficiently with an accurate right-of-way map. Local and other connecting streets also need to be depicted for at least ½ mile from an arterial if the plan is corridor based.

Assess Land Division and Land Use Trends

Obviously, the traffic volume and crash data previously discussed need to be analyzed over time to identify trends and specific problem areas. At

the same time, data related to land division, land use and roadway character needs to be gathered and analyzed to identify important trends. This information will help establish whether the traffic volume and crash data is likely to change significantly because of land use changes.

Because poorly planned land use change can contribute to traffic congestion and safety problems over time, an access management plan should analyze land division and land use trends. Planning ahead can avert problem areas and create a deeper understanding of how land divisions and land uses contribute to crashes and traffic congestion.

All of the land division and subdivision activity along or near major corridors over a specified period of time (like 10-15 years) should be identified and mapped. Lot sizes, width, shape and relationship to the road and street system should all be examined. Where new lots have been created, but not yet developed, and opportunities for alternative access (like front or rear service drives) are feasible, they should be identified and discussed. Where separate driveways and shared driveways are possible, owners should also be consulted. Where large areas of land have not yet been divided, measures to "lock in" future driveways should be considered.

Land use trends to focus on will be those areas that have newly developed or redeveloped with a change in land use. For example, when a low intensity land use like agriculture is converted to a subdivision, commercial mall or industrial facility, there is usually a sharp increase in traffic. The cumulative effect of many smaller changes over time, however, can often be greater. It is important to identify these and other land use trends and to project them forward (where additional change is feasible) to get insight into the implication of continuing these trends.

Roadway Character

Character of the roadway is a critical issue in many communities, especially in historic or scenic areas. Where a corridor management plan includes aesthetic concerns, then it is important to document existing character and changes to that character over a period of time (often 10-15 years). This involves preparing a photographic record of corridors and accurate descriptions of their natural and built character, by road segment. It also requires documenting how and where the character has changed over time, and how (if at all) it has changed in negative ways.

Where a small town character is changing to a suburban character because of the common color, size and scale of fast food restaurants and retail big box establishments, the community should examine the extent to which local regulations contribute to those designs (if unwanted). For example, parking in the front of buildings and deep setbacks are often required, if not sanctioned by local zoning. However, if the community wants to retain a small town character, it may instead want to continue to locate retail stores close to roadways with parking in the back.

The location and characteristics of signs, natural features and landscaping can also have a significant affect on character over time. These features need to be documented along with changes over time.

Where the character is rural and very scenic, and land use trends are resulting in negative impacts on scenic views and natural character, communities have to decide what they wish to achieve. If a roadway is preserved as scenic it severely limits other uses. Communities that make road character preservation a priority have benefited from tourism and preservation of community character. Organizations like Scenic Michigan and local land conservancies offer options for open space preservation for communities that are interested. Purchasing scenic easements may be the best option in some areas. If so, roadway function is also maintained as no new driveways can be constructed on property abutting a road with scenic easements in place.

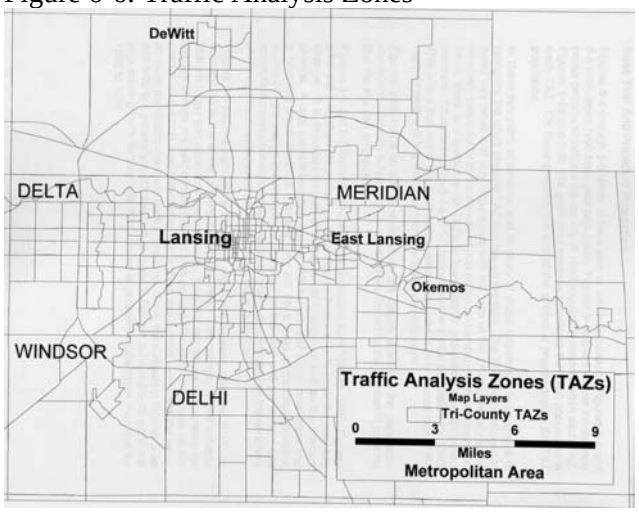
Estimate Future Demand

The following three methods are often used to estimate future travel demand and its impact on an arterial or road system. Each of these methods requires input by trained professionals. Data may be available from a local MPO or COG, which

could assist with analysis if travel demand data for particular roads is not readily available.

1. Trends in population, households, employment, and vehicular trips: Since new traffic is a result of land use change and trip behavior played out on a road network, it is essential to look at fundamental features that drive land use change if we are to have an accurate idea of future traffic. In particular, current and projected population, employment and various household data are key information to gather and project. Most of this data are gathered and stored on a small area basis in what are called traffic analysis zones (TAZ). A TAZ is a part of a jurisdiction with (usually) an identifiable border. It could be a block, a multiple block, or even a several square mile area. See Figure 6-6.

Figure 6-6: Traffic Analysis Zones



Source: Tri-County Regional Planning Commission, *Regional Transportation Plan*, 1995.

Information on the number of people living in a TAZ today and projected to live there at various points of time in the future is fundamental to estimating future travel demand. This data is most accurate in the years closest to a decennial or special local census. It must be estimated at other times based on changes in the number of dwelling units in the area (existing units plus new construction, minus demolitions).

The number of people who work in a TAZ today and in the future is another key element of travel demand. Which employment sectors (agricultural, manufacturing, etc.) and how many employees each will contribute are also important to refining employment projections. Employment by place of work survey data is supplemented with projected employment based on proposed future land use in the TAZ (usually as illustrated on local future land use maps or permitted by local zoning).

Data on several household related characteristics rounds out key inputs to traffic models. In particular, total households, average residential densities, average household size and average vehicles per household, by TAZ are key variables that are gathered, examined and projected into the future.

Future projections of these variables are usually done in a variety of ways. One of the simplest is to look at change over the recent past (e.g., 10-15 years) and project the trend into the future. Obviously, if the future continues along the trend line of the past, the projection will be a good one. However, if the economy slows or a more intensive major land use is built instead of a less intensive one (such as a mall instead of a residential subdivision) the projections will not be as good.

2. Relationship to the Master Plan: One of the ways to improve population, household, trip and employment projections is to incorporate as many proposed or anticipated future developments into the projections as possible. This involves talking to developers and major businesses to get an idea of major plans for expansion or contraction.

Another way is to look at the local master plan, zoning ordinance and capital improvement program. In communities with a strong planning program, these documents will provide important insights into future development potential. They will be most useful in communities that routinely update local plans and which tie zoning and capital improvements to those plans.

The situation is much different when examining a community that has built out (like a large older city) and that of an emerging suburban township where little new development has occurred. In the older city, the plan will largely focus on redevelopment and major new activity centers may be planned, or a former one may be planned for

major rejuvenation. In the suburbanizing township, there is so much undeveloped land that new development could take many forms, densities and locations — each of which may have very different traffic impacts. Here the issue is largely whether the community has and follows a future land use plan. If it does, it will "predict" future development locations. If it doesn't, market forces (which are often much harder to project) will guide future land use. The timing and location of new sewer and water lines and of road extensions or expansions however, are usually good indicators of future growth corridors.

In either case, buildout analysis can provide another perspective. A buildout analysis shows the total population and dwelling units if a community fully develops based on existing zoning or the adopted future land use plan. This usually produces a final dwelling count and nonresidential total square footage which could be considered a "worst case" scenario, from which future traffic can be projected.

3. Traffic Models: Many jurisdictions and most metropolitan planning organizations utilize traffic modeling as a sophisticated method of predicting future traffic on an arterial or road network. Traffic modeling is a mathematical representation of traffic movement within an area based on observed relationships between origins and destinations within the area modeled. Traffic models use present and projected population, employment, household, vehicle, traffic volumes, trip origin and destination, and other data to scientifically model future traffic volumes on a road network.

These projections are then compared to existing traffic levels to establish the difference (usually traffic growth) expected to take place. Projections at 5 year increments are common. Volume projections are compared to existing capacity to identify deficiencies and conflicts. Alternative ways to meet the identified needs can then be devised. Where there is no traffic model, all the available data described in the preceding paragraphs of this section are examined by transportation planners or traffic engineers and corridor-specific projections of future demand are made. Future demand projections indicate future traffic volumes across the entire road network based on new household, employment and anticipated trip behavior. It is very helpful in predicting road segments, intersections and corridors likely to experience congestion and approximately when it is likely to occur.

ANALYZE ALTERNATIVE COURSES OF ACTION

At this point, all the most important data should be gathered and analyzed. Current problems should be clearly identified. Future projections should be known and the implications should be clear. It is time to identify a range of alternative actions that could be taken to solve identified problems, prevent future potential problems and achieve the goals and objectives set forth at the start of the planning process. Often the range of alternative actions is organized by cost and complexity. All options are compared to doing nothing (i.e. allowing current trends to continue). The simplest and lowest cost options are often presented first. The most complex and highest cost options are presented last.

Frequently, the most complex and highest cost options include building new roads, major reconstruction projects, or a bypass around a congested area. This is where many traditional access management techniques shine. Driveway consolidation and redesign can make a noticeable difference on congested roads at comparatively low cost. This is especially true if done in conjunction with a curb repair and resurfacing project. If front or rear service drives are viable options, then further congestion reduction will be achieved—at little cost where private businesses pick up the expense. Of course, for these options to be acceptable, the study team and/or advisory committee will need to work closely with affected property owners to explain the pros and cons of each alternative. When business owners understand the safety and convenience benefits of many access management techniques they are often supportive. When they realize the delayed time and high cost for other "engineered" solutions, they usually support the simpler, lower cost access management options as pilot projects. If these are successful, more effort is not necessary, if they

aren't, road authorities will know the simpler and lower cost options have already been tried. Sometimes low cost access management techniques will not be helpful. That is when the full toolbox of access management techniques must be consulted. It may be that restricted left-turns or medians would help solve the identified problems. These are often not "low cost" techniques, but may relieve the congestion and restore the desired traffic flow.

In addition to sharing all options with affected businesses and property owners, it is also important to share them with the broader public. As described earlier in this Chapter, there are many different ways to do this.

CHOOSE A COURSE OF ACTION AND PREPARE THE ACCESS MANAGEMENT PLAN

Once public and property owner input on alternative actions is received, it is time to settle on a preferred course of action and document the process, data and recommended implementation steps in an access management plan. As mentioned earlier, this could be a freestanding document, or a part of a corridor plan, or part of the transportation section of a local comprehensive or master plan.

The access management plan will include:

- a description of the process followed to create it,
- a definition of the study area,
- the goals and objectives of the plan,
- a summary of the data gathered and analyzed,
- the implications if existing trends continue,
- a clear statement of the identified problems and options proposed to address them
- a summary of property owner and business input,
- a list of alternatives considered and anticipated pros and cons of each alternative,
- a list of recommended actions with estimated costs, timing and implementation responsibility.

Any proposed new access management policies will be detailed along with the scope of new regulations, and capital improvements necessary for the plan to be successful. The plan will be reviewed in draft form by the advisory committee before being forwarded to the planning commission, and then the governing body for endorsement or adoption. More details on the contents of an access management plan are presented in Chapter 7.

ADOPT PLAN

Following a successful public participation process, which may or may not require a public hearing (it depends on who adopts the plan, a public hearing is required if the planning commission adopts it), the plan can be adopted. If it is a multi-jurisdiction plan, it will likely need to be adopted by each jurisdiction along the corridor.

IMPLEMENT PLAN

Adoption and implementation of access management regulations and making targeted public improvements consistent with the selected access management strategies should begin shortly after plan adoption. Implementation activities usually include adopting and administering access management regulations, coordinating development reviews with road authorities and making targeted road improvements. Implementation should be coordinated with county and state road authorities to assure a smooth process. See Chapter 7 for a more detailed description of alternative implementation strategies and consult Chapter 8 for sample access management ordinances.

MONITOR PROGRESS

The adopted access management plan and regulatory tools should be monitored for degree of success and for potential problems. Key data like crashes, traffic volumes, and travel delay can be monitored to see if progress is being made. Alternate measures can be taken if the initial results

indicate that more effort is needed. The plan should be reviewed and updated at regular intervals, or as needed. A multi-jurisdictional access management plan can be monitored by periodically checking achievement against the terms of a memorandum of understanding signed by all jurisdictions and road authorities involved in the project.

SOURCES OF FUNDING ASSISTANCE

Funding for access management (beyond purely local funds) comes in two categories: 1) Funding for the development of a Corridor Management Plan or for an Access Management Plan, and 2) Funding for the implementation of some access management techniques.

Funding Access Management Planning: Funding for the development of access management planning activities may be available from one of two sources. Jurisdictions within metropolitan areas can seek funding through Metropolitan Planning Organizations while those jurisdictions outside of metropolitan areas may seek the assistance of Regional Planning and Development Commissions.

Metropolitan Planning Funds: There are 13 Metropolitan Planning Organizations (MPO) in the State of Michigan (see map in Appendix A). Each agency is allotted federal planning funds to conduct a continuous, comprehensive and coordinated transportation planning process. The process requires an annual Unified Work Program (UWP). A multiple jurisdiction corridor or access management plan is an item which is eligible for funding within the process. Any plan is limited to those routes which are eligible for national highway system or surface transportation funds.

If funding is available through the MPO, there will be a requirement for local matching funds of 20 percent of the total cost of the study. In addition to the funding, there may also be a requirement for an interagency agreement or memorandum of understanding between the agencies participating in the study. Development of annual Unified Work Programs, in most instances, begin in June of each year and are based on an October 1st, fiscal year.

State Regional Planning Funds: The Michigan Department of Transportation provides an annual allotment of state funding for transportation planning activities within the 14 Regional Planning and Development Commissions. Annually, each region must submit a work program to MDOT for the expenditure of funds in those subject areas which will benefit the state, county or city/village transportation system. Access management is one subject area that is eligible for funding. Depending on the annual financial and work activities of a region, access management plans could be a funding element within the annual work program or could be a work element eligible for supplemental funding. Any local agency should approach the Regional Planning and Development Commission which serves it, to determine if and/or when a study can be pursued.

The Regional Planning and Development Commissions must develop an annual work program which requires a 20 percent local match. Initial efforts on a work program usually begins in June with October 1st, as the beginning of the program's fiscal year. A local agency or group of local agencies should approach their Regional Planning and Development Commission as soon as their local elected officials have approved financial participation in a corridor or access management plan.

Funding for Access Management Implementation: Implementing access management within the street and highway network is best accomplished when based upon a cooperative plan developed through an inter-agency agreement. Funding sources may be federal or state. Federal, National Highway System and Surface Transportation Funds are the primary sources for funding. This funding is distributed to the Michigan Department of Transportation, the county road commissions and cities/villages within the state. These monies are committed for at least three years and are listed with the State Transportation Improvement Program (STIP), so any local agency which does not receive these funds and would like to implement access management along a corridor,

should contact the appropriate road agency at least three years prior to any planned implementation.

Other financial resources exist, but are limited to the designated areas or corridors based on specific criteria. Federal Congestion Management/Air Quality funds are available to MDOT/counties and cities where air quality standards are not met. Implementing access management along a corridor might be an activity which could be funded provided it receives a priority funding evaluation.

State Transportation Economic Development Fund - Category "C", Congestion Management is available in Wayne, Oakland, Macomb, Genesee and Kent Counties for two lane routes which carry over 10,000 vehicles per day or 25,000 vehicles per day on roads with more than two lanes. Access management design features could fall within the parameters of projects proposed within those jurisdictions.

Generally, access management design changes are viewed as activities which take place when a roadway is widened or reconstructed. However, road agency/local agreements might be possible when a road is resurfaced. Examples might be that a local agency, as part of a corridor or access management plan, requests the reduction in the number of driveways in a two for one or three for one retrofit as part of a resurfacing project. This may require the local land use planning agency to be the primary lead in the negotiation and to secure agreements with the affected property owners. Another option would be for street closure or creating a cul-de-sac out of a county or city local road, when feasible, where they enter a highway or other primary arterial with dense commercial activity. This would reduce vehicle conflict locations and only requires negotiation and agreement between the local unit of government and the appropriate road authority.

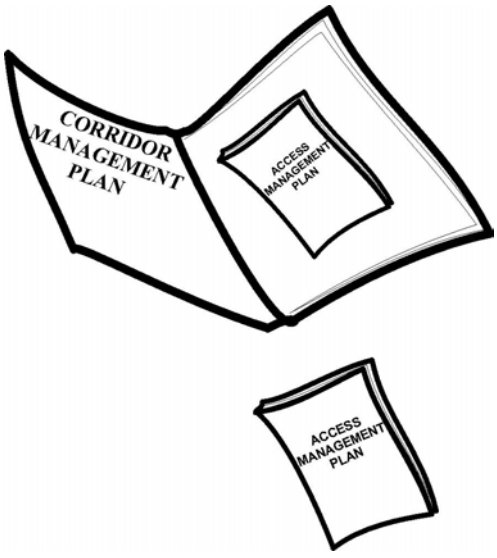
Chapter 7
ACCESS MANAGEMENT PLAN ELEMENTS

Chapter 6 provides an overview of the entire access management planning process. This chapter focuses on the contents of both corridor management plans and access management plans. It presents an outline for each type of plan as well as commentary on the contents of an access management plan. Both types of plans include access management elements.

CORRIDOR MANAGEMENT PLANS AND ACCESS MANAGEMENT PLANS COMPARED

Corridor management plans and access management plans can easily be confused because they both are associated with improving traffic safety and efficiency and each has access management elements. However, it is important to know the difference to ensure that your community carries out a plan that best suits local needs. Corridor management plans usually address more issues than access management plans. They combine identification of needed future right-of-way with traffic capacity and flow improvements, aesthetic concerns and access management techniques to coordinate long-term transportation and land use decisions. However, they usually apply to only one corridor, whereas an access management plan could apply to one or more corridors, or be community-wide. Each type of plan is often prepared on a multi-jurisdictional basis. Corridor management plans are usually prepared when there is a need for extensive road improvements to increase road capacity or a desire to build a new road. In contrast, access management plans often have a narrower focus with more targeted, and usually less extensive and less costly road improvements.

Figure 7-1



Graphic prepared by John Warbach, Planning & Zoning Center, Inc.

Corridor management plans often enable communities to evaluate problems and opportunities in a corridor in more detail and over a longer time frame than a typical access management plan. As such, they provide an opportunity for extensive public involvement and more time to achieve intergovernmental agreement on corridor management strategies. This is usually necessary because of the more extensive scope of proposed improvements in most corridor management plans. Nevertheless, the access management component of a corridor management plan is critical to addressing existing congestion problems in any part of the corridor that may not be selected for traffic capacity or flow improvements and to help preserve any new capacity or flow improvements that are planned.

In contrast, except where median construction or other extensive left-turn limitations are proposed, the scope of an access management plan is usually smaller and implementation less costly. Access management plans can usually be prepared in less time as well. There may also be greater attention on access management regulations because they are often the principal implementation mechanism.

CORRIDOR MANAGEMENT PLANS

The following table of contents provides the general elements typically included within a corridor management plan. Many elements within a corridor management plan overlap with elements within an access management plan. Communities that embark on a corridor management plan may find that access management planning fits easily into the process because both activities require similar data and follow a similar planning process.

CORRIDOR MANAGEMENT PLAN
Table of Contents

I. Introduction
   a. Identification and overview of corridor
   b. Purpose and benefits of the corridor plan
   c. Relationship to local master (land use) plan
   d. History of road improvements in corridor
   e. Process followed to create plan
II. Goals and objectives of plan
III. Study area profile
   a. Development trends
   b. Economic and demographic profile (include economic stability of corridor)
IV. Corridor analysis (inventory as well as identification of existing problems and opportunities)
   a. Roadway description (usually by segment) and functional classification of the main and intersecting roads within the corridor
   b. Environmental features and conditions
   c. Historic resources
   d. Scenic resources
      i. Scenic views
      ii. Signs
      iii. Facades
      iv. Entryway issues
      v. Other aesthetic concerns.
   e. Traffic and safety analysis (by transportation mode)
   f. Physical constraints
   g. Scheduled transportation improvements
V. Existing Land Use, Zoning and Future Land Use

Corridor Planning and Management Guidebook Available

Managing Corridor Development is the title of a useful guidebook published by the Center for Urban Transportation Research at the University of South Florida to educate local officials on what corridor management is and why it is important. It provides a detailed analysis and guidelines for corridor management. Following is an overview of the Chapters included in the guidebook and a brief summary of the contents.

Chapter 1: Introduction

The opening chapter reviews definitions and the importance of corridor management. It also provides an overview of some of the challenges involved in implementing corridor management and protecting right-of-way.

Chapter 2: Planning

This chapter reviews the roles of the state, regional and local governments in corridor planning. A review of the process of establishing priorities within the community and identifying what type of plan is relevant for the situation (corridor plan, access management plan, etc) is also presented.

Chapter 3: Updating Regulations

This chapter reviews tools to preserve right-of-way for existing and future corridors. Corridor management ordinances, zoning and subdivision regulations, development review and moratoriums are addressed.

Chapter 4: Preserving Right-of-Way

In this part of the guidebook, police power techniques are presented to preserve right-of-way. These include: official mapping, mapped street ordinances, setback requirements, overlay zones and transfer of development rights.

Chapter 5: Right-of-Way Acquisition

How to acquire property and compensation issues are discussed.

Chapter 6: Access Management

The concept of access management and how it fits into corridor management are presented with a brief review of access management techniques.

Chapter 7: Funding

Options for funding projects are presented.

Chapter 8: Legal Considerations

This chapter is geared toward Florida laws and regulations regarding corridor management but it also presents nationally accepted legal guidelines.

This guidebook was written by former Michigan planner Kristine Williams and can be downloaded free from the Center for Urban Transportation Research at the University of South Florida website http://cutr.eng.usf.edu/research/access_mpublicat.htm..

VI. Analysis of Future Land Use and Future Transportation Demand Trends (may include analysis of alternative land use arrangements)
VII. Identification of Needed Right-of-Way and Acquisition Plan (if applicable)
VIII. Design Guidelines and Rationale
  a. Proposed road improvements
  b. Access management
  c. Bus, bicycle and pedestrian
  d. Visual character and landscape
    i. Building setback, size, scale and mass
    ii. Building facades
    iii. Utilities and drainage
    iv. Natural features
    v. Parking
    vi. Landscaping
    vii. Lighting
    viii. Signs
    ix. Dumpsters
  e. Zoning standards
IX. Action Plan
  a. Road improvements
  b. Intergovernmental agreements
  c. Access management regulations
  d. Timeline for action
X. Monitoring and Enforcement Program

ACCESS MANAGEMENT PLANS

"An access management plan is a long-range planning guide that coordinates access to public roads with surrounding developments. The plan can either identify future access points along a facility that is planned, existing but with undeveloped abutting land, or proposed for expansion. This is largely preventative. Or the plan can provide access management solutions to problems along an existing highway. This is largely remedial.

Access management plans:

- *Improve long range planning for highway access;*
- *Provide a coherent framework for planning and location of future access points;*
- *Promote intergovernmental consistency and coordination on access decisions; and*
- *Facilitate administration of access regulations and permitting."*[1]

Following is a table of contents outlining an access management plan. It is followed by a brief description of each major section.

ACCESS MANAGEMENT PLAN
Table of Contents

I. Introduction
  a. Identification and overview of roadways included in plan
  b. Definition of access management
  c. Purpose and benefits of access management
  d. Relationship to local master (land use) plan
  e. Relationship of access management plan to access management program
  f. Process followed to create plan
II. Goals and Objectives of Plan
III. Road Description, Problem and Opportunity Analysis
  a. Roadway description (usually by segment) and functional classification of road system (also identify management and driveway permitting responsibility for all roads)
  b. Traffic and safety analysis
  c. Physical conditions (especially sight distances)
  d. Environmental features and conditions
  e. Existing land use, zoning and future land use
  f. Estimate future transportation demand
  g. Problem and opportunity analysis by road segment
  h. Scheduled transportation improvements
IV. Access Management and Related Land Use Strategies
  a. Identify alternative access management techniques from Chapter 3 that appear to fit the identified problems and opportunities (usually by road segment).
  b. Identify alternative land use policies to better achieve access management goals

1. From "*Managing Corridor Development*" by the Center for Urban Transportation Research at the University of South Florida, 1996, page 37.

c. Analyze alternative strategies with pros and cons
d. Identify preferred coordination policies with other road authorities
e. Present recommended access management strategies (by road segment)

V. Present Recommended Access Management Standards for Platting and Site Plan Review
a. Identify specific regulatory standards for inclusion in local lot split and subdivision regulations
b. Identify specific site design standards to be utilized for new development and redevelopment and applied through the site plan review process
c. Other related standards

VI. Process for Deviation from Standards

VII. Action Plan
a. Driveway consolidation, closures and locations for future driveways
b. Road improvements
c. Intergovernmental agreements
d. Access management regulations
e. Timeline for action.

VIII. Monitoring and Enforcement Program

Description of Contents

Following is a brief description of each major element within the access management plan outline. Communities should adapt this outline to fit the unique circumstances in their community. It is recommended that local governments obtain assistance from qualified professionals when developing an access management plan if they do not have the necessary expertise on staff.

I. Introduction

a. Identification and overview of roadways included in Plan
List, map and generally describe all roadways included in the plan, whether specific corridors are addressed or a community-wide effort is planned. Many communities address all roads in the same fashion as in the local master or comprehensive plan. The map should clearly depict the depth and boundary of property included in the plan. If single corridors are selected, connecting roads need to be included to at least ½ mile away.

b. Definition of access management
Access management is the process that provides (or manages) access to land development, while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity and speed.

c. Purpose and benefits of access management
The purpose of the access management plan for the community needs to be clearly explained early in the document. Reference findings in support of the need for access management. Try to address these questions: What community problems will the plan be addressing? What are the benefits of an access management plan after implementation?

d. Relationship to local master (land use) Plan
The access management plan should be directly related to the local master plan because comprehensive planning evaluates land use, land division and development trends, related policy issues and implementation strategies. Try to answer these questions: How can the access management plan and master plan be effectively linked? How can the access management plan solve or prevent problems identified in the master plan? Look at the goals and objectives identified within the master plan for support of the access management objectives. Also look at the transportation element of the comprehensive plan. There should be general access management policies and a reference to (the need for) an access management plan included in this section. Master plans can strengthen the legal basis for access management by establishing a link between access problems and the public health, safety and general welfare.

e. Relationship of access management plan to access management program

The access management plan define the elements of an ongoing access management program because many of the implementation steps involve long term planning, zoning and road improvement actions. An ongoing access management program can assure that the action elements documented within the access management plan is carried out and regularly updated.

f. Process followed to create plan
This could also be referred to as the approach or the methodology used to create the plan. A few paragraphs are needed in the plan to tell the reader the specific process that was followed locally to create the plan. Who prepared it, what agencies, boards or commissions were consulted, what public input was sought (as well as when and how)?

II. Goals and Objectives of Plan
The community should generate goals and objectives based on local problems and perceived opportunities from access management. Following is a list of generic examples of access management goals:

- *Reduce potential hazards to life, property and improve safety.*
- *Lessen congestion on public roads and streets.*
- *Shorten travel time.*
- *Coordinate projected traffic growth with planned land use growth.*
- *Maintain road function to protect existing road investment and traffic movement ability.*
- *Control access along arterials and connecting streets with appropriate regulatory elements.*
- *Educate residents, businesses and developers about access management techniques and the value of access management.*
- *Develop and adopt a well-defined implementation program to ensure appropriate and equitable application of access management techniques.*

III. Road Description, Problem and Opportunity Analysis
Data describing current and future conditions of the roadway is critical to appropriate analysis of problems and opportunities. Aerial photos taken 5-10 years apart provide detailed data on development trends and provide an effective medium to analyze driveway and signal spacing and conflict points. They should be obtained wherever feasible and should be periodically retaken. If aerial photos are not available, a parcel-by-parcel inventory is necessary. Many road authorities already have detailed roadway maps with driveways indicated. They often need to be updated, but are a good starting point.

a. Roadway description (usually by road segment) and functional classification of road system (also identify management and driveway permitting responsibility for all roads)
It is very important to understand the functional classification of all roads in the study in order to preserve the functional integrity of the road network (for more detail see Chapter 2). This element includes observations about how existing conditions on particular road segments are at variance with the functional classification of the road and the implications if the situation worsens.

b. Traffic and safety analysis
Crash reports and traffic volume records will provide a critical basis for data analysis of area roads. Analyze any troublesome conflict areas, particularly left turn conflicts and frequent crash locations. It is usually necessary to carefully study specific crash reports and diagram crashes to fully understand problems. See Appendix C for a common crash analysis methodology and Chapter 6 for more information on related data needs. The following brief list includes examples of the traffic and safety conditions that a municipality might examine;

- *Number and spacing of existing driveways and intersections*

- *Congestion areas*
- *High crash locations*
- *Sight distance problem areas*
- *Safety/road deficiency areas*
- *Driveway geometrics and locations*
- *Signalization issues*
- *Conflicts with through traffic and local traffic*
- *Problem areas for bicycles, pedestrians and transit vehicles*
- *Connections between properties.*

c. Physical conditions
Document any physical characteristics of the road that may lend to more crashes. Give special attention to sight distance problems such as curves, hills, steep slopes, vegetation, etc. These physical conditions may also present constraints for the use of certain techniques. Compare these physical conditions to right-of-way width and pavement characteristics. Document building type and location, parking location and extent, land use and connections (or lack thereof) between abutting similar land uses.

d. Environmental features and conditions
An analysis of environmental conditions will vary depending on natural features, but often includes an analysis of the community's sensitive environmental features such as natural slopes, soils, wetlands, woodlots, lakes and natural drainage along the corridor(s). An analysis of storm water runoff is also included. This will help identify constraints to the use of various techniques.

e. Existing land use, zoning and future land use
How land is presently used and proposed for future use will have a great impact on whether present problems are exacerbated by projected future conditions. Existing and future land use information would be gathered, documented and analyzed in this section. See Chapter 6 "Analyze Land Use Trends" for more detail.

f. Estimate future transportation demand
This section would represent the results of the analysis of future demographic and traffic projections on the corridor(s) under study. The projections give the community an idea of how new development will affect the current traffic situation. See Chapter 6 "Estimating Future Demand" for more detail.

g. Problem and opportunity analysis by road segment
This section represents the results of a detailed analysis of all of the data collected thus far, and the problems and opportunities associated with each road segment. This includes for example, areas with too many driveways as well as opportunities for driveway consolidation; congested areas abutting deep lots and opportunities for rear access drives. Maintenance of traffic flow during construction of any improvements is a major issue that should be addressed as part of this analysis.

h. Scheduled transportation improvements
There may be a number of transportation improvements already scheduled along a corridor. It is important to document these. Some of them may be affected by alternatives and other analysis in the Plan. The following list represents examples of scheduled transportation improvements which may already be planned on a corridor under study for access management.
- *Intersection reconstruction to include right- and left-turn lanes*
- *Installation of a new traffic signal*
- *Road widening to add lanes*
- *Construction of deceleration lanes*
- *Resurfacing and curb replacement*
- *Utility line burial*
- *Landscaping and aesthetic improvements.*

IV. Access Management and Related Land Use Strategies

a. Identify alternative access management techniques that appear to best fit the identified problems and opportunities.
Access management techniques are described in detail in Chapter 3. Techniques that are often included but are not limited to:

- *Driveway consolidation and closure*
- *Improving corner clearance*
- *Constructing frontage or rear access roads*
- *Improved driveway geometrics*
- *New median treatments or closure of median openings*
- *Signal separation.*

Strategies should be developed for particular road segments.

b. Identify alternative land use policies to better achieve access management goals
Several land use policies can help promote better access management. The following list provides some examples:

- *Wide lot widths and wide separation between driveways*
- *Mixed use*
- *Limit strip development*
- *Larger corner lot frontage.*

Refer to Chapter 4 for regulatory techniques to achieve these policies.

c. Analyze alternative strategies with pros and cons
The pros and cons of each alternative strategy need to be identified and documented in this section as it applies to the corridor or road segments in question. It will become the basis for the final recommendations. Strategies should be evaluated for their effectiveness to:

- *Limit the number of conflict points*
- *Separate conflict points*
- *Limit direct access*
- *Separate turning movements from through movements*
- *Improve driveway operation*
- *Locate traffic signals to facilitate traffic movement.*

Strategies should also be evaluated for effectiveness in reducing crashes, improving travel speed and capacity, and business and community impact. Will there be more or less traffic, better or worse air quality, greater or fewer sales, etc.?

d. Identify preferred coordination policies with other road authorities
Coordination is a key part of access management because of the impacts from both land use and transportation decisions on multiple road authorities. Close coordination with state, county and local road agencies is recommended. Overlapping jurisdiction may require some negotiation if the access management plan addresses a corridor that crosses community boundary lines. It is important that agreement on access management regulations, site plan review and approval processes be reached to avoid future conflicts. See Chapter 5 for more discussion of intergovernmental coordination issues.

e. Present Recommended Access Management Strategies (by road segment)
Select preferred strategies by road segment and document in this section of the plan. Retrofit road segments should have different recommendations than areas that need more preventative recommendations. There should be a map that shows where specific improvements will be made and new policies targeted.

V. Present Recommended Access Management Standards for Platting and Site Plan Review

a. Identify specific regulatory standards for inclusion in local lot split and subdivision regulations, for example, adding standards on:

- *Interconnecting streets*
- *Adequate street offsets*
- *Wide frontage corner lots.*

See Chapter 4 for more ideas on specific techniques.

b. Identify specific site design standards to be utilized for new development and redevelopment and applied through the site plan review process. For example:
   - *Restricting the number of driveways per parcel*
   - *Encouraging shared access, regulating driveway spacing, and driveway design.*
   - *Encouraging joint and cross access and shared parking*
   - *Requiring frontage or rear access roads.*

   See Chapters 3 and 4 for more detailed ideas on specific techniques. See Chapter 8 for sample ordinance language for implementing these techniques. Some communities use incentives along with regulations to encourage conformance with new standards.

c. Other related standards
   It may be appropriate to propose additional new regulatory standards in other ordinances such as:
   - *Lot split ordinances*
   - *Private road ordinances*
   - *Condominium ordinances, etc.*

   See Chapter 4 for more details on these techniques.

VI. Process for Deviation from Standards
Some flexibility is needed when administering standards for access management because of a wide variety of unique circumstances. Zoning ordinances are not retroactive, so if a community is already substantially developed, adopting access management standards may create a significant number of non-conforming properties.

Consequently, zoning ordinances should provide an option for properties that cannot meet the adopted regulations. Situations that may require deviation include unique historic properties, unusual topography causing a safety problem, narrow lots, or emergency vehicle concerns. Waivers or exceptions can be established to cover conditions in which flexibility is needed. See Chapter 8 for sample language on the appropriate circumstances in which waivers and exceptions may be authorized.

VII. Action Plan
The access management plan should present the selected strategies and standards to be applied and detail prioritized steps of what is to be done by whom, by when and with what resources, including capital improvement program recommendations. It needs to specify costs and who will pay for them. Local and outside funding sources should be identified (see Chapter 6). Any inter-local agreements or the contents of memorandum of understanding would be included. Possible short term actions may include remedial road improvements, voluntary driveway closures, and adoption of new access management zoning controls. Longer term actions could involve construction of a median or rear service drives, or other more expansive investments. Be sure the public involvement process described in Chapter 6 provides for adequate input prior to finalizing the Action Plan.

VIII. Monitoring and Enforcement Program
A monitoring and enforcement program can help to evaluate the effectiveness of strategies that are implemented. An ongoing monitoring and enforcement program should be described in the access management plan as an instrumental part of the jurisdiction's ongoing access management program. The monitoring and enforcement program should include an impartial assessment system for implemented strategies and an appropriate timetable for their execution. There should be a mechanism for determining the effectiveness of implemented strategies based on many variables including, but not limited to:
- *Safety improvements (crash reduction)*
- *Reduced congestion*
- *Improved travel time*
- *Fewer tickets for "driver rage," etc.*
- *Number of closed or consolidated driveways*

- *Number of improved driveway designs as a result of changes associated with business or parking expansion*
- *Number and length of new service drives*
- *Business impact*
- *Improved non-motorized access*
- *Enforcement action taken against creation of unauthorized driveways.*

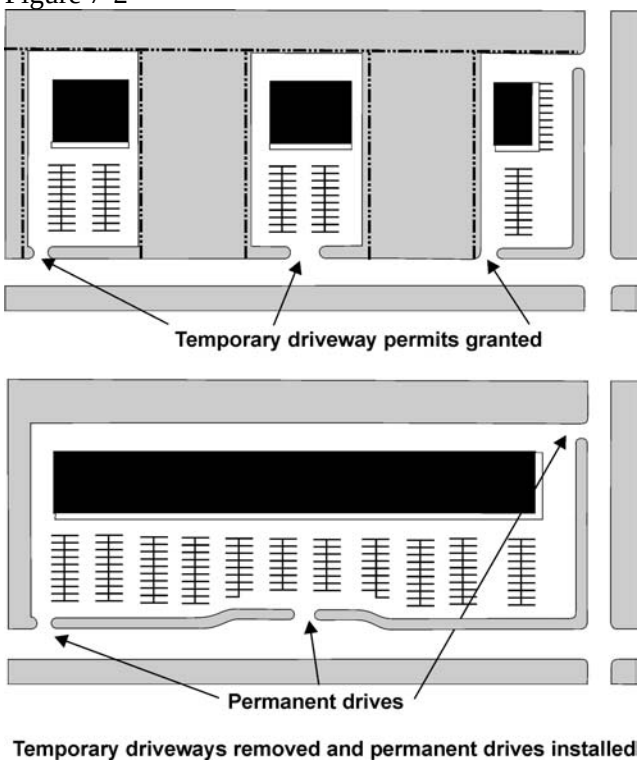
Note: Communities will need to adapt the planning process described in Chapter 6 and the access management plan elements described in this chapter to fit their situation. The nature of current problems, available staff, or consultants, political will, proposed new land uses, inter-jurisdictional cooperative attitudes, and other factors will shape the decision on planning process and plan elements.

No community that has a consensus for improved access management should let an obvious lack of funds (or similar impediment) get in the way of trying to get something done. As the funding options at the end of Chapter 6 show, there are a variety of options for funding support to develop an access management plan – especially if done on an inter-jurisdictional basis. In addition, many driveways can be voluntarily closed or consolidated through timely one-on-one discussions with landowners. Many of the access management regulatory techniques identified in Chapter 4 can be quickly added to a local zoning ordinance using the sample ordinance language in Chapter 8. It is more important to move forward with targeted actions designed to prevent future access management problems or correct existing ones that are obvious by targeted effective strategies initiated by a local government in cooperation with neighboring communities and the responsible road authorities than it is to follow every planning step in Chapter 6 and write-up every plan element in this chapter. In other words, if the opportunity to act presents itself – seize it. However, most communities do not start with a consensus to make significant access management improvements and the process in Chapter 6 and the plan elements in this chapter are designed to methodically get consensus on a planned course of action. Consensus government is often slow, but in the end, long-lasting change is often the result.

Phased Improvements & Temporary Driveways

One effective strategy for phasing improved driveways in an already developed area, or in a newly developing area is to issue temporary driveway permits for a period of time and then when the circumstances are right (as defined in the temporary permit) require removal of the temporary driveways and installation of the permanent driveways. Figure 7-2 illustrates how this can work. Temporary driveways would be authorized for the drives in the first illustration. These would be largely removed when all the buildings were connected and the parking lots were connected, as in the second illustration. This is easiest to achieve with an access management plan that identifies contiguous lots with existing access problems or undeveloped land that could be developed as a common project. This approach requires very careful planning and coordination between the local government and road authority. It also requires a clear understanding of who pays what share of the new driveways before the temporary permits are issued.

Figure 7-2



Adapted by John Warbach, Planning & Zoning Center, Inc. from **Arterial Street Access Control Study**, TCRPC, 1981

Chapter 8
SAMPLE ACCESS MANAGEMENT ORDINANCES

This chapter focuses on one of the access management principles.

- Many access management techniques are best implemented through zoning and others through local lot split, subdivision, condominium and private road regulations.

ACCESS MANAGEMENT ORDINANCE OPTIONS

This chapter presents sample access management ordinances to fit three common local situations in Michigan.

- Option 1: best suited for a slowly growing rural community with one or two state highways or major county roads
- Option 2: best suited for a rural community in the path of growth or a growing suburb with significant undeveloped land along major arterials
- Option 3: best suited for an urban community with little undeveloped land and many retrofit or redevelopment opportunities.

Not all communities will neatly fit into one of the three situations described above. As a result, it may be necessary to pull elements from two or three of the options to fit the unique situation of an individual community. The commentary (in *italics* and [BRACKETED TEXT]) is designed to help a community decide which parts of which sample ordinance to use and how to adapt it. It is imperative that a community obtain qualified professional planning and legal assistance and coordinate closely with MDOT and county road commission staff when adapting any of these sample regulations to fit a local situation. As the administration of access management regulations has some strong technical dimensions, it may also be necessary for a community to hire a qualified professional traffic engineer or transportation planner to assist them with this task, if it does not have this expertise already.

Sample ordinance language to enable the collection of escrow fees for a professional review of a proposed site plan is provided at the front of this Chapter under "Supplementary Ordinance Language". This language should be adopted along with one of the three access management regulatory options in this Chapter. This language ensures that communities without professional planning and/or engineering staff still have access to qualified professionals when reviewing site plans. Even if a community has such staff, a particular project may require unique skills or the staff may be overloaded with work and outside assistance is needed. The costs of such professional reviews should be charged to the applicant. This can be achieved by collecting and holding a fee from the applicant in escrow to pay for this cost. Any unused fee must be returned to the applicant.

Also, in "Supplementary Ordinance Language" are definitions of terms used in the sample ordinances that may be unique. These definitions should also be added to the zoning ordinance. They will need to be adapted to fit each community. Note the term "access point" is very broad but the term "driveway" is narrow.

These three sample access management ordinance options are substantially adapted from the following Michigan Zoning Ordinances: Acme Township, Alpine Township, Delta Township, Dewitt Township, Genoa Township, Grand Blanc Township, City of Hudsonville, Oshtemo Township, Shiawassee County, and Tittabawassee Township. It was also influenced by the Martin

County, Florida code and model ordinances prepared for New York state and Iowa communities. Many other Michigan communities already have access management provisions based on one or more of the above listed ordinances, so any similarity of the sample language to another ordinance is entirely possible. Most of these communities have administered access management regulations for at least 10 years. None of the above listed local ordinances is as comprehensive in regulating the full range of access management situations as Option 2 in this Chapter. However, each of the above listed ordinances is carefully adapted to the specific community in which it has been used. It is important that the sample language which follows be properly adapted to fit the needs of your community. Each of the above listed local ordinances and the sample ordinance options presented in this Chapter are included on a single CD for those interested in examining any of these ordinances in digital format. To order a copy, please send in the postcard on the last page of this guidebook.

Site Plan Review Required

All of the following ordinance options (except Option 1a) assume the community using them already has separate zoning permit and site plan review and approval processes incorporated in the zoning ordinance. It also assumes that proposed plats and land divisions go through the same or a very similar review. Similar standards and processes need to be added to these ordinances if not covered by the zoning ordinance site plan review process. If not, it is necessary to include them. A sample site plan review procedure is included in the Appendix to Site Plan Review: A Guidebook for Planning & Zoning Commissions published by the Michigan Society of Planning Officials in 1988. It is available from the Michigan Society of Planning, 27300 Haggerty Road, Suite F-30, Farmington Hills, Michigan 48331; 248-553-7526. All of the above listed local units of government with access management ordinances also use site plan review and those ordinances could be consulted as well.

The following ordinance options also assume that decisions on plot plans (reviews of uses allowed by right without any special review process or without site plan review) are made by the Zoning Administrator and that decisions on site plans are made by the Planning Commission. If that is not the case in your community, the sample language will need to be adapted to fit your situation.

For Additional Information

For additional information on access management regulations or for other sample access management ordinances consult the following publications which are cited more completely in the Bibliography:

- Model Land Development & Subdivision Regulations that Support Access Management, CUTR, 1994
- Best Practices in Arterial Management and Sample Access Management Ordinance, New York Department of Transportation, 1998.
- Access Management Handbook, Iowa DOT, 1999.
- National Access Management Manual, TRB, 2002.
- National Cooperative Highway Research Program (NCHRP), "Access Management Guidelines to Activity Centers" Report 348 and "Impacts of Access Management Techniques" Report 420.
- AASHTO "Green Book", A Policy on Geometric Design of Highways and Streets.

Note: Text in the following sample ordinances in *italics* are directions (such as what to insert in a blank space) or limited commentary and are NOT to be included as part of the adopted ordinance. Text in regular type is proposed ordinance language. Text in [BRACKETS AND SMALL CAPS] are explanatory notes and are NOT to be included as part of the adopted ordinance.

SUPPLEMENTARY ORDINANCE LANGUAGE

The following language is intended to accompany each of the sample Options in this Chapter. It is usually inserted in the "General Provisions" or "Supplementary Provisions" section of the Ordinance. The first section on fees in escrow for professional reviews is an increasingly common approach that was upheld by the Michigan Supreme Court in Cornerstone Investments v. Cannon Township, 459 Mich 908 (1998); after remand 239 Mich App 98 (1999).

Fees in Escrow for Professional Reviews

Section ____: Fees in Escrow for Professional Reviews

Any application for rezoning, site plan approval, a Special Use Permit, Planned Unit Development, variance, or other use or activity requiring a permit under this Ordinance above the following threshold, may also require the deposit of fees to be held in escrow in the name of the applicant. An escrow fee shall be required by either the Zoning Administrator or the Planning Commission for any project which requires a traffic impact study under Section _____, or which has more than _____ *(e.g. twenty (20))* dwelling units, or more than _____ *(e.g. twenty thousand (20,000))* square feet of enclosed space, or which requires more than _____ *(e.g. twenty (20))* parking spaces. [THRESHOLD COULD ALSO BE ANY PROPERTY ALONG THE CORRIDOR IN THE OVERLAY DISTRICT, OR ANY USE REQUIRING SITE PLAN REVIEW.] An escrow fee may be required to obtain a professional review of any other project which may, in the discretion of the Zoning Administrator or Planning Commission create an identifiable and potentially negative impact on public roads, other infrastructure or services, or on adjacent properties and because of which, professional input is desired before a decision to approve, deny or approve with conditions is made.

1) The escrow shall be used to pay professional review expenses of engineers, community planners, and any other professionals whose expertise the _____ *(name of community)* values to review the proposed application and/or site plan of an applicant. Professional review will result in a report to the _____ *(name of community)* indicating the extent of conformance or nonconformance with this Ordinance and to identify any problems which may create a threat to public health, safety or the general welfare. Mitigation measures or alterations to a proposed design may be identified where they would serve to lessen or eliminate identified impacts. The applicant will receive a copy of any professional review hired by the _____ *(name of community)* and a copy of the statement of expenses for the professional services rendered, if requested.

2) No application for which an escrow fee is required will be processed until the escrow fee is deposited with the _____ *(name of community)* Treasurer. The amount of the escrow fee shall be established based on an estimate of the cost of the services to be rendered by the professionals contacted by the Zoning Administrator. The applicant is entitled to a refund of any unused escrow fees at the time a permit is either issued or denied in response to the applicant's request.

3) If actual professional review costs exceed the amount of an escrow, the applicant shall pay the balance due prior to receipt of any land use or other permit issued by the _____ *(name of community)* in response to the applicant's request. Any unused fee collected in escrow shall be promptly returned to the applicant once a final determination on an application has been made or the applicant withdraws the request and expenses have not yet been incurred.

4) Disputes on the costs of professional reviews may be resolved by an arbitrator mutually satisfactory to both parties.

Definitions

The definitions that follow do not include those that are generally already included in local zoning ordinances. Therefore they must be compared with the definitions within local zoning ordinances and any differences need to be reconciled. Not all of these definitions will be needed with every adaptation of the sample ordinance. For example, very few of the definitions apply to Options 1a or 1b. Please select only definitions for terms that are actually used. Note: many of the defined terms that follow are used in other definitions, but not in the sample ordinance language itself.

Access -- A way or means of approach to provide vehicular or pedestrian entrance or exit to a property from an abutting property or a public roadway.

Access Connection -- Any driveway, street, road turnout or other means of providing for the movement of vehicles to or from the public road system or between abutting sites.

Access Management -- The process of providing and managing reasonable access to land development while preserving the flow of traffic in terms of safety, capacity, and speed on the abutting roadway system.

Access Management Plan -- A plan establishing the preferred location and design of access for properties along a roadway or the roadways in a community. It may be a freestanding document, or a part of a community master or comprehensive plan, or a part of a corridor management plan.

Access Point -- a) The connection of a driveway at the right-of-way line to a road. b) A new road, driveway, shared access or service drive.

Acceleration Lane -- A speed-changing lane, including taper, for the purpose of enabling a vehicle entering the roadway to increase its speed to a rate at which it can safely merge with through traffic.

ADT -- The annual average two-way daily traffic volume. It represents the total annual traffic for the year, divided by 365. (Where annual data is not available, data from a shorter period may sometimes be used).

Alternative Means of Access -- A shared driveway, frontage road, rear service drive or connected parking lot.

Arterial -- See Road Classification.

AASHTO -- Abbreviation of the American Association of State Highway and Transportation Officials, which conducts research and publishes many national road and non-motorized standards.

Boulevard – See Divided Driveway.

Channelized or Channelizing Island -- An area within the roadway or a driveway not for vehicular movement; designed to control and direct specific movements of traffic to definite channels. The island may be defined by paint, raised bars, curbs, or other devices.

Classification of Roads -- See Road Classification.

Collector -- See Road Classification.

Conflict -- A traffic event that causes evasive action by a driver to avoid collision with another vehicle, bicycle or pedestrian.

Conflict Point -- An area where intersecting traffic either merges, diverges, or crosses.

Connected Parking Lot -- Two or more parking lots that are connected by cross access.

Corner Clearance -- The distance from an intersection of a public or private road or street to the nearest access connection, measured from the closest edge of the driveway pavement to the closest edge of the road pavement. [SOME COMMUNITIES MEASURE FROM THE CENTER OF DRIVEWAY.]

Corridor Overlay Zone -- A zoning district that provides special requirements that apply to property in addition to those of the underlying district regulations along portions of a public roadway.

Cross Access -- A service road or driveway providing vehicular access between two or more contiguous sites so the driver need not enter the public road system.

Cross Street -- The adjacent intersecting street or road.

Deceleration Lane -- A speed-change lane, including taper, for the purpose of enabling a vehicle to leave the through traffic lane at a speed equal to or slightly less than the speed of traffic in the through lane and to decelerate to a stop or to execute a slow speed turn.

Divided Driveway – A driveway with a raised median between ingress and egress lanes.

Driveway -- Any entrance or exit used by vehicular traffic to or from land or buildings abutting a road.

Driveway Flare -- A triangular pavement surface at the intersection of a driveway with a public street or road that facilitates turning movements and is used to replicate the turning radius in areas with curb and gutter construction.

Driveway Offset – The distance between the inside edges of two driveways [OR COULD BE MEASURED FROM THE CENTERLINE] on opposite sides of an undivided roadway.

Driveway Return Radius -- A circular pavement transition at the intersection of a driveway with a street or road that facilitates turning movements to and from the driveway.

Driveway, Shared -- A driveway connecting two or more contiguous properties to the public road system.

Driveway Spacing -- The distance between driveways as measured from the centerline of one driveway to the centerline of the second driveway along the same side of the street or road. [SOME COMMUNITIES MEASURE FROM THE EDGE OF DRIVEWAY PAVEMENT TO EDGE OF THE PAVEMENT OF THE SECOND DRIVEWAY.]

Driveway Width -- Narrowest width of driveway measured perpendicular to the centerline of the driveway.

Egress -- The exit of vehicular traffic from abutting properties to a street or road.

Frontage Road or Front Service Drive -- A local street/road or private road typically located in front of principal buildings and parallel to an arterial for service to abutting properties for the purpose of controlling access to the arterial.

Functional Classification -- A system used to group public roads into classes according to their purpose in moving vehicles and providing access to abutting properties. See Road Classification.

Grade -- The rate or percent of change in slope, in either ascending or descending, from or along the roadway. It is to be measured along the centerline of the roadway or access.

Ingress -- The entrance of vehicular traffic to abutting properties from a roadway.

Interchange -- A facility that grade separates intersecting roadways and provides directional ramps for access movements between the roadways. The structure, ramps and right-of-way are considered part of the interchange.

Intersection -- The location where two or more roadways cross at grade without a bridge.

Intersection Sight Distance -- The sight distance provided at intersections to allow the drivers of stopped vehicles a sufficient view of the intersecting roadways to decide when to enter the intersecting roadway or to cross it. The time required is the sum of the perception reaction time plus the time to accelerate and cross or enter the major roadway traffic stream.

ITE -- Abbreviation of the Institute of Transportation Engineers, which conducts research and publishes many national road standards.

Lane -- The portion of a roadway for the movement of a single line of vehicles which does not include the gutter or shoulder of the roadway.

Local Road or Street -- See Road Classification.

Median -- The portion of a divided roadway or divided entrance separating the traveled ways from opposing traffic. Medians may be depressed, painted or raised with a physical barrier or may be landscaped.

Median Opening -- A gap in a median provided for crossing and turning traffic.

Nonconforming Access -- Features of the access system of a property that existed prior to the effective date of Article ___ and that do not conform with the requirements of this Ordinance; or in some cases, elements of approved access that are allowed by means of a temporary permit or on a conditional basis, until alternative access meeting the terms of this ordinance becomes available.

Passing Sight Distance -- The length of roadway ahead necessary for one vehicle to pass another before meeting an opposing vehicle which might appear after the passing maneuver began. (This type of sight distance is not an issue in access management.

Peak Hour Trips (PHT) -- A weighted average vehicle trip generation rate during the hour of highest volume of traffic entering and exiting the site in the morning (a.m.) or the afternoon (p.m.). OR The highest number of vehicles found to be passing over a section of a lane or roadway during any 60 consecutive minutes. [CHOOSE ONE.]

Reasonable Access: The minimum number of access connections, direct or indirect, necessary to provide safe access to and from a public road consistent with the purpose and intent of this Ordinance, with any other applicable plans of the _____ *(insert name of jurisdiction),* with Act 200 of 1969, or with other applicable law of the State of Michigan. Reasonable access does not necessarily mean direct access.

Rear Service Drive -- A local street/road or private road typically located behind principal buildings and parallel to an arterial for service to abutting properties for the purpose of controlling access to the arterial.

Regional Arterial – A major arterial. See Road Classification.

Right-of-Way – A general term denoting land, property or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

Road -- A way for vehicular traffic, whether designated as a “street”, “highway”, “thoroughfare”, “parkway”, “through-way”, “avenue”, “boulevard”, “lane”, “cul-de-sac”, “place”, or otherwise designated, and includes the entire area within the right-of-way.

Roadway -- That portion of a street, road or highway improved, designed or ordinarily used for vehicular travel exclusive of the berm or shoulder. In the event a highway includes two or more separate roadways, "roadway" refers to any such roadway separately, but not to all such roadways collectively.

Road Classification -- Roadways are classified by the following categories and are indicated on Map ____ by their functional classification. [NOTE: NOT EVERY COMMUNITY USES ALL SIX CLASSIFICATIONS (FOR EXAMPLE IT IS COMMON TO ONLY HAVE ONE TYPE OF COLLECTOR), AND SOME COMMUNITIES USE A SLIGHTLY DIFFERENT FUNCTIONAL CLASSIFICATION. BE SURE TO ADAPT TO FIT THE LOCAL SITUATION.]

1. Limited Access Highway -- Major highways providing no direct property access that are designed primarily for through traffic.
2. Major Arterial -- Arterials are roadways of regional importance intended to serve moderate to high volumes of traffic traveling relatively long distances. A major arterial is intended primarily to serve through traffic where access is carefully controlled. Some major arterials are referred to as "regional arterials". [SOME COMMUNITIES REFER

Figure 8-1a
SCHEMATIC OF A PORTION OF A RURAL HIGHWAY NETWORK

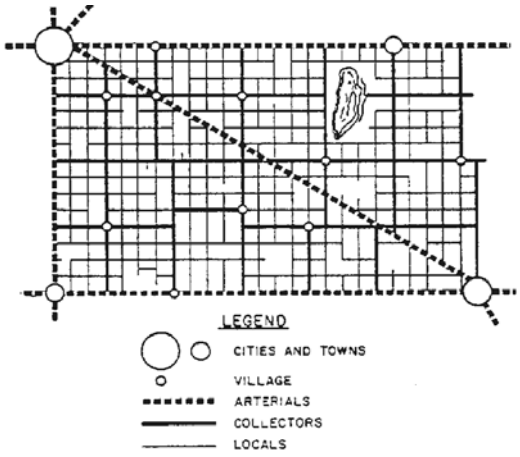
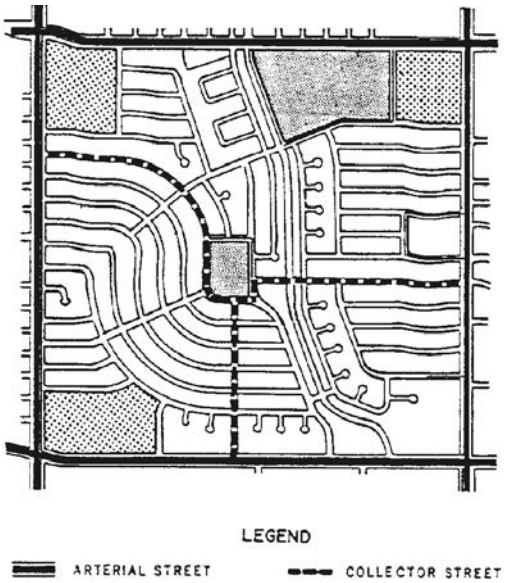


Figure 8-1b
SCHEMATIC OF A PORTION OF AN URBAN STREET NETWORK



Source: Federal Highway Administration, *Highway Functional Classification,* Volume 20, Appendix 12, July 74, p. II-3 and II-5.

TO MAJOR ARTERIALS AS "MAJOR THOROUGHFARES".]

3. Minor Arterial -- A roadway that is similar in function to major arterials, but operates under lower traffic volumes, over shorter distances, and provides a higher degree of property access than major arterials. [SOME COMMUNITIES REFER TO THESE AS MINOR THOROUGHFARES.]
4. Major Collector -- A roadway that provides for traffic movement between arterials and local streets and carries moderate traffic volumes over moderate distances. Collectors may also provide direct access to abutting properties.
5. Minor Collector -- A roadway similar in function to a major collector but which carries lower traffic volumes over shorter distances and provides a higher degree of property access than a major collector.
6. Local Street -- A street or road intended to provide access to abutting properties, which tends to accommodate lower traffic volumes and serves to provide mobility within that neighborhood.

[DO NOT INSERT THE FOLLOWING SAMPLE MAPS (FIGURES 8-1A AND 8-1B) IN THE ZONING ORDINANCE, USE ACTUAL LOCAL THOROUGHFARE MAP INSTEAD.]

Secondary Street or Side Street -- A street or road with a lower functional classification than the intersecting street or road (e.g. a local street is a side or secondary street when intersecting with a collector or arterial).

Service Drive -- See Frontage Road or Rear Service Drive.

Shared Driveway or Common Driveway -- See Driveway, Shared.

Shoulder -- The portion of a public road contiguous to the traveled way for the accommodation of disabled vehicles and for emergency use.

Sight Distance -- The distance of unobstructed view for the driver of a vehicle, as measured along the

normal travel path of a roadway to a specified height above the roadway.

Standard – A definite rule or measure establishing a minimum level of quantity or quality that must be complied with or satisfied in order to obtain development approval, such as (but not limited to) a height, setback, bulk, lot area, location or spacing requirement.

Stopping Sight Distance -- The available sight distance should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. Stopping sight distance is the sum of brake reaction distance and braking distance.

Street – See Road.

Taper -- A triangular pavement surface that transitions the roadway pavement to accommodate an auxiliary lane.

Temporary Access -- Provision of direct access to a road until that time when adjacent properties develop in accordance with a joint access agreement, service road, or other shared access arrangement.

Thoroughfare -- A public roadway, the principal use or function of which is to provide an arterial route for through traffic, with its secondary function the provision of access to abutting property and which is classified as a “limited access highway" or a "major or minor arterial” on the Street and Highway Classification Map (see Map ____).

Throat Length -- The distance parallel to the centerline of a driveway to the first on-site location at which a driver can make a right-turn or a left-turn. On roadways with curb and gutter, the throat length shall be measured from the face of the curb. On roadways without a curb and gutter, the throat length shall be measured from the edge of the paved shoulder.

Throat Width -- The distance edge-to-edge of a driveway measured at the right-of-way line.

Traveled Way -- The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

TRB -- Abbreviation of the Transportation Research Board, which conducts research and publishes transportation research, findings and policy.

Trip Generation – The estimated total number of vehicle trip ends produced by a specific land use or activity. A trip end is the total number of trips entering or leaving a specific land use or site over a designated period of time. Trip generation is estimated through the use of trip rates that are based upon the type and intensity of development.

Undivided Roadway – A roadway having access on both sides of the direction of travel, including roadways having center two-way left-turn lanes.

OPTION 1 -- BEST SUITED FOR A SLOWLY GROWING RURAL COMMUNITY WITH ONE OR TWO STATE HIGHWAYS OR MAJOR COUNTY ROADS

Two options are presented to meet the needs of a rural community with little land use change, and/or little professional staff or consultant assistance. Option 1a merely "locks in" existing access so that as land is divided, additional access points are not created (see Chapter 4, page 4-2). This approach leaves all driveway permits to the Michigan Department of Transportation on state highways and to County Road Commissions on county roads. It also establishes a simple coordination mechanism for review of development proposals before the appropriate road authority makes a driveway permit decision. The community may not even have a site plan review process in the zoning ordinance and it would not be needed unless they choose to regulate service drives.

Option 1b also leaves all the access management decisions to the Michigan Department of Transportation on state highways and to the County Road Commission on county roads, but instead of "locking in access" it targets one or two

arterials (as identified in a "corridor overlay zone") for coordinated review and approval of a proposed site plan with the driveway permit requirements of these two road authorities. This approach would need substantial modification in Section 0.3 to adapt its use in a city or village that controlled all the streets within the community. Coordination would then be between the city or village road authority and the planning commission.

Options 1a and 1b can be most effective if the community has site plan review, because the zoning enabling acts permit a community to condition approval of a site plan on the requirements of other county and state agencies. (See Chapter 5 for more discussion of this coordination function). However, even without site plan review, coordination alone will prevent a community from approving a site plan with access that doesn't meet a road authority's standards and vice versa.

Option 1a and 1b will work best with professional planning assistance in review of proposed site plans for large development proposals. It is important that the companion sample ordinance language found at the beginning of this Chapter under "Supplementary Ordinance Language" also be adopted. This language permits a community to charge an applicant for the cost of a professional review of a site plan by collecting an escrow fee along with the application.

Option 1a or 1b could be inserted as a separate Section in the General Provisions, or Supplementary Provisions Article (or Chapter) of the Ordinance, or they could be a separate Article (or Chapter).

Section 0.3 in Option 1a and Section 1.3 in Option 1b sets forth information to be submitted by an applicant and a coordination process for review of a site plan. Most local site plan review procedures already address these issues, however, the coordination function may not be as clear. Be sure to adapt this language to fit the local circumstances. Section 0.4 in Option 1a and Section 1.4 in Option 1b addresses service drives. Since these are usually outside the right-of-way of a road authority, there must be standards in the Ordinance if this technique is used. Standards should be derived from Section 2.3 in Option 2 and adapted to fit the local situation.

Option 1a - "Lock-In Access" Approach

This approach could be

- *adopted alone and applied to a single corridor expected to experience pressure for land splitting, or*
- *it could be used with Option 1b, or*
- *it could be adapted to apply to all roads in the community except those subject to the corridor overlay zone language in Option 1b.*

Option 1a should be adapted to fit the local ordinance. In particular, if the community does not permit private roads, or if it does not wish to allow front or rear service drives, the references to them would need to be deleted.

Section 0.1 -- Intent

The provisions of this Article *(or Chapter)* are intended to promote safe and efficient travel within the_____ *(name of jurisdiction);* minimize disruptive and potentially hazardous traffic conflicts; ensure safe access by emergency vehicles; protect the substantial public investment in the street system by preserving capacity and avoiding the need for unnecessary and costly reconstruction which disrupts business and traffic flow; separate traffic conflict areas by reducing the number of driveways; provide safe spacing standards between driveways, and between driveways and intersections; provide for shared access between abutting properties; implement the _____Master Plan *(insert name of Plan)* and the _____ Corridor *(or Access)* Management Plan *(insert name of Plan if there is one)* recommendations; ensure reasonable access to properties, though not always by the most direct access; and to coordinate access decisions with the Michigan Department of Transportation and/or the _____ County Road Commission, as applicable.

Section 0.2 -- One Access Per Parcel

A. All land in a parcel or lot having a single tax code number, as of the effective date of the amendment adding this provision to the Ordinance (hereafter referred to as "the parent parcel"), that shares a lot line for less than _____ feet [AT LEAST 330 FEET, BETTER IS 660 FEET; SEE TECHNIQUE #1 IN CHAPTER 3.] with right-of-way on a public road or highway *(or specifically define the beginning and ending points of one or two corridors if the community doesn't want this provision to apply to all public roads in the community)* shall be entitled to one (1) driveway or road access per parcel from said public road or highway.

1. All subsequent land divisions of a parent parcel, shall not increase the number of driveways or road accesses beyond those entitled to the parent parcel on the effective date of this amendment.
2. Parcels subsequently divided from the parent parcel, either by metes and bounds descriptions, or as a plat under the applicable provisions of the Land Division Act, Public Act 288 of 1967, as amended, or as a condominium project in accord with the Condominium Act, Public Act 59 of 1978, as amended, shall have access by a platted subdivision road, by another public road, by a private road that meets the requirements of Section ____, or by a service drive meeting the requirements of Section 0.40.

B. Parent parcels with more than _____ feet [AT LEAST 330 FEET, BETTER IS 660 FEET; SEE TECHNIQUE #1 IN CHAPTER 3.] of frontage on a public road or highway shall also meet the requirements of A.1 and A.2 above, except that whether subsequently divided or not, they are entitled to not more than one driveway for each _____ feet [AT LEAST 330 FEET, BETTER IS 660 FEET; SEE TECHNIQUE #1 IN CHAPTER 3.] of public road frontage thereafter, unless a registered traffic engineer determines that topographic conditions on the site, curvature on the road, or sight distance limitations demonstrate a second driveway within a lesser distance is safer or the nature of the land use to be served requires a second driveway for safety. If the parcel is a corner lot and a second driveway is warranted, the second driveway shall have access from the abutting street unless that street is of a higher functional classification.

Section 0.3 Application Review, Approval and Coordination Process

A. Standards of Road Authorities Apply
All standards of the applicable road authority (either the Michigan Department of Transportation or the _____ County Road Commission, or both) shall be met prior to approval of an access application under this Article.

B. Application, Review and Approval Process
Applications for driveway or access approval shall be made on a form prescribed by and available at _____ *(insert name of jurisdiction)* and/or the _____ County Road Commission and Michigan Department of Transportation as applicable. [IF THE COMMUNITY ALREADY HAS A SITE PLAN REVIEW PROCESS, THE FOLLOWING ITEMS CAN BE ADDED TO THE EXISTING LIST OF SUBMITTAL REQUIREMENTS, IF THEY AREN'T ALREADY INCUDED.]

1. Applications shall be accompanied by clear, scaled drawings (minimum of 1''=20') in triplicate showing the following items:
   a. Location and size of all structures proposed on the site.
   b. Size and arrangement of parking stalls on aisles.
   c. Proposed plan of routing vehicles entering and leaving the site (if passenger vehicles are to be separated from delivery trucks indicate such on drawing).
   d. Driveway placement.
   e. Property lines.
   f. Right-of-way lines.
   g. Intersecting roads, streets and driveways within 300' either side of the property on both sides of the street.
   h. Width of right-of-way.
   i. Width of road surface.
   j. Type of surface and dimensions of driveways.
   k. Proposed inside and outside turning radii.

l. Show all existing and proposed landscaping, signs, and other structures or treatments within and adjacent to the right-of-way.
m. Traffic analysis and trip generation survey results, obtained from a licensed traffic engineer for all developments with over 100 directional vehicle trips per peak hour.
n. Design dimensions and justification for any alternative or innovative access design.
o. Dumpsters or other garbage containers.

2. Applications are strongly encouraged to rely on the following sources for access designs, the National Access Management Manual, TRB, 2002; National Cooperative Highway Research Program (NCHRP), "Access Management Guidelines to Activity Centers" Report 348 and "Impacts of Access Management Techniques" Report 420; and the AASHTO "Green Book" A Policy on Geometric Design of Highways and Streets. The following techniques are addressed in these guidebooks and are strongly encouraged to be used when designing access:
   a. Not more than one driveway access per abutting road
   b. Shared driveways
   c. Service drives: front, rear and perpendicular
   d. Parking lot connections with adjacent property
   e. Other appropriate designs to limit access points on an arterial or collector.

3. Applications shall be accompanied by an escrow fee for professional review per the requirements of Section _____. [BE SURE TO INCLUDE THIS SECTION IN THE ZONING ORDINANCE. SAMPLE LANGUAGE IS FOUND AT THE BEGINNING OF THIS CHAPTER UNDER "SUPPLEMENTARY REGULATIONS".]

C. Review and Approval Process

The following process shall be completed to obtain access approval: [THE FOLLOWING PROCESS COULD BE INCORPORATED INTO THE SITE PLAN REVIEW PROCESS OF THE ZONING ORDINANCE IF THERE IS ONE, INSTEAD OF BEING LISTED SEPARATELY HERE.]

1. An Access Application meeting the requirements of Section 0.3.B.1 shall be submitted to the Zoning Administrator and on the same day to the _____ County Road Commission and/or the Michigan Department of Transportation, as applicable. [THE COMMUNITY COULD AGREE TO USE THE MDOT FORM FOR A STATE HIGHWAY OR THE COUNTY ROAD COMMISSION FORM FOR A COUNTY ROAD INSTEAD. SEE APPENDIX D FOR SAMPLE.]

2. The completed application must be received by the _____ Zoning Administrator at least ____ days *(insert number, typically 14-30)* prior to the Planning Commission meeting where the application will be reviewed.

3. The applicant, the Zoning Administrator and representatives of the _____ County Road Commission, the Michigan Department of Transportation and the Planning Commission may meet prior to the Planning Commission meeting to review the application and proposed access design. [SOME COMMUNITIES AND/OR ROAD AUTHORITIES MAY WANT THESE MEETINGS EVERY TIME, IF SO, CHANGE "MAY" TO "SHALL".]

4. The Planning Commission shall review and recommend approval, or denial, or request additional information. They shall also forward the Access Application (*and other relevant project information*) to the _____ County Road Commission and/or Michigan Department of Transportation for their review as applicable.

5. The _____ County Road Commission and/or the Michigan Department of Transportation, as applicable, shall review the access application and conclusions of the Planning Commission. One of three actions may result;
   a) If the Planning Commission and the Road Commission, and/or the Michigan

Department of Transportation, as applicable, approve the application as submitted, the access application shall be approved.

b. If both the Planning Commission and the Road Commission, and/or the Michigan Department of Transportation, as applicable, deny the application, the application shall not be approved.

c. If either the Planning Commission, Road Commission, and/or Michigan Department of Transportation, as applicable, requests additional information, approval with conditions, or does not concur in approval or denial, there shall be a joint meeting of the Zoning Administrator, a representative of the Planning Commission and staff of the _____ County Road Commission, and/or the Michigan Department of Transportation, as applicable, and the applicants. The purpose of this meeting will be to review the application to obtain concurrence between the Planning Commission and the applicable road authorities regarding approval or denial and the terms and conditions of any permit approval.

   No application will be considered approved, nor will any permit be considered valid unless <u>all</u> the above-mentioned agencies have indicated approval unless approval by any of the above-mentioned agencies would clearly violate adopted regulations of the agency. In this case the application shall be denied by that agency and the requested driveway(s) shall not be constructed. Conditions may be imposed by the Planning Commission to ensure conformance with the terms of any driveway permit approved by a road authority.

6. The Zoning Administrator shall keep a record of each application that has been submitted, including the disposition of each one. This record shall be a public record.

7. Approval of an application remains valid for a period of one year from the date it was authorized. If authorized construction is not initiated by the end of one (1) year, the authorization is automatically null and void. Any additional approvals that have been granted by the Planning Commission or the Zoning Board of Appeals, such as Special Use Permits, or variances, also expire at the end of one year.

8. An approval may be extended for a period not to exceed _____ [TYPICALLY 6 MONTHS TO ONE YEAR]. The extension must be requested, in writing by the applicant before the expiration of the initial approval. The Zoning Administrator may approve extension of an authorization provided there are no deviations from the original approval present on the site or planned, and there are no violations of applicable ordinances and no development on abutting property has occurred with a driveway location that creates an unsafe condition. If there is any deviation or cause for question, the Zoning Administrator shall consult a representative of the _____ County Road Commission and/or the Michigan Department of Transportation, as applicable, for input.

9. Re-issuance of an authorization that has expired requires a new Access Application form to be filled out and processed independently of previous action.

10. The applicant shall assume all responsibility for all maintenance of such driveway approaches from the right-of-way line to the edge of the traveled roadway.

11. Where authorization has been granted for entrances to a parking facility, said facility shall not be altered or the plan of operation changed until a revised Access Application has been submitted and approved as specified in this Section.

12. Application to construct or reconstruct any driveway entrance and approach to a site shall also cover the reconstruction or

closing of all nonconforming or unused entrances and approaches to the same site at the expense of the property owner.

13. When a building permit is sought for the reconstruction, rehabilitation or expansion of an existing site or a zoning or occupancy certificate is sought for use or change of use for any land, buildings, or structures, all of the existing, as well as proposed driveway approaches and parking facilities shall comply, or be brought into compliance, with all design standards as set forth in this Ordinance prior to the issuance of a zoning or occupancy certificate, and pursuant to the procedures of this section.

14. _____ *(insert name of jurisdiction)* and the _____ County Road Commission and/or the Michigan Department of Transportation, as applicable, may require a performance bond or cash deposit in any sum not to exceed $5,000 for each such approach or entrance to insure compliance with an approved application. Such bond shall terminate and deposit be returned to the applicant when the terms of the approval have been met or when the authorization is cancelled or terminated.

Section 0.4 Service Drives

[ADAPT FROM SECTION 2.3 IN OPTION 2 TO FIT LOCAL CIRCUMSTANCES, IF THE COMMUNITY WISHES TO PERMIT SERVICE DRIVES.]

Option 1b - Rural Corridor Overlay Zone

Option 1b is intended for use in a rural area without planning staff or a sophisticated planning commission. It is essentially the same as Option 1a without the "lock in access" provisions and it targets one or two corridors. If the community is in the path of development, or anticipates significant development along a particular corridor in the next few years, it would be better to adopt the more robust approach presented in Option 2. However, if a community was unprepared to adopt all of the provisions in Option 2, but wanted more than this option offers, it could add another Section 1.5 that was a "slimmed down" version of the standards in Section 2.2 in Option 2.

Section 1.1 Intent

The provisions of this Article *(or Chapter)* are intended to promote safe and efficient travel within the_____ *(name of jurisdiction);* minimize disruptive and potentially hazardous traffic conflicts; ensure safe access by emergency vehicles; protect the substantial public investment in the street system by preserving capacity and avoiding the need for unnecessary and costly reconstruction which disrupts business and traffic flow; separate traffic conflict areas by reducing the number of driveways; provide safe spacing standards between driveways, and between driveways and intersections; provide for shared access between abutting properties; implement the _____Master Plan *(insert name of Plan)* and the _____ Corridor *(or Access)* Management Plan *(insert name of Plan if there is one)* recommendations; ensure reasonable access to properties, though not always by the most direct access; and to coordinate access decisions with the Michigan Department of Transportation and/or the _____ County Road Commission, as applicable.

Section 1.2 Identification of the Corridor Overlay Zone

The _____ (*insert name of road here*) corridor is defined as those properties that abut the highway right-of-way either side of _____ (*insert name of road here*) in _____ (*insert name of community here*) between _____ (*location A – usually an intersection*) and _____ (*location B – usually an intersection*). The following regulations apply in addition to the applicable regulations of the specific districts beneath the overlay zone. [AS AN ALTERNATIVE, A MAP COULD BE ATTACHED AND SPECIFICALLY REFERRED TO. THIS IS A PREFERRED APPROACH IF PROPERTY DEEPER THAN THE ONE LOT ABUTTING THE ROAD IS PROPOSED FOR INCLUSION IN THE OVERLAY ZONE.]

Section 1.3 Application Review, Approval and Coordination Process

[ADAPT FROM SECTION 0.3 IN OPTION 1A TO FIT LOCAL CIRCUMSTANCES.]

Section 1.4 Standards for Service Drives

[ADAPT FROM SECTION 2.3 IN OPTION 2 TO FIT LOCAL CIRCUMSTANCES, IF THE COMMUNITY WISHES TO PERMIT SERVICE DRIVES.]

Section 1.5 Driveway and Related Access Standards

[ADAPT FROM SECTION 2.2 IN OPTION 2 TO FIT LOCAL CIRCUMSTANCES, IF THE COMMUNITY WISHES TO REGULATE DRIVEWAY SPACING, LOCATION AND CONSTRUCTION.]

OPTION 2 -- BEST SUITED FOR A RURAL COMMUNITY IN THE PATH OF GROWTH OR A GROWING SUBURB WITH SIGNIFICANT UNDEVELOPED LAND ALONG MAJOR ARTERIALS

Option 2 is a comprehensive access management regulation. It is divided into major topic categories with many specific regulations within each category. The pertinent provisions from every major topic category should be reviewed and adapted to fit local circumstances in cooperation with appropriate county road commission and MDOT staff. Alternative language is offered to apply Option 2 to all collectors and arterials in a community (not merely to state highways and key city or county roads). Be sure to insert the proper name of the community and the pertinent road authority names in the places indicated. Many tasks are assigned to the zoning administrator. If it is more appropriate to assign these tasks to someone else, like the planning director, be sure to change the text accordingly. Option 2 assumes a complete local site plan review process and that review is carefully completed in cooperation with the appropriate road authority (see Chapter 5). A memorandum of understanding (MOU) is the best way to proceed. Appendix B presents a sample MOU. Some communities may want to add the key parts of the MOU review process in the site plan review section of the zoning ordinance. If so, language in Option 1a, Section 0.3 could be used as a starting point. The rest would come from the MOU itself. If this language is proposed for use in a city or village which controls all the streets within the community, then coordination between the city or village road authority and the planning commission (rather than with MDOT or the county road commission) would be the focus.

CHAPTER ___ ACCESS MANAGEMENT REGULATIONS

Section 2.0 Purpose, Intent and Application

A. The purpose of this Article *(or Chapter)* is to establish minimum regulations for access to property. Standards are established for new roads, driveways, shared access, parking lot cross access, and service roads. The standards of this Article (*or Chapter*) are intended to promote safe and efficient travel within the_____ *(name of jurisdiction);* minimize disruptive and potentially hazardous traffic conflicts; ensure safe access by emergency vehicles; protect the substantial public investment in the street system by preserving capacity and avoiding the need for unnecessary and costly reconstruction which disrupts business and traffic flow; separate traffic conflict areas by reducing the number of driveways; provide safe spacing standards between driveways, and between driveways and intersections; provide for shared access between abutting properties; implement the _____Master Plan *(insert name of Plan)* and the _____ Corridor (or Access) Management Plan *(insert name of Plan)* recommendations; ensure reasonable access to properties, though not always by the most direct access; and to coordinate access decisions with the Michigan Department of Transportation and/or the _____ County Road Commission, as applicable.

B. The standards in this Article *(or Chapter)* are based on extensive traffic analysis of this corridor by the _____ *(name of jurisdiction)*, the _____ Road Commission and the Michigan Department of Transportation (MDOT) as applicable. This analysis demonstrates that the

combination of roadway design, traffic speeds, traffic volumes, traffic crashes and other characteristics necessitate special access standards. [INSERT THESE TWO SENTENCES IF TRUE AND MODIFY TO FIT SITUATION--OTHERWISE DELETE THEM]. The standards in this Article *(or Chapter)* apply to private and public land along road rights-of-way which are under the jurisdiction of the _____ *(city or village street department)*, the _____ County Road Commission or the Michigan Department of Transportation (MDOT). [SELECT APPLICABLE ENTITIES.] The requirements and standards of this Article *(or Chapter)* shall be applied in addition to, and where permissible shall supercede, the requirements of the Michigan Department of Transportation, _____ County Road Commission, or other Articles *(or Chapters)* of this Zoning Ordinance. [ADAPT PARAGRAPH TO FIT LOCAL CIRCUMSTANCES. IT IS A GOOD IDEA TO LIST SPECIFIC FINDINGS OF AN ACCESS MANAGEMENT PLAN OR CORRIDOR MANAGEMENT PLAN HERE WHERE THEY SUPPORT THE PURPOSE OF THE REGULATIONS]

C. The standards of this Article *(or Chapter)* shall be applied by the Zoning Administrator during plot plan review and by the Planning Commission during site plan review, as is appropriate to the application. The Planning Commission shall make written findings of nonconformance, conformance, or conformance if certain conditions are met with the standards of this Article *(or Chapter)* prior to disapproving or approving a site plan per the requirements of Section _____ *(the site plan review section of the Ordinance).* The _____ *(name of jurisdiction)* shall coordinate its review of the access elements of a plot plan or site plan with the appropriate road authority prior to making a decision on an application (see D. below). The approval of a plot plan or site plan does not negate the responsibility of an applicant to subsequently secure driveway permits from the appropriate road authority, either the _____ *(city or village road authority)*, the _____ County Road Commission, or the Michigan Department of Transportation *(depending on the roadway).* Any driveway permit obtained by an applicant prior to review and approval of a plot plan or site plan that is required under this Ordinance will be ignored. [THIS REVIEW PROCESS WILL BE EXPEDITED BY A FORMAL MEMORANDUM OF UNDERSTANDING BETWEEN THE COMMUNITY AND THE MICHIGAN DEPARTMENT OF TRANSPORTATION, AND/OR THE _____ COUNTY ROAD COMMISSION. A SAMPLE MOU IS PROVIDED IN APPENDIX B].

D. Neither the Zoning Administrator nor the Planning Commission shall take action on a request for a new road, driveway, shared access, or a service drive that connects to a public road without first consulting the _____ (*name of city or village street department, when on a city or village street*), the _____ County Road Commission *(when on a county road)* or the Michigan Department of Transportation *(when on a state highway)*. To ensure coordination, applicants are required to submit a plot plan, site plan or a tentative preliminary plat concurrently to both the _____ *(name of jurisdiction)*, the ____ County Road Commission, and the Michigan Department of Transportation [BASED ON THE JURISDICTION RESPONSIBLE FOR REVIEW OF DEVELOPMENT ALONG SHARED PROPERTY LINES] as applicable. Complete applications shall be received at least ____ days *(insert number -- typically 14-30 days as established in the site plan review section of the ordinance or by a staff procedure manual)* before the Planning Commission meeting at which action is to be taken. If the initial review of the application by the Zoning Administrator reveals noncompliance with the standards of this Article *(or Chapter)*, or if the proposed land use exceeds the traffic generation thresholds in Section _____, then the Zoning Administrator shall require submittal of a traffic impact study as described below prior to consideration of the application by either the Zoning Administrator or the Planning Commission.

1. At a minimum the traffic study shall contain the following*:* [FOR A SAMPLE TRAFFIC IMPACT ORDINANCE, SEE EVALUATING TRAFFIC IMPACT STUDIES, AVAILABLE FROM THE PROJECT PLANNING DIVISION OF THE MICHIGAN DEPT. OF TRANSPORTATION BY USING THE POSTCARD AT THE END OF THIS REPORT OR THE TRI-COUNTY REGIONAL PLANNING COMMISSION AT 913 W. HOLMES ROAD, SUITE 201, LANSING, MI 48910; 517/393-0342.]
   a. Analysis of existing traffic conditions and/or site restrictions using current data.

b. Projected trip generation at the subject site or along the subject service drive based on the most recent edition of the Institute of Transportation Engineers Trip Generation manual. The _____ *(name of jurisdiction)* may approve use of other trip generation data if based on recent studies of at least three (3) similar uses within similar locations in Michigan.
c. Illustrations of current and projected turning movements at access points. Include identification of the impact of the development and its proposed access on the operation of the abutting streets. Capacity analysis shall be completed based on the most recent version of the Highway Capacity Manual published by Transportation Research Board, and shall be provided in an appendix to the traffic impact study.
d. Description of the internal vehicular circulation and parking system for passenger vehicles and delivery trucks, as well as the circulation system for pedestrians, bicycles and transit users.
e. Justification of need, including statements describing how the additional access will meet the intent of this Section, will be consistent with the _____ Corridor or Access Management Plan *(insert name of Plan)* and the _____ Master Plan *(insert name of Plan),* will not compromise public safety and will not reduce capacity or traffic operations along the roadway.
f. Qualifications and documented experience of the author, describing experience in preparing traffic impact studies in Michigan. The preparer shall be either a registered traffic engineer (P.E.) or transportation planner with at least three (3) years of experience preparing traffic impact studies in Michigan [OR OTHER QUALIFIED INDIVIDUAL -- SEE DISCUSSION ON PAGE 24-25 IN EVALUATING TRAFFIC IMPACT STUDIES]. If the traffic impact study involves geometric design, the study shall be prepared or supervised by a registered engineer with a strong background in traffic engineering.

2. The _____*(name of jurisdiction)* may utilize its own traffic consultant to review the applicant's traffic impact study, with the cost of the review being borne by the applicant per Section _____. [ADD SUPPLEMENTARY ORDINANCE LANGUAGE PRESENTED AT THE START OF THE CHAPTER IN THE APPROPRIATE PLACE OF THE ORDINANCE.]

E. Failure by the applicant to begin construction of an approved road, driveway, shared access, service drive or other access arrangement within twelve (12) months from the date of approval, shall void the approval and a new application is required. [THIS SUBSECTION MAY ALREADY BE ADEQUATELY COVERED ELSEWHERE IN THE ORDINANCE, IF SO, DELETE HERE.]

F. The Zoning Administrator *(or municipal engineer or other authorized person)* shall inspect the driveway as constructed for conformance with the standards of this Ordinance and any approval granted under it, prior to issuing an occupancy permit. *(Insert proper name of permit if different than "occupancy permit". This subsection "F." may already be adequately covered elsewhere in the Ordinance. Also, the community may want to explore a formal agreement process to coordinate inspection with MDOT or the County Road Commission so that dual inspections are avoided.)*

Section 2.1 Identification of Corridor Overlay Zone

The _____ (*insert name of road here*) corridor is defined as those properties that abut the highway right-of-way either side of _____ (*insert name of road here*) in _____ (*insert name of community here*) between _____ (*location A – usually an intersection*) and _____ (*location B--usually an intersection*). The following regulations supercede otherwise applicable regulations of the specific districts beneath the overlay zone.

OR

[OR INSERT THE FOLLOWING ALTERNATIVE LANGUAGE WHICH WOULD MAKE THIS ARTICLE APPLY TO ALL STREETS AND ROADS IN THE COMMUNITY, NOT TO JUST A FEW MAJOR ARTERIALS. USE ONE OR THE OTHER BUT NOT BOTH]

Section 2.1 Roadways Subject to Access Management Regulations

The access management regulations of this Article *(or Chapter)* apply to all property according to the roadway classification of the abutting public streets and roads within _____ *(name of community)* as described below and as illustrated on Map ____. [THE COMMUNITY MAY OR MAY NOT ALSO WISH TO USE THE TEXT IN A. AND B. WHICH FOLLOWS THE MAP FOR GREATER CLARITY.]

A. Application of the access location and design standards of this Article *(or Chapter)* requires identification of the functional classification of the street on which access is requested and then applying the appropriate spacing requirements. The streets and roads of _____ *(insert name of community)* are classified as follows and are as defined in Section _____:

1. Local Street or Road;
2. Minor Collector;
3. Major Collector;
4. Minor Arterial;
5. Major Arterial; and
6. Limited Access Highway.

B. Major arterial, minor arterial, and collector streets are indicated on the Thoroughfare Map (Map ___). [A SAMPLE THOROUGHFARE MAP IS ILLUSTRATED IN FIGURE 8-2.] All unclassified public streets are local streets principally providing access to single family residences. *(Add this next sentence only if local streets are not classified on the Map or use the following language:* The functional classification of any street in _____ *(insert name of jurisdiction)* not indicated as an arterial or collector on this Map shall be determined using the functional street classification defined by the AASHTO "Green Book", A Policy on Geometric Design of Highways and Streets.*)*

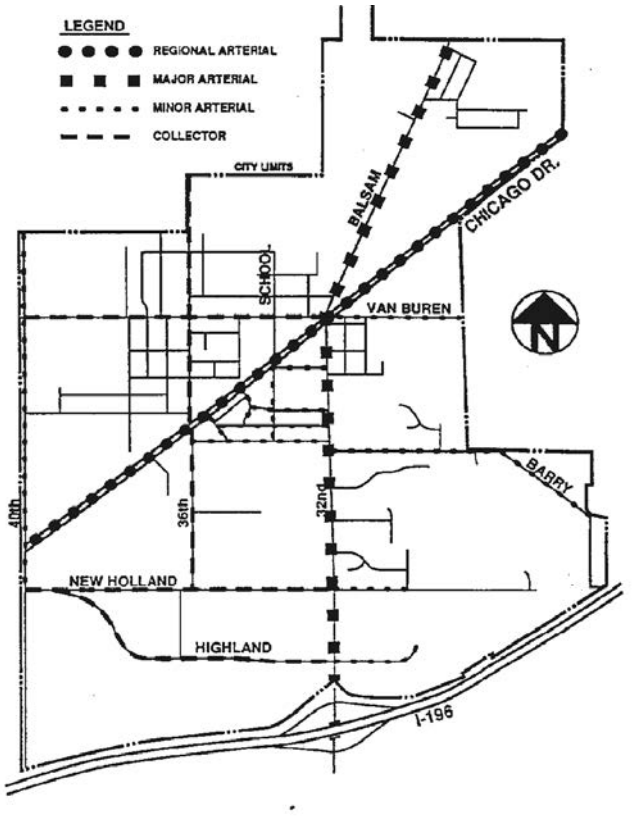
Section 2.2 Driveway and Related Access Standards

All lots hereafter created and all structures hereafter created, altered or moved on property with frontage on or access to a public road or street that is subject to regulation per Section 2.1, shall conform with the following requirements:

A. General Standards [GREAT CARE SHOULD BE TAKEN TO CAREFULLY INTEGRATE THIS SECTION WITH EXISTING DISTRICT REGULATIONS AND PROVISIONS IN THE SCHEDULE OF REGULATIONS.]

1. Access Approval Required - No road, driveway, shared access, parking lot cross access, service road, or other access

Figure 8-2
Sample Roadway Classification Map

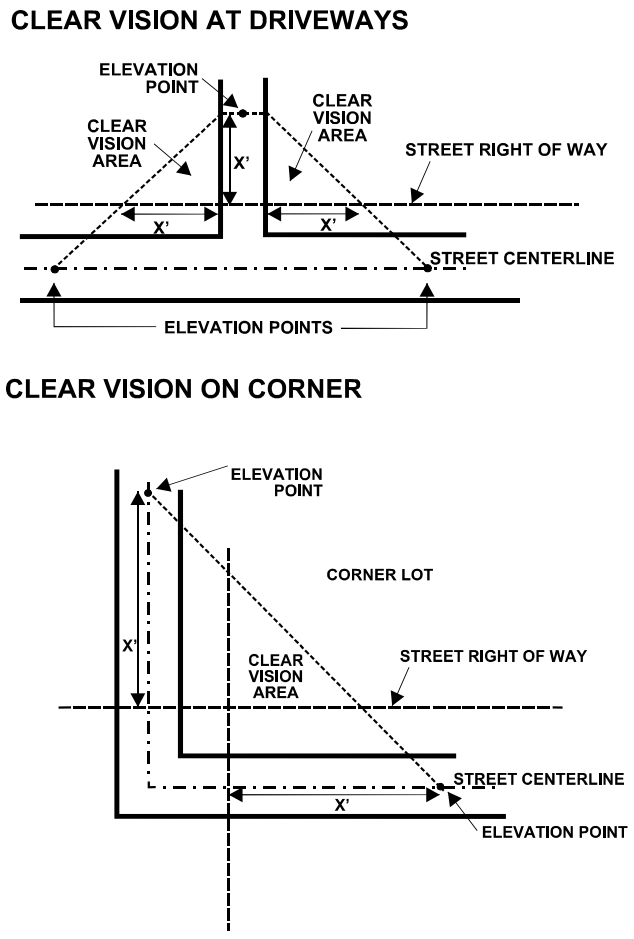


Source: City of Hudsonville, Michigan: *Driveway Location Standards*, 1999.

arrangement shall be established, reconstructed or removed without first meeting the requirements of this Section.

2. Frontage on a Public Road or Street - Any lot created after the effective date of this Ordinance shall have frontage upon a public street right-of-way or private road or access easement recorded with the County Register of Deeds that meets the requirements of this Article *(or Chapter)*. Contiguous properties under one ownership or consolidated for unified development will be considered one parcel for purposes of this Article.
3. Minimum Lot Width - Except for existing lots of record, all lots fronting on a major arterial, arterial or collector subject to this Article, shall not be less than _____ feet in width (*at least 300 feet with 400 feet better*), unless served by shared access or a service drive that meets the requirements of Section 2.3, in which case minimum lot width may be reduced per the requirements of Section 2.6. [THIS CAN BE AN IMPORTANT INCENTIVE TO MOVE TO SHARED ACCESS.]
4. Structure Setback - No structure other than signs, as allowed in Section ___, telephone poles and other utility structures that are not buildings, transfer stations or substations, shall be permitted within _____ feet of the roadway right-of-way. [THIS SHOULD BE DEEP ENOUGH (USUALLY 75-100 FEET) TO PERMIT EXPANSION OF THE RIGHT-OF-WAY AT A FUTURE TIME WITHOUT PREVENTING EFFECTIVE USE OF THE STRUCTURE AT THAT TIME, IF CAPACITY IMPROVEMENTS LIKE THE ADDITION OF LANES OR A MEDIAN ON THE ROADWAY ARE LIKELY].
5. Parking Setback and Landscaped Area - No parking or display of vehicles, goods or other materials for sale, shall be located within ____*(often 50)* feet of the roadway right-of-way. This setback shall be planted in grass and landscaped with small clusters of salt tolerant trees and shrubs suitable to the underlying soils unless another design is approved under the landscape provisions of Section _____. [THIS PROVISION IMPROVES THE AESTHETIC APPEARANCE ALONG A ROADWAY, AND IMPROVES THE CONTRAST BETWEEN A VEHICLE AND THE PAVEMENT, IMPROVING EASE OF VISIBILITY. IT ALSO SERVES AS A SNOW STORAGE ZONE. SEE MDOT RULE 32(2) IN ADMINISTRATIVE RULES IN APPENDIX D.]
6. Clear Vision – All access points shall maintain clear vision as illustrated in Figure ___. [SEE EXAMPLE IN FIGURE 8-3.]
7. Street Structures - No driveway shall interfere with municipal facilities such as street light or traffic signal poles, signs, fire hydrants, cross walks, bus loading zones, utility poles, fire alarm supports, drainage structures, or other necessary street structures. The Zoning Administrator is authorized to order and

Figure 8-3



Note: The dimension of X' is variable depending on local conditions and must be specified in the local zoning ordinance.

Graphic by John Warbach, Planning & Zoning Center, Inc.

effect the removal or reconstruction of any driveway which is constructed in conflict with street structures. The cost of reconstructing or relocating such driveways shall be at the expense of the abutting property owner.

B. Access Location Standards
   1. Access Point Approval - No access point shall connect to a public street or road, without first receiving approval of the location and cross-section specifications from the _____ (*name of city or village street department, when on a city or village street)*, _____ County Road Commission *(when on a county road)* or the Michigan Department of Transportation *(when on a state highway).* No access point shall connect to a private road unless approved by the Planning Commission and by the parties with an ownership interest in the private road. [INSERT THIS SENTENCE ONLY IF PRIVATE ROADS ARE ALLOWED].
   2. Factors on Location of Driveway Access - At a minimum, the following factors shall be considered prior to making a decision on the location of a driveway or other access point: [IF THE COMMUNITY PREPARES A PROPERTY SPECIFIC ACCESS MANAGEMENT PLAN, THESE FACTORS MAY BE ABLE TO BE REPLACED WITH A SPECIFIC REFERENCE TO THE APPLICABLE PART OF THE ACCESS MANAGEMENT PLAN. SEE ALSO TRAFFIC AND SAFETY DIVISION NOTE "SPACING FOR COMMERCIAL DRIVES AND STREETS," 7.9 IN APPENDIX D.]
      a. The characteristics of the proposed land use;
      b. The existing traffic flow conditions and the future traffic demand anticipated by the proposed development on the adjacent street system;
      c. The location of the property;
      d. The size of the property;
      e. The orientation of structures on the site;
      f. The minimum number of driveways or other access points needed to accommodate anticipated traffic based on a traffic analysis, as determined by the community and road agency. Such finding shall demonstrate traffic operations and safety along the public street would be improved (or at least not negatively affected), and not merely that another access point is desired for convenience;
      g. The number and location of driveways on existing adjacent and opposite properties;
      h. The location and functional classification of abutting streets or roads and the carrying capacity of nearby intersections;
      i. The proper geometric design of driveways;
      j. The spacing between opposite and adjacent driveways and from any nearby intersection;
      k. The internal circulation between driveways and through parking areas;
      l. The size, location and configuration of parking areas relative to the driveways; and
      m. The speed of the adjacent roadway.
   3. Access Point Location - Each access point location shall conform with access management plans or corridor improvement plans that have been adopted by the _____ *(name of community)*, the _____ County Road Commission, and/or the Michigan Department of Transportation.
   4. Access Points within Right-of-Way - Driveways including the radii but not including right-turn lanes, passing lanes and tapers, shall be located entirely within the right-of-way frontage, unless otherwise approved by the road agency and upon written certification from the adjacent land owner agreeing to such encroachment.
   5. Backing-up from Parking or Loading Area Onto a Public Street or Service Drive - Driveway access to arterials shall not be permitted for any parking or loading areas that require backing maneuvers in a public street or road right-of-way. Driveway access to collector streets, local streets, or service drives for commercial, office, industrial, or multifamily developments shall not be permitted for parking or loading areas that require backing maneuvers in a public street

right-of-way or onto a public or private service drive.

6. Relationship to Lot Line - No part of a driveway shall be located closer than _____ feet *(typical range 4-15 feet)* from a lot line unless it is a common or shared driveway as provided in Section 2.2 F. This separation is intended to help control stormwater runoff, permit snow storage on site, and provide adequate area for any necessary on-site landscaping.
7. Existing Driveways – Except for shared driveways, existing driveways that do not comply with the requirements of this Article *(or Chapter)* shall be closed when an application for a change of use requiring a zoning permit or a site plan requiring approval under Section ____ is submitted and once approval of a new means of access under this Article *(or Chapter)* is granted. A closed driveway shall be graded and landscaped to conform with adjacent land and any curb cut shall be filled in with curb and gutter per the standards of the applicable road authority. See also Section 2.5.
8. Intersection Sight Distance – Driveways shall be located so as not to interfere with safe intersection sight distance as determined by the appropriate road authority.
9. Adequate Corner Clearance – Driveways shall be located so as not to interfere with safe traffic operations at an intersection as determined by Table 2.2-3 as long as that distance is beyond any clear vision area owned by a road authority. [SEE MDOT TRAFFIC AND SAFETY DIVISION NOTE 7.9, "MDOT GUIDELINES FOR ACCESS SPACING ON STATE HIGHWAYS" IN APPENDIX D.]
10. Traffic Signals – Access points on arterial and collector streets may be required to be signalized in order to provide safe and efficient traffic flow. Any signal shall meet the spacing requirements of the applicable road authority. A development may be responsible for all or part of any right-of-way, design, hardware, and construction costs of a traffic signal if it is determined that the signal is warranted by the traffic generated from the development. The procedures for signal installation and the percent of financial participation required of the development in the installation of the signal shall be in accordance with criteria of the road authority with jurisdiction. [MAKING THE "LAST GUY IN" PAY THE TOTAL COST OF A TRAFFIC SIGNAL COULD BE UNREASONABLE IF HIS DEVELOPMENT ONLY GENERATED A SMALL PORTION OF THE TRAFFIC. FINANCIAL PARTICIPATION IN THE COST NEEDS TO CONSIDER THE SHARE OF TRAFFIC GENERATED.]

C. Number of Driveways Permitted
   1. Access for an individual parcel, lot, or building site or for contiguous parcels, lots or building sites under the same ownership shall consist of either a single two-way driveway or a paired system wherein one driveway is designed, and appropriately marked, to accommodate ingress traffic and the other egress traffic.
   2. One driveway shall be permitted for each single and two-family residential lot or parcel. [SEE ALTERNATIVE IN RULE 47 OF MDOT ADMINISTRATIVE RULES UNDER ACT 200 IN APPENDIX D.]
   3. A temporary access permit may be issued for field entrances per Section 2.4, for cultivated land, timber land, or undeveloped land, as well as for uses at which no one resides or works such as cellular towers, water wells, pumping stations, utility transformers, billboards, and similar uses. Field-entrance and utility-structure driveways will be reviewed on a case-by-case basis. The review shall take into account the proximity of the adjacent driveways and intersecting streets, as well as traffic volumes along the roadway. [SEE RULE 49 OF MDOT ADMINISTRATIVE RULES UNDER ACT 200 IN APPENDIX D.]
   4. For a parcel, lot, or building site with frontage exceeding ____ feet *(typically over 600 feet)*, or where a parcel, lot, or building site has frontage on at least two streets, an additional driveway may be allowed, provided that a traffic impact study is submitted by the applicant showing that conditions warrant an additional driveway

and that all driveways meet the spacing requirements.

5. Certain developments generate enough traffic to warrant consideration of an additional driveway to reduce delays for exiting motorists. Where possible, these second access points should be located on a side street or service drive, or shared with adjacent uses, or designed for right-turn-in, right-turn-out only movements and shall meet the spacing requirements of this ordinance. In order to be considered for a second driveway on an arterial or collector street combined approach volumes (entering and exiting) of a proposed development shall exceed 100 directional trips during the peak hour of traffic and a traffic impact study shall be performed. [MDOT TRAFFIC AND SAFETY DIVISION NOTE # 7.9C LISTS LAND USES WHICH COMMONLY EXCEED 100 DIRECTIONAL PEAK HOUR TRIPS.] Uses where a second driveway could be considered are influenced by the trip generation characteristics of the uses and the volumes of the adjacent roadway. [SEE THE ITE TRIP GENERATION MANUAL FOR PEAK HOUR TRIP GENERATION COUNTS FOR DRIVEWAYS BY TYPE OF LAND USE.] Table 2.2-1 lists land uses which may warrant consideration of an additional driveway. [A COMMUNITY MAY NOT WISH TO PUBLISH A LIST AND INSTEAD LEAVE THE DETERMINATION UP TO TRAFFIC ENGINEERS FOLLOWING A TRAFFIC IMPACT STUDY. IF SO, DELETE THIS TABLE AND RENUMBER THE REST OF THE TABLES ACCORDINGLY.] (Note: Where the development has access to a signalized arterial or collector, the approach volume of driveway traffic should be double that of unsignalized locations to warrant consideration of a second access. See Section 2.2D.1.a.)
[NOTE: IF RESIDENTIAL USES PREDOMINATE ON THE SIDE STREET, THERE MAY BE OPPOSITION TO A COMMERCIAL DRIVEWAY. THE POTENTIAL NEGATIVE IMPACTS AND HENCE OPPOSITION, MAY BE MITIGATED BY USE OF A DIRECTIONAL DRIVEWAY.]

Table 2.2-1

Development that may Warrant Consideration of an Additional Driveway
• multiple family development with over 250 units
• a grocery store of over 30,000 square feet (GFA)
• a shopping center with over 40,000 square feet (GFA)
• a hotel or motel with over 400 rooms
• industrial developments with over 300,000 square feet (GFA) or 350 employees (although a secondary entrance for trucks should be allowed)
• warehouses of over 750,000 square feet (GFA) or 350 employees
• a mobile home park with over 300 units
• general office building of 150,000 square feet (GFA) or 500 employees
• medical office building of 60,000 square feet (GFA) or 200 employees
• fast food restaurant of over 6,000 square feet (GFA)
• sit down restaurant of over 20,000 square feet (GFA).

Source: *Oshtemo Township Zoning Ordinance*

6. When alternatives to a single, two-way driveway are necessary to provide reasonable driveway access to property fronting on an arterial street, and shared access or a service drive are not a viable option, the following progression of alternatives should be used:
   a. One (1) standard, two-way driveway;
   b. Additional ingress/egress lanes on one (1) standard, two-way driveway;
   c. Two (2), one-way driveways;
   d. Additional ingress/egress lanes on two (2), one-way driveways;
   e. Additional driveway(s) on an abutting street with a lower functional classification;
   f. Additional driveway on arterial street. Note: Restricted turns and roadway modifications will be considered in conjunction with alternative driveway designs.

D. Access Point Spacing Standards

1. Separation from Other Driveways -

a. The minimum spacing between unsignalized driveways and other access points shall be determined based upon posted speed limits along the parcel frontage unless the appropriate road authority approves less based on the land use and restricted turns in the driveway design. The minimum spacings indicated below are measured from the centerline of one driveway to the centerline of another driveway. For sites with insufficient road frontage to meet the table below, the Planning Commission shall require one of the following: construction of the driveway along a side street, a shared driveway with an adjacent property, construction of a driveway along the property line farthest from the intersection, or a service drive as described in Section 2.3. The Planning Commission may grant temporary access approval (see Section 2.4) until such time that minimum spacing requirements can be met, or alternative access meeting the requirements of this ordinance is approved. [SOME COMMUNITIES MEASURE FROM NEAREST EDGE OF PAVEMENT TO NEAREST EDGE OF PAVEMENT.]

Table 2.2-2

Posted Speed Limit (MPH)	Min. Access Spacing (in feet) between Adjacent Access Points
25	130
30	185
35	245
40	300
45	350
50	455

Note: The values in Table 2.2-2 *(above)* are considered minimums based on the distances required to avoid conflicts between vehicles turning right or left from adjacent driveways. [SEE MDOT TRAFFIC AND SAFETY DIVISION NOTE 7.9 IN APPENDIX D. THIS COULD BE STRUCTURED TO PERMIT A REDUCTION IN SPACING BETWEEN DRIVEWAYS BASED ON RESTRICTED TURNS AS IN THE NEXT TABLE.] [NOTE: THESE STANDARDS ARE SIGNIFICANTLY LESS THAN IN VARIOUS NATIONAL PUBLICATIONS, GREATER SPACING MAY BE ESPECIALLY APPROPRIATE IN RURAL AREAS. LESSER SPACING MAY BE APPROPRIATE ON NON-ARTERIAL ROADS THAT ARE ALREADY LARGELY DEVELOPED.]

b. In the case of expansion, alteration or redesign of an existing development where it can be demonstrated that pre-existing conditions prohibit adherence to the minimum driveway spacing standards, the Planning Commission shall have the authority to modify the driveway spacing requirements or grant temporary access approval until such time that minimum spacing requirements can be met, or alternative access meeting the requirements of this ordinance is approved. Such modifications shall be of the minimum amount necessary, but in no case shall driveway spacing of less than ___ feet *(typically 60-75 feet, depending on the common lot size in the area)* be permitted by the Planning Commission. [THIS SUBSECTION COULD BE REMOVED AND THE COMMUNITY COULD RELY ON SECTION 2.7 WAIVERS. IF THE WAIVERS SECTION IS NOT INCLUDED IN THE ORDINANCE THEN THIS SECTION NEEDS TO STAY HERE.]

2. Access Point Separation from Intersections - All one and two-family driveways shall be separated from the nearest right-of-way of an intersecting street by at least _____ feet *(usually at least 50 feet, more if lot sizes are large).* Driveways for all other land uses shall be separated from the nearest right-of-way of an intersecting street according to Table 2.2-3 below:

a. Access point spacing from intersections shall be measured from the centerline of the driveway to the extended edge of the travel lane on the intersecting street, as shown in Figure 2-1 unless otherwise noted.

[SOME COMMUNITIES CHOOSE TO MEASURE FROM THE EDGE OF THE DRIVEWAY INSTEAD OF FROM THE CENTER. SEPARATION DISTANCES NEED TO BE ADJUSTED ACCORDINGLY.]

b. The minimum distance between an access point and an intersecting street shall be based on Figure 2-1 and the following: [ADAPT FIGURE 2-1 TO FIT TABLE DIMENSIONS DECIDED UPON IN A PARTICULAR UNIT OF LOCAL GOVERNMENT. ALSO SEE MDOT TRAFFIC AND SAFETY DIVISION NOTE 7.9.D IN APPENDIX D.]

Table 2.2-3
Minimum Access Point Spacing from Street and Other Intersections*

Location of Access Point	**Min. Spacing for a Full Movement Driveway or other Access Point**	**Min. Spacing for a Driveway Restricting Left-turns** (channelized for right-turn-in and right-turn-out only)
Along Arterial or from • Expressway Ramps • Railroad crossings • Bridges • Median openings	300 feet [600 FEET IS BETTER] Contact MDOT for a site specific determination 100 feet 75 feet	300 feet [600 FEET IS BETTER] Contact MDOT for a site specific determination 100 feet 75 feet
Along Arterial or from another Intersecting Arterial	300 feet	125 feet
Along Arterial Intersecting a Collector or Local Street	200 feet	125 feet
Along a Collector	125 feet	75 feet
Along a Local Street or Private Road	75 feet	50 feet

*Regional Arterials, Arterials and Collectors are as classified in the _____Master Plan *(or on Map ____ in this Ordinance).*

[SOME COMMUNITIES MAY REQUIRE LESS RESTRICTIVE STANDARDS WHEN LOCATING A DRIVEWAY AWAY FROM A NON-SIGNALIZED INTERSECTION THAN A SIGNALIZED ONE. IF SO, ADAPT THESE STANDARDS TO FIT THE LOCAL SITUATION. ALSO, THE APPROACH MDOT USES IS MORE DIRECTLY TIED TO THE SPEED OF THE TRUNKLINE, RATHER THAN THE FUNCTIONAL CLASS OF THE ROAD, SEE FIGURE 3-16. IT MAY BE A MORE USEFUL APPROACH IN SOME JURISDICTIONS.]

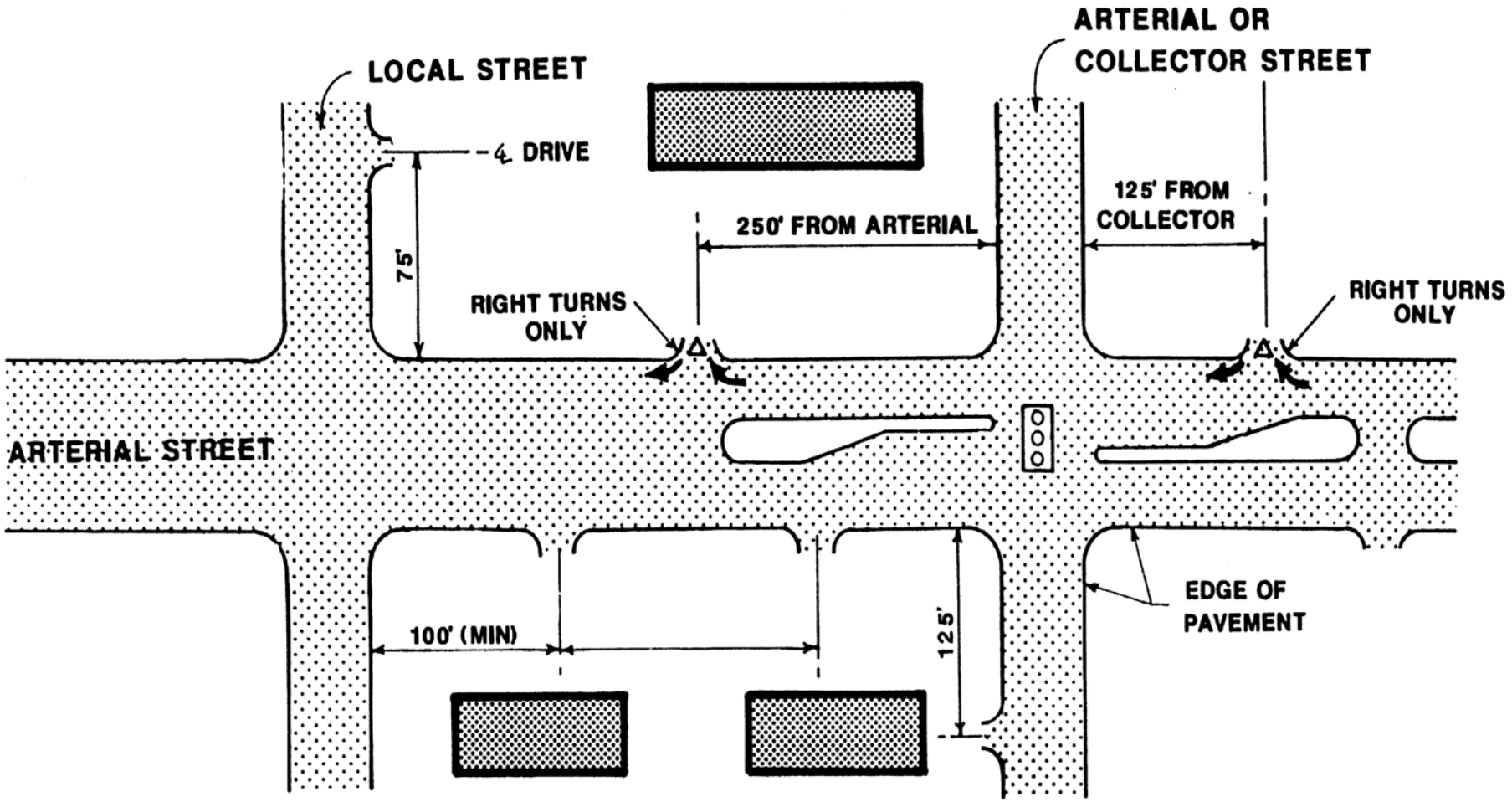
c. If the amount of lot frontage is not sufficient to meet the above criterion, the driveway shall be constructed along the property line farthest from the intersection to encourage future shared use, and/or a frontage road or rear service drive shall be developed as described in Section 2.3.

d. For parcels on which an alternative means of access (shared driveway, frontage road, service drive or connected parking lots) is not feasible due to parcel size or existing adjacent development, the Planning Commission may allow a non-channelized, full movement driveway provided that:
   1. the driveway is spaced no closer to the intersection than the minimum spacing allowed for a right-turn-in, right-turn-out driveway; and
   2. a traffic study conducted by a registered traffic engineer shows a right-turn-in, right-turn-out driveway does not provide reasonable access or desired safety; and
   3. a traffic study, conducted by a registered traffic engineer, provides substantial justification that the driveway operation will not create safety problems at the adjacent intersection.

3. Access Alignment -
   In order to prevent left-turn conflicts, two-way driveways shall not be across from an expressway ramp and shall be either:
   a. offset in accordance with the minimum spacing standards in Table 2.2-3 or
   b. perpendicular to the existing public street or an approved private road and shall line up with existing or planned driveways on the opposite side of the road wherever facing lots are not separated by a median, unless doing so in a particular case is substantially demonstrated by a registered traffic engineer to be unsafe.

FIGURE 2 -1 [EXAMPLE FROM DELTA TOWNSHIP, MICHIGAN]

TYPICAL DRIVEWAY SPACINGS



Note: The spacing on this example is tailored to fit local conditions and is different from the spacing in Table 2.2-3 or MDOT's guidelines on Figure 3-16. Local driveway spacing standards need to be established to fit local conditions.

E. Driveway Design and Construction Standards

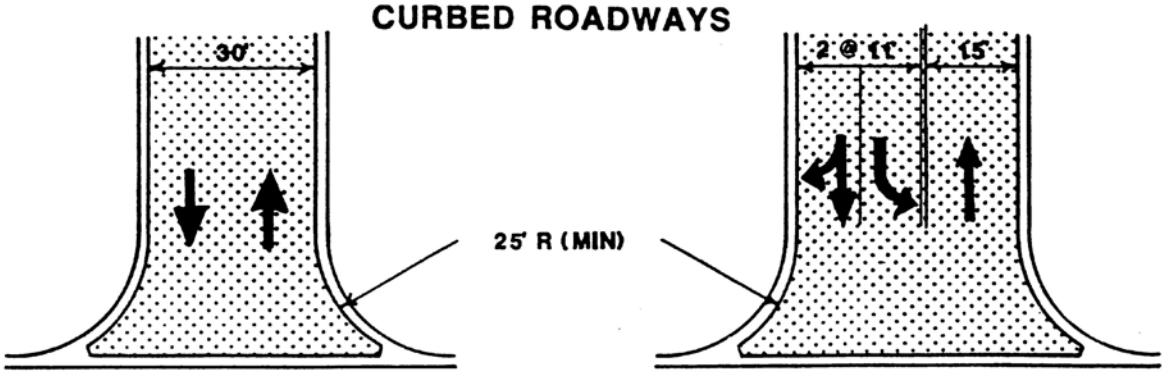
1. Driveway or Throat Width –
   a. No single or two-family driveway shall have a width less than nine (9) feet nor more than sixteen (16) feet at the public road right-of-way. The driveway opening, including flares, shall not be more than 1.5 times the width of the driveway at the right-of-way line. [SEE RULE 48 OF MDOT ADMINISTRATIVE RULES UNDER ACT 200 IN APPENDIX D.]
   b. The typical commercial driveway design shall include one ingress lane and one egress lane with a combined maximum throat width of thirty (30) feet, measured from face to face of curb (see Figure 2-2a).
   c. Where exit traffic volumes are expected to exceed 100 directional trips per peak hour, or in areas where congestion along the arterial may create significant delays, as determined by the Planning Commission, two exit lanes shall be required. The total width of such a driveway shall be between 37 and 39 feet, with one 15 foot wide ingress lane and two 11-12 foot wide egress lanes (See Figure 2-2b).
   d. For access systems which include a pair of one-way driveways, each driveway shall be a minimum of sixteen (16) feet wide, measured perpendicularly (See Figure 2-2c).
   e. As an alternative to (d) above, the driveway may be designed with a fully curbed median dividing the ingress and egress driveways, with a maximum median width of ten feet. The radii forming the edges on the median shall be designed to accommodate the largest vehicle that will normally use the driveway. Where median or boulevard driveways are located across the street from each other, the left-turn egress lanes shall be aligned directly across from one another to minimize left-turn conflicts (see Figure 2-2d). Boulevard driveways should not be constructed at existing or future traffic signal locations unless there is a left-turn lane where the boulevard meets the road right-of-way. Ground or monument signs shall not be permitted in boulevards if they would block motorist vision or otherwise create an unsafe condition. The Planning Commission may require landscaping on the portion of the boulevard outside the public right-of-way. Such landscaping shall use salt tolerant species.
2. Restricted Access Driveways -
   Left and right-turn movements on and off roadways typically have the greatest impact on traffic flow and crash frequency. Therefore, where driveways are to be located in a segment defined in adopted corridor studies as having a high crash rate or significant traffic congestion/delays, or where left-turn access is available through alternative means of access, the Planning Commission may require driveway design and signing which discourages certain turning movements. Where driveways are intended to control specific left and/or right-turn ingress and egress, the designs shown in Figure 2-3 shall apply. Similar designs shall be accepted, provided that they are approved by the Michigan Department of Transportation and/or the _____ County Road Commission, if applicable.
3. Throat Length or Vehicle Stacking/Storage Space- There shall be a minimum of twenty (20) feet of throat length for entering and exiting vehicles at the intersection of a driveway and pavement of the public road or service drive as measured from the pavement edge. For driveways serving between one-hundred (100) and four-hundred (400) vehicles in the peak hour (two-way traffic volumes) the driveways shall provide at least sixty (60) feet of throat length. For driveways serving over four-hundred (400) vehicles per peak hour (two-way traffic volume) and for all driveways controlled by a traffic signal, adequate throat length shall be determined by a traffic impact study. In areas where significant pedestrian/bicycle travel is expected, the ingress and egress lanes should be separated by a 4-10 feet wide median with pedestrian

refuge area. In the absence of adequate traffic volume data, application of the commonly used values in Table 2.2-4 is appropriate.

4. Construction Standards -
   a. Curb radii:
      1. Driveways shall be designed with minimum 25 foot radii where primarily passenger vehicle traffic is expected.
      2. For sites where truck traffic is expected, the driveways shall be designed with a minimum 30 foot radii unless a traffic analysis by a qualified traffic engineer reveals another radii is more appropriate for the vehicles expected to use the driveway.
   b. Deceleration lanes and tapers:
      1. Where it can be demonstrated that driveway volumes are expected to exceed 100 peak hour directional trips per hour, a right-turn taper, deceleration lane and/or left-turn bypass lane may be required. [SEE MDOT TRAFFIC AND SAFETY DIVISION NOTES #7.3 AND #7.5 AND DESIGN GUIDE VII-650C IN APPENDIX D.]
      2. Where site frontage allows and a right-turn lane is warranted, a taper between 50 and 225 feet may be required. See example in Figure 2-4a. [SEE MDOT DESIGN GUIDE VII-650C IN APPENDIX D.]
      3. Where the amount of frontage precludes the construction of a deceleration lane and taper combination entirely within the property lines of a parcel, a request shall be made to the owner of the parcel to allow the installation of a right-turn bay and taper which extends beyond the property line. If permission cannot be obtained from the adjacent property owner for an extension onto that parcel, a taper of at least 75 feet shall be constructed as shown in Figure 2-4b.
      4. A continuous right-turn lane, as shown in Figure 2-4c may be required where driveway spacing requirements restrict the use of consecutive turn bays and tapers, and a traffic engineer concludes it can be constructed without being used as a through lane.
      5. For driveways located along streets without an exclusive left-turn lane, a bypass lane may be required. Such a lane shall be designed to the standards in the Michigan Department of Transportation, Traffic and Safety Notes # 7.7 and as shown in Figure 2-4d.
   c. Acceleration lanes
      1. Generally, acceleration lanes are not permitted. However, where site frontage allows and large semi-trucks and other slow moving vehicles routinely access an arterial, an acceleration lane may be required in consultation with the applicable road authority.
      2. The acceleration lane shall be designed by a traffic engineer to meet the needs of vehicles using it, topography, sight distance and other relevant factors.
      3. Driveways shall not be permitted within an acceleration lane.
   d. Grades and drainage
      1. Driveways shall be constructed such that the grade for the 25 feet nearest the pavement edge or shoulder does not exceed 1.5% (one and one-half foot vertical rise in one-hundred feet of horizontal distance) wherever feasible. Where not feasible, grades shall conform with Figure 2-5. [MDOT DESIGN GUIDE, VII-680A, SHEET 3 IN APPENDIX D.]:

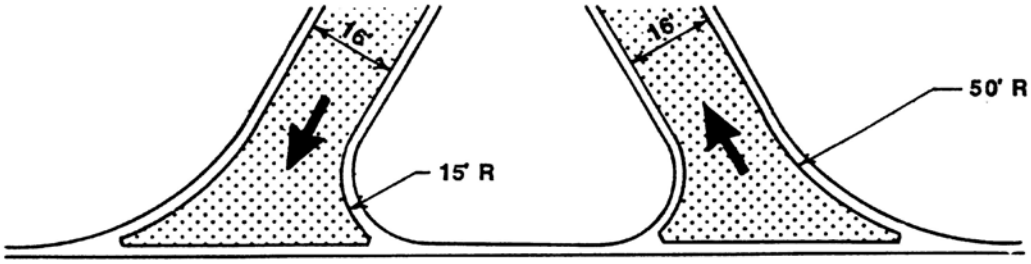
FIGURE 2 -2 [EXAMPLE FROM DELTA TOWNSHIP, MICHIGAN]

TYPICAL CONFIGURATIONS FOR DRIVEWAYS CURBED ROADWAYS

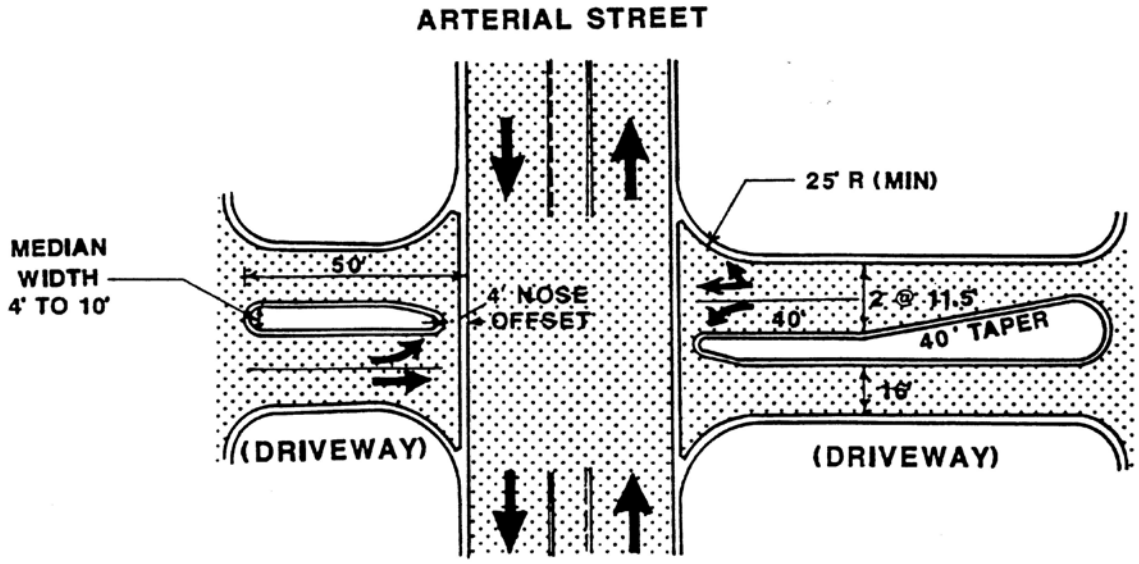


a. TYPICAL 2-WAY DRIVEWAY

b. HIGH-USE DRIVEWAY



c. ONE-WAY DRIVEWAYS

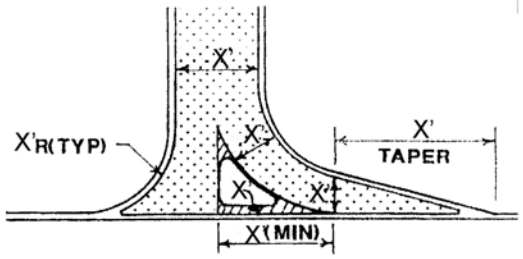


d. BOULEVARD DRIVEWAYS

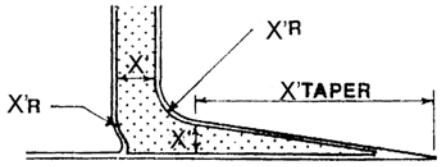
Note: The left-turn lanes in d. Boulevard Driveways will work better if the left-turn lanes are directly across from one another. This requires cutting off a portion of the nose of the boulevard. Also, turning radii and throat width need to be designed to accommodate vehicles using the driveway. See also *MDOT Design Guide for Commercial Driveways, VII-680A*.

Figure 2-3

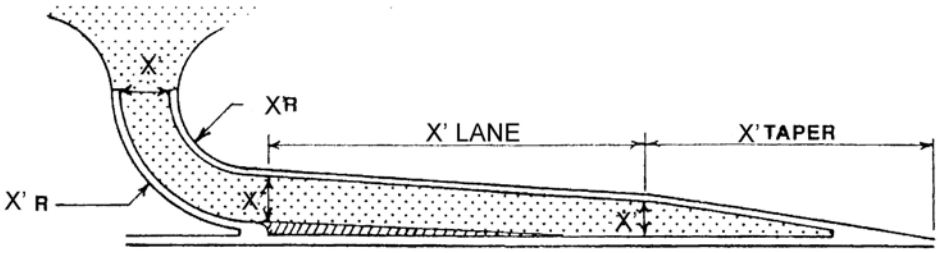
CHANNELIZATION ISLAND OPTIONS FOR CONTROLLING TURNS



a. TO PREVENT LEFT-TURN INGRESS MOVEMENTS



b. TO ALLOW RIGHT-TURN IN ONLY



c. TO ALLOW RIGHT TURN IN ONLY

Note: The dimension of X' is variable depending on site conditions, speed, number of vehicles and the design needs of the vehicles to use it. The local ordinance must specify what these dimensions are. [See MDOT Traffic and Safety Division Notes #7.3 and #7.5 and *Design Guide VII-650C i*n Appendix D.]]

Source: adapted from Delta Township Zoning Ordinance. See also MDOT *Geometric Design Guide VII-680 and VII-650 series* in Appendix D.

2. Vertical curves, with a minimum length of 15 feet shall be provided on driveway approaches at a change in grade of 4% or more. [SEE MDOT RULE 63(E) OF THE ADMINISTRATIVE RULES TO ACT 200 IN APPENDIX D.]
3. Driveways shall be constructed such that drainage from impervious areas located outside of the public right-of-way, which are determined to be in excess of existing drainage from these areas shall not be discharged into the roadway drainage system absent the approval of the responsible agency. Storm drains, or culverts, if required shall be of a size adequate to carry the anticipated storm flow and be constructed and installed pursuant to the specifications of the responsible road authority. [SEE RULE 61 OF THE ADMINISTRATIVE RULES TO ACT 200 IN APPENDIX D].

Table 2.2-4 Minimum Throat Length Requirement

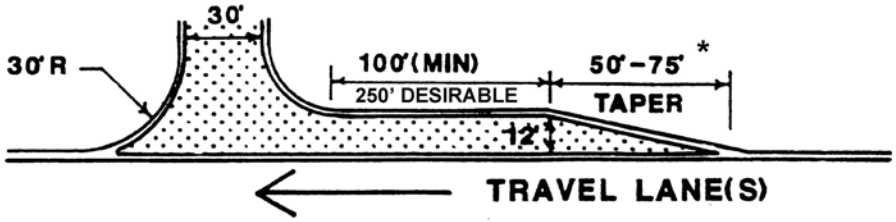
		Minimum Throat Length (Feet)	
Land Use	**Building Site**	**Collector**	**Arterial**
Apartments	<100 Units	25	50
	100-200 Units	50	75
	>200 Units	75	125
Office	<50,000 Sq ft	25	50
	50,001 - 100,000 Sq ft	25	75
	100,001 - 200,000 Sq ft	50	100
	200,001 - 500,000 Sq ft	100	150
	<500,000 Sq ft	125	250
Retail	<30,000 Sq ft	25	50
	> 30,000 Sq ft	25	75
Shopping Center	< 250,000 Sq ft	25	50
	250,001 - 500,000 Sq ft	50	75
	500,000 - 750,000 Sq ft	75	200
	> 750,000 Sq ft	125	250
Supermarket	<20,000 Sq ft	50	75
	>20,000 Sq ft	75	125
Restaurant	<15,000 Sq ft	25	50
	>15,000 Sq ft	25	75
Drive-in Restaurant	<2,000 Sq ft	25	75
	>2,000 Sq ft	50	100
Motel	<150 Rooms	25	75
	>150 Rooms	25	100
Light Industrial	<100,000 Sq ft	25	50
	100,001 - 500,000 Sq ft	50	100
	>500,000 Sq ft	50	200

Source: *Oshtemo Township Zoning Ordinance*, Section 67, Access Management Guidelines, 1991

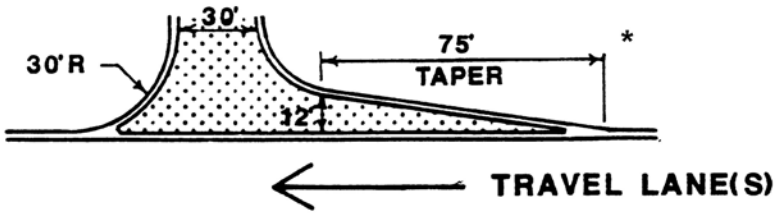
[THESE THROAT LENGTHS SHOULD BE ADJUSTED TO FIT LOCAL CIRCUMSTANCES]

Figure 2-4
[EXAMPLES A AND C ADAPTED FROM DELTA TOWNSHIP, MICHIGAN. EXAMPLE B FROM DELTA TOWNSHIP, MICHIGAN. EXAMPLE D FROM MDOT *DESIGN GUIDE VII-650 C*, SHEET 2]

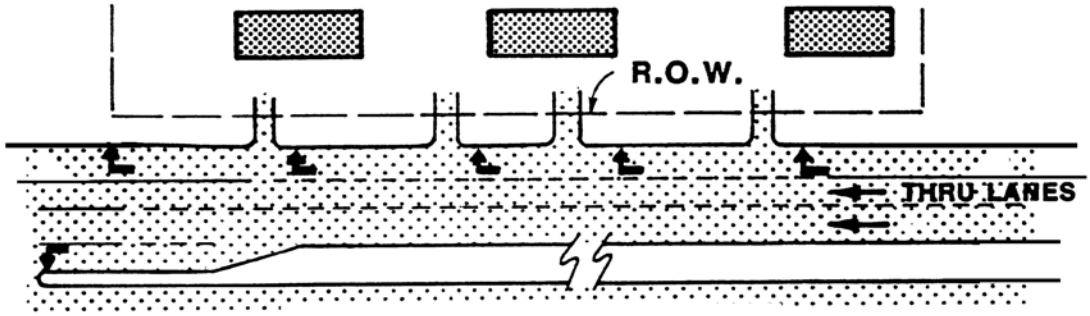
a. DECELERATION TAPER WITH PARALLEL LANE



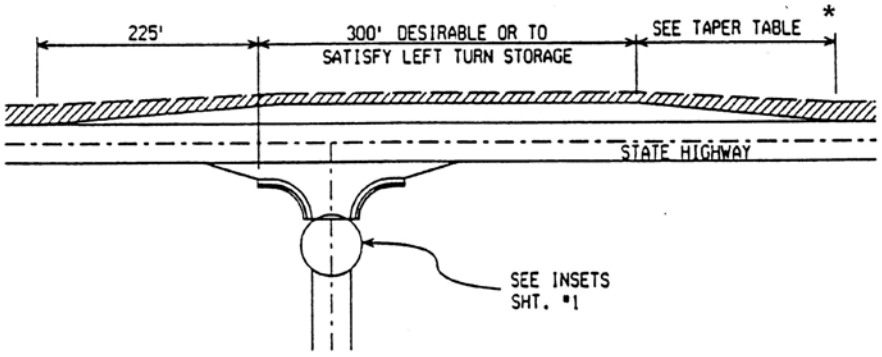
b. DECELERATION TAPER



c. CONTINUOUS RIGHT-TURN LANE

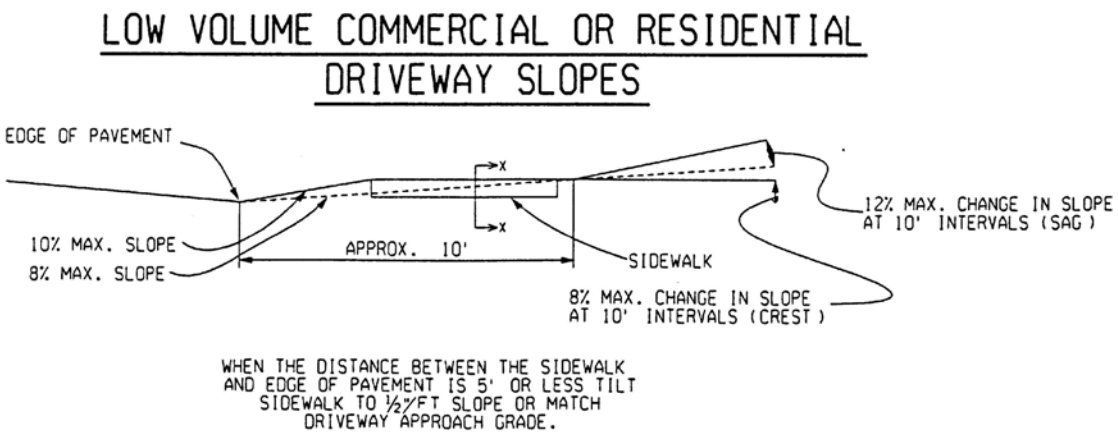


d. TYPE 4 MODIFIED (PASSING FLARE), FOR T-INTERSECTIONS



*All taper lengths should be based on posted speeds, see MDOT Design Guide VII-650C.

Figure 2-5



Source: MDOT, *Geometric Design Guide VII-680A*, Sheet 3.

e. Surface and Curb Construction - Commercial and all other nonresidential driveways shall be constructed of a permanent asphalt or concrete material sufficient to provide the bearing capacity needed to carry the anticipated traffic loads as determined by the appropriate road authority unless the road authority approves use of another material. Where a driveway connects with a curbed road, it shall be paved and curbed from the edge of pavement to either the right-of-way line or point of curvature of the radius returns. [SEE MDOT RULES 51 AND 52 OF ADMINISTRATIVE RULES TO ACT 200 IN APPENDIX D.] All soil erosion and sedimentation requirements shall be met.

f. Directional Signs and Pavement Markings -
In order to ensure smooth traffic circulation on the site, direction signs and pavement markings shall be installed at the driveway(s) in a clearly visible location as required by the _____ *(name of jurisdiction)* as part of the site plan review process and approved by the Michigan Department of Transportation and _____ County Road Commission (as appropriate), and shall be maintained on a permanent basis by the property owner. Directional signs and pavement markings shall conform to the standards in the Michigan Manual of Uniform Traffic Control Devices. [BE SURE TO COORDINATE THIS WITH EXISTING SIGN STANDARDS IN THE ZONING ORDINANCE WHICH MAY REFER TO A DIFFERENT TYPE OF DIRECTIONAL SIGN.]

F. Shared Access

Shared access is strongly encouraged and in some cases may be required. When required, one or more of the following options, and the standards of Section 2.3 apply.

1. Shared Driveways: Sharing or joint use of a driveway by two or more property owners shall be encouraged. In cases where access is restricted by the spacing requirements of Section 2.2.D, "Access Point Spacing Standards", a shared driveway may be the only access design allowed. The shared driveway shall be constructed along the midpoint between the two properties unless a written easement is provided which allows traffic to travel across one parcel to access another, and/or access the public street.
2. Frontage Roads: In cases where a frontage road exists, is recommended either in the _____'s Comprehensive Plan or in

an adopted corridor study, and/or is proposed in an approved site plan for an adjoining lot or parcel, access shall be provided via such frontage road, rather than by direct connection to the abutting arterial street.

3. Rear Service Drives: Rear service drives shall be encouraged, especially for locations where connection to a side street is available. In addition to access along the rear service drive, direct connection(s) to the arterial street may be allowed, provided that the driveways meet the requirements of Section 2.2.C, "Number of Driveways", and 2.2.D, "Access Point Spacing Standards."

G. Parking Lot Connections

Where a proposed parking lot is adjacent to an existing parking lot of a similar use, there shall be a vehicular connection between the two parking lots where physically feasible, as determined by the Planning Commission. For developments adjacent to vacant properties, the site shall be designed to provide for a future connection. A written access easement signed by both landowners shall be presented as evidence of the parking lot connection prior to the issuance of any final zoning approval. [SOME COMMUNITIES PROVIDE AN INCENTIVE FOR PARKING LOT CONNECTIONS BY ALLOWING A REDUCTION OF 5-10% OF REQUIRED PARKING SPACES FOR EACH USE IF THERE IS A PARKING LOT CONNECTION. SEE SECTION 2.6 FOR AN EXAMPLE.]

H. Access Easements

Shared driveways, cross access driveways, connected parking lots, and service drives shall be recorded as an access easement and shall constitute a covenant running with the land. Operating and maintenance agreements for these facilities should be recorded with the deed. [SEE APPENDIX B FOR EXAMPLES.]

I. Medians and Median Openings

1. The type, location and length of medians on public roads shall be determined by the entity having jurisdiction over such roads. This determination will be made in consultation with the Planning Commission and will be based on existing and projected traffic conditions; the type, size, and extent of existing and projected development and traffic generated by development; traffic control needs; and other factors.

2. The minimum spacing between median openings shall be as shown in Table 2.2-5: [INSERT LOCAL NUMBERS IF BEING APPLIED ON A ROAD NOT UNDER MDOT CONTROL.]

Table 2.2-5: Minimum Directional Median Opening Spacing

Location	Directional crossover spacing
Urban	660 feet
Rural	1,320 feet

See MDOT Traffic and Safety Division, *Directional Median Crossovers, #11.4* and *Geometric Design Guide VII-670.*

3. Median openings intended to serve development must meet or exceed the minimum median opening spacing standards and must also be justified by a traffic impact analysis approved by the entity having jurisdiction over such roads, in consultation with the Planning Commission *(add as appropriate:* ,or by the Planning Commission where driveways are proposed to connect to city roads*)*. The cost for preparation of the traffic impact analysis and construction of the median opening or openings, including installation and operation of signals and other improvements where warranted, shall be borne by the applicant.

Section 2.3 Service Drives and Other Shared Access Standards

A. The use of shared access, parking lot connections and service drives, in conjunction with driveway spacing, is intended to preserve traffic flow along major thoroughfares and minimize traffic conflicts, while retaining reasonable access to the property. Where noted above, or where the Planning Commission determines that restricting new access points or reducing the number of existing access points may have a beneficial impact

on traffic operations and safety while preserving the property owner's right to reasonable access, then access from a side street, a shared driveway, a parking lot connection, or service drive connecting two or more properties or uses may be required instead of more direct connection to the arterial or collector street. However, where traffic safety would be improved, and the driveway spacing requirements of this ordinance can be met, then direct connection to the arterial or collector street may be allowed in addition to a required service drive.

1. In particular, shared access, service drives or at least a connection between abutting land uses may be required in the following cases:
   a. Where the driveway spacing standards of this section can not be met.
   b. Where recommended in the _____ Corridor or Access Management Plan and/or other corridor or sub-area master plans of _____ *(name of jurisdiction)*.
   c. When the driveway could potentially interfere with traffic operations at an existing or planned traffic signal location.
   d. The site is along a collector or arterial with high traffic volumes, or along segments experiencing congestion or a relatively high number of crashes.
   e. The property frontage has limited sight distance.
   f. The fire (or emergency services) department recommends a second means of emergency access.
2. In areas where frontage roads or rear service drives are recommended, but adjacent properties have not yet developed, the site shall be designed to accommodate a future road/facility designed according to the standards of this Section. The Planning Commission may approve temporary access points where a continuous service drive is not yet available and a performance bond or escrow is accepted to assure elimination of temporary access when the service road is constructed. (See Section 2.4 Temporary Access Permits).

B. Notwithstanding the requirements of the _____ *(community name and ord. No.)* Land Division Ordinance, the standards for all service drives shall be as follows:

1. Site Plan Review - The Planning Commission shall review and approve all service drives to ensure safe and adequate continuity of the service drive between contiguous parcels as part of the site plan review process in Section _____.
2. Front and Rear Service Drives - A front or rear service drive may be established on property which abuts only one public road. The design of a service road shall conform with national design guidelines such as those identified in the National Access Management Manual by TRB, the AASHTO "Green Book", and National Cooperative Highway Research Program (NCHRP), "Access Management Guidelines to Activity Centers" Report 348 and "Impacts of Access Management Techniques" Report 420.
3. Location - Service roads shall generally be parallel to the front property line and may be located either in front of, or behind, principal buildings and may be placed in required yards. In considering the most appropriate alignment for a service road, the Planning Commission shall consider the setbacks of existing and/or proposed buildings and anticipated traffic flow for the site.
4. Width and Construction Materials - A service drive shall be within an access easement permitting traffic circulation between properties. The easement shall be recorded with the County Register of Deeds. This easement shall be at least forty (40) feet wide. A service drive shall have a minimum pavement width of ____ *(typically 26-36)* feet, measured face to face of curb with an approach width of _____ feet *(typically 36-39 feet)* at intersections. The service drive shall be constructed of a paved surface material that is resistant to erosion and shall meet _____ *(city or village, County Road Commission or MDOT -- depending on what road the service drive parallels)* standards for base

and thickness of asphalt or concrete, unless the community has more restrictive standards.

5. Snow Storage and Landscaping Area - A minimum of fifteen (15) feet of snow storage/landscaping area shall be reserved along both sides of the service drive. Frontage roads shall have a minimum setback of 30 feet from the right-of-way, with a minimum of 60 feet of storage at the intersection for entering and exiting vehicles as measured from the pavement edge (See Figure 2-6a).
6. Distance from Intersection on Service Drives - Frontage road and service drive intersections at the collector or arterial street shall be designed according to the same minimum standards as described for driveways in Section 2.2.D.2.
7. Driveway Entrance - The Planning Commission shall approve the location of all accesses to the service drive, based on the driveway spacing standards of this Article *(or Chapter).* Access to the service drive shall be located so that there is no undue interference with the free movement of service drive and emergency vehicle traffic, where there is safe sight distance, and where there is a safe driveway grade as established by the applicable road authority (*local, MDOT or CRC*).
8. Driveway Radii - All driveway radii shall be concrete curbs and conform with the requirements of Section 2.2.E.4.
9. Acceleration Lanes and Tapers - The design of the driveway, acceleration, deceleration or taper shall conform with the requirements of Section 2.2.E.4.
10. Elevation - The elevation of a service drive shall be uniform or gently sloping between adjacent properties.
11. Service Drive Maintenance - No service drive shall be established on existing public right-of-way. The service drive shall be a public street (if dedicated to and accepted by the public), or a private road maintained by the adjoining property owners it serves who shall enter into a formal agreement for the joint maintenance of the service drive. The agreement shall also specify who is responsible for enforcing speed limits, parking and related vehicular activity on the service drive. This agreement shall be approved by the _____ *(municipal)* attorney and recorded with the deed for each property it serves by the County Register of Deeds. If the service drive is a private road, the local government shall reserve the right to make repairs or improvements to the service drive and charge back the costs directly or by special assessment to the benefiting landowners if they fail to properly maintain a service drive.
12. Landscaping - Landscaping along the service drive shall conform with the requirements of Section ____ *(reference applicable landscaping standards).* Installation and maintenance of landscaping shall be the responsibility of the developer or a property owners association.
13. Parking Areas - All separate parking areas *(i.e. those that do not use joint parking cross access)* shall have no more than one (1) access point or driveway to the service drive.
14. Parking - The service road is intended to be used exclusively for circulation, not as a parking, loading or unloading aisle. Parking shall be prohibited along two-way frontage roads and service drives that are constructed at the minimum width *(see B.4. above).* One-way roads or two-way roads designed with additional width for parallel parking may be allowed if it can be demonstrated through traffic studies that on-street parking will not significantly affect the capacity, safety or operation of the frontage road or service drive. Perpendicular or angle parking along either side of a designated frontage road or service drive is prohibited. The Planning Commission may require the posting of "no parking" signs along the service road. As a condition to site plan approval, the Planning Commission may permit temporary parking in the easement area where a continuous service road is not yet available, provided that the layout allows removal of the parking in the future to allow extension of the service road.

Temporary parking spaces permitted within the service drive shall be in excess of the minimum required under Article____, Parking and Loading Standards.

15. Directional Signs and Pavement Markings - Pavement markings may be required to help promote safety and efficient circulation. The property owner shall be required to maintain all pavement markings. All directional signs and pavement markings along the service drive shall conform with the current Michigan Manual of Uniform Traffic Control Devices.
16. Assumed Width of Pre-existing Service Drives - Where a service drive in existence prior to the effective date of this provision has no recorded width, the width will be considered to be _____ *(typically 40-66)* feet for the purposes of establishing setbacks and measured an equal distance from the midpoint of the road surface.
17. Pedestrian and Bicycle Access - Separate, safe access for pedestrians and bicycles shall be provided on a sidewalk or paved path that generally parallels the service drive unless alternate and comparable facilities are approved by the Planning Commission.
18. Number of Lots or Dwellings Served - No more than twenty-five (25) lots or dwelling units may gain access from a service drive to a single public street.
20. Service Drive Signs - All new public and private service drives shall have a designated name on a sign meeting the standards on file in the office of the Zoning Administrator.
21. In the case of expansion, alteration or redesign of existing development where it can be demonstrated that pre-existing conditions prohibit installation of a frontage road or service drive in accordance with the aforementioned standards, the Planning Commission shall have the authority to allow and/or require alternative cross access between adjacent parking areas through the interconnection of main circulation aisles. Under these conditions, the aisles serving the parking stalls shall be aligned perpendicularly to the access aisle, as shown in Figure 2-6c, with islands, curbing and/or signage to further delineate the edges of the route to be used by through traffic.

Section 2.4 Temporary Access Permits

A.A temporary access permit may be conditionally issued to a property included in an adopted corridor or access management plan that programs road improvements and installation of service drives and shared driveways that would eliminate the need for the temporary driveway.

B.Conditions may be included in the temporary access permit including but not limited to, a limitation on development intensity on the site until adjoining parcels develop which can provide a shared driveway, shared access via a service drive, and/or cross parking lot connection consistent with the requirements of Section 2.3.

C. A temporary access permit shall expire when the use of the site for which the temporary access permit was granted has ceased for twelve (12) months or more, or the use of the site or the driveway has changed such that the use of the driveway has increased from its initial use level at least _____ percent.

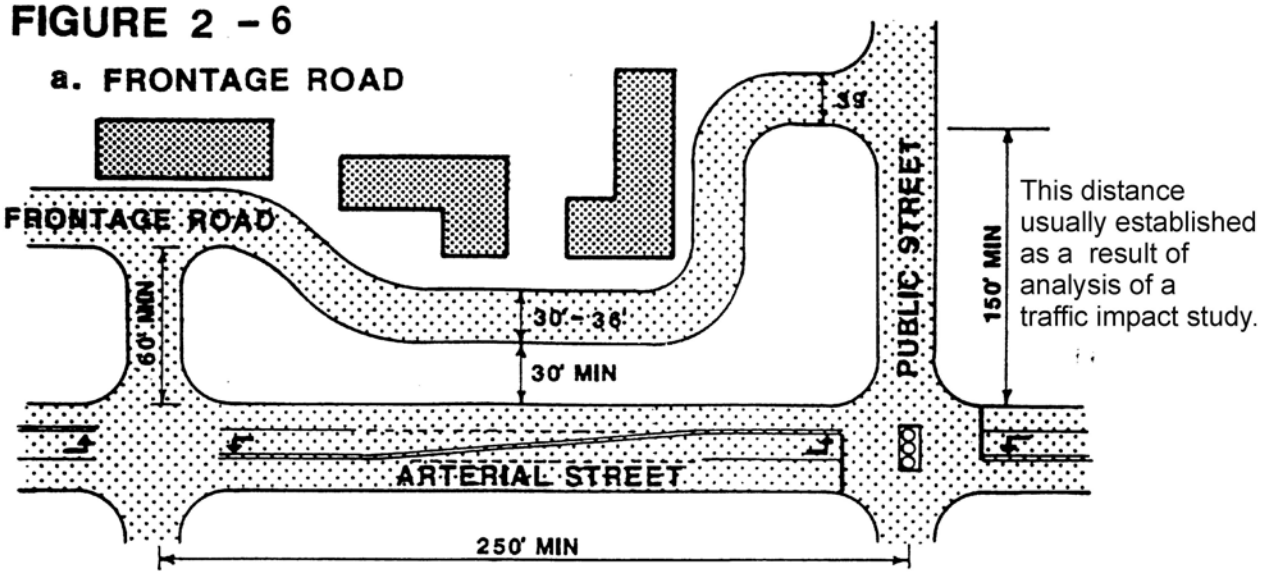
D. A site plan for property that cannot meet the access requirements of Section 2.3 nor the waiver standards in Section 2.7, and has no alternative means of reasonable access to the public road system may be issued a temporary access permit. When adjoining parcels develop which can provide a shared driveway, shared access via a service drive or a cross parking lot connection, the temporary access permit shall be rescinded and an application for an access permit consistent with the requirements of Section 2.3 shall be required.

Section 2.5 Nonconforming Driveways

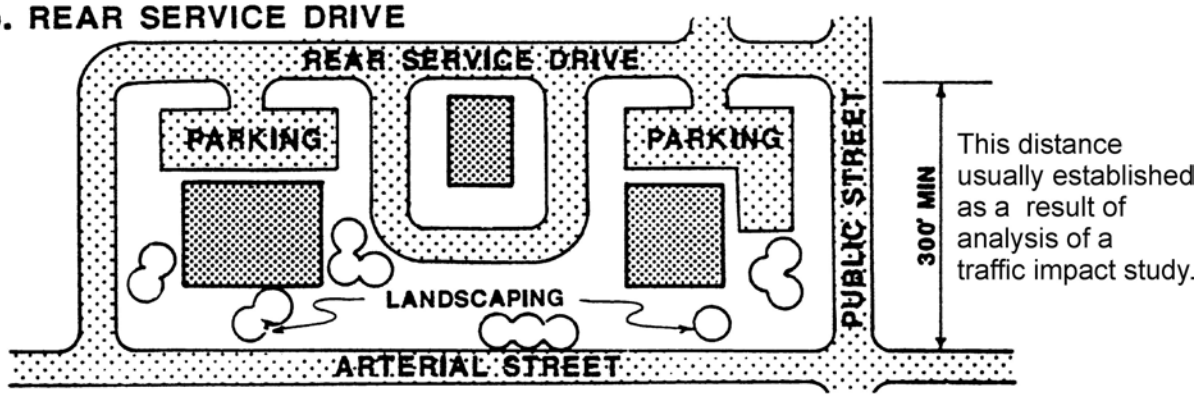
A. Driveways that do not conform to the regulations in this Article *(or Chapter),* and were constructed before the effective date of this Article *(or Chapter),* shall be considered legal

FIGURE 2 – 6

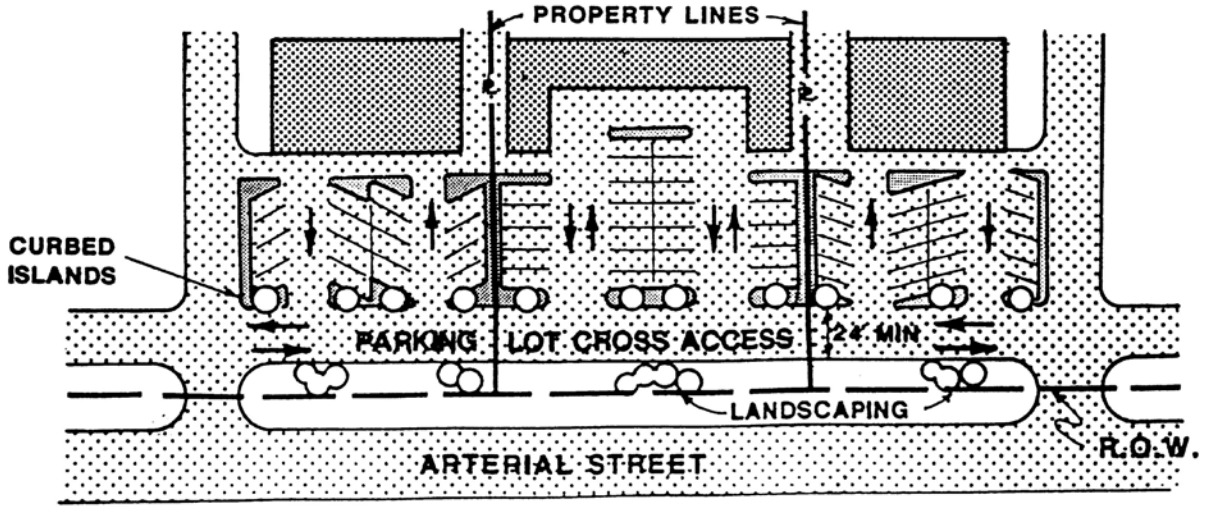
a. FRONTAGE ROAD



b. REAR SERVICE DRIVE



c. PARKING LOT CROSS ACCESS



[EXAMPLE FROM DELTA TOWNSHIP, MICHIGAN]

nonconforming driveways. Existing driveways granted a temporary access permit are legal nonconforming driveways until such time as the temporary access permit expires.

B. Loss of legal nonconforming status results when a nonconforming driveway ceases to be used for its intended purpose, as shown on the approved site plan, or a plot plan, for a period of twelve (12) months or more. Any reuse of the driveway may only take place after the driveway conforms to all aspects of this Article.

C. Legal nonconforming driveways may remain in use until such time as the use of the driveway or property is changed or expanded in number of vehicle trips per day or in the type of vehicles using the driveway (such as many more trucks) in such a way that impact the design of the driveway. At this time, the driveway shall be required to conform to all aspects of the Ordinance.

[OR THE FOLLOWING LESS RESTRICTIVE APPROACH. USE ONE OR THE OTHER BUT NOT BOTH.]

C. When the owner of a property with an existing, nonconforming driveway or driveways, applies for a permit to upgrade or change the use of the property, the Planning Commission will determine whether it is necessary and appropriate to retrofit the existing driveway or driveways.

1. The property owner may be required to establish a retrofit plan. The objectives of the retrofit plan will be to minimize the traffic and safety impacts of development by bringing the number, spacing, location, and design of driveways into conformance with the standards and requirements of this Article *(or Chapter)*, to the extent possible without imposing unnecessary hardship on the property owner. The retrofit plan may include:
    a. elimination of driveways,
    b. realignment or relocation of driveways,
    c. provision of shared driveways and/or cross parking lot connection,
    d. access by means of a service drive
    e. restriction of vehicle movements (e.g. elimination of left-turns in and out),
    f. relocation of parking,
    g. traffic demand management (e.g. a reduction in peak hour trips),
    h. signalization, or
    i. such other changes as may enhance traffic safety.

2. The requirements of the retrofit plan shall be incorporated as conditions to the permit for the change or upgrade of use and the property owner shall be responsible for the retrofit.

D. Driveways that do not conform to the regulations in this Ordinance and have been constructed after adoption of this Ordinance, shall be considered illegal nonconforming driveways.

E. Illegal nonconforming driveways are a violation of this Ordinance. The property owner shall be issued a violation notice which may include closing off the driveway until any nonconforming aspects of the driveway are corrected. Driveways constructed in illegal locations shall be immediately closed upon detection and all evidence of the driveway removed from the right-of-way and site on which it is located. The costs of such removal shall be borne by the property owner.

F. Nothing in this Ordinance shall prohibit the repair, improvement, or modernization of lawful nonconforming driveways, provided it is done consistent with the requirements of this Article.

Section 2.6 Incentives

A. In order to ensure the safe and efficient movement of traffic along a road and between the road and properties abutting the road, shared driveways, service roads, and interconnected parking lots are encouraged.

B. The Planning Commission may waive the required bulk, area and coverage requirements including lot width, setbacks, density, area, height, parking, or open space otherwise required in the zoning district by up to ____ % *(typically 5-10%)* when such property owner elects to provide and maintain shared driveways, service roads, or

interconnected parking lots. [MOST COMMUNITIES DO NOT ALLOW ANY WAIVERS. SOME MAY WISH TO ONLY ALLOW A WAIVER ON ONE OR TWO ITEMS UP TO THE MAXIMUM AMOUNT. NOT ALL OF THESE ITEMS NEED BE INCLUDED, IF THERE IS A SENTIMENT IN FAVOR OF WAIVERS. THE TWO ITEMS OF GREATEST INCENTIVE VALUE ARE OFTEN LOT WIDTH AND PARKING. INCENTIVES ARE MOST USEFUL AT IMPROVING ACCESS IN EXISTING DEVELOPED AREAS, TRANSITION AREAS AND OTHER AREAS WHERE A RETROFIT PLAN WOULD BE BENEFICIAL.]

C. The Planning Commission reserves the authority to determine, in its discretion, the adequacy of the access management amenities to be accepted and the particular incentive to be provided to a property owner. [NOTE: MANY COMMUNITIES BELIEVE NO INCENTIVES ARE NECESSARY OR DESIRABLE, IN LIGHT OF CONCERN ABOUT EQUAL TREATMENT OF ALL PROPERTY OWNERS. SOME COMMUNITIES BELIEVE THE NEXT SECTION ON "WAIVERS AND VARIANCES" IS ALL THAT IS NEEDED.]

Section 2.7 Waivers and Variances

A. Any applicant for access approval under the provisions of this Article *(or Chapter)* may apply for a waiver of standards in Section 2.3 if the applicant cannot meet one or more of the standards according to the procedures provided below:

1. For waivers on properties involving land uses with less than 500 vehicle trips per day based on rates published in the Trip Generation Manual of the Institute of Transportation Engineers: Where the standards in this Article (*or Chapter*) cannot be met, suitable alternatives, documented by a registered traffic engineer and substantially achieving the intent of the Article *(or Chapter)* may be accepted by the Zoning Administrator, provided that all of the following apply:
    a. The use has insufficient size to meet the dimensional standards.
    b. Adjacent development renders adherence to these standards economically unfeasible.
    c. There is no other reasonable access due to topographic or other considerations.
    d. The standards in this Article *(or Chapter)* shall be applied to the maximum extent feasible.
2. For waivers on properties involving land uses with more than 500 vehicle trips per day based on rates published in the Trip Generation Manual of the Institute of Transportation Engineers: During site plan review the Planning Commission shall have the authority to waive or otherwise modify the standards of Section 2.3 following an analysis of suitable alternatives documented by a registered traffic engineer and substantially achieving the intent of this Article *(or Chapter),* provided all of the following apply:
    a. Access via a shared driveway or front or rear service drive is not possible due to the presence of existing buildings or topographic conditions.
    b. Roadway improvements (such as the addition of a traffic signal, a center turn lane or bypass lane) will be made to improve overall traffic operations prior to project completion, or occupancy of the building.
    c. The use involves the redesign of an existing development or a new use which will generate less traffic than the previous use.
    d. The proposed location and design is supported by the _____ County Road Commission and/or the Michigan Department of Transportation, as applicable, as an acceptable design under the circumstances.

B. Variance Standards: The following standards shall apply when the Board of Appeals considers a request for a variance from the standards of this Article.

1. The granting of a variance shall not be considered until a waiver under Section 2.7.A or a temporary access permit under Section 2.4.D. has been considered and rejected. [SOME COMMUNITIES MAY DECIDE A VARIANCE OPTION IS NOT NEEDED

BECAUSE OF THE FLEXIBILITY OFFERED IN SECTION 2.7.A AND 2.4.D. IF SO, DROP THIS SUBSECTION B. AND DROP "AND VARIANCES" FROM THE TITLE IN SECTION 2.7. IT IS NOT APPROPRIATE TO DROP EITHER SECTION 2.7 OR SECTION 2.4.D AND ONLY KEEP THE VARIANCE SECTION IN 2.7.B. ZONING BOARD OF APPEALS MEMBERS ARE NOT ADEQUATELY TRAINED TO CONSIDER DRIVEWAY OR OTHER ACCESS VARIANCES.]

2. Applicants for a variance must provide proof of practical difficulties unique to the parcel (such as wetlands, steep slopes, an odd parcel shape or narrow frontage, or location relative to other buildings, driveways or an intersection or interchange) that make strict application of the provisions of this Article *(or Chapter)* impractical. This shall include proof that:
   a. indirect or restricted access cannot be obtained; and,
   b. no reasonable engineering or construction solution can be applied to mitigate the condition; and,
   c. no reasonable alternative access is available from a road with a lower functional classification than the primary road; and**,**
   d. without the variance, there is no reasonable access to the site.
3. The Board of Appeals shall make a finding that the applicant for a variance met their burden of proof under B.2. above, that a variance is consistent with the intent and purpose of this Article, and is the minimum necessary to provide reasonable access.
4. Under no circumstances shall a variance be granted unless not granting the variance would deny all reasonable access, endanger public health, welfare or safety, or cause an unnecessary hardship on the applicant. No variance shall be granted where such hardship is self-created.

OPTION 3 -- BEST SUITED FOR AN URBAN COMMUNITY WITH LITTLE UNDEVELOPED LAND AND MANY RETROFIT OR REDEVELOPMENT OPPORTUNITIES

Option 3 is Option 2 modified to meet the needs of a particular urban situation. Usually the lots are narrower along major arterials in an old city or village. In addition, the nature of land use change includes much more adaptive reuse and redevelopment along major arterials in a built-out city, than in a suburbanizing township or rural area.

It may also be necessary to either exempt the downtown from the access management standards, or to adopt a different set of access management standards in the downtown because:

- *lots are often much narrower,*
- *speed limits and traffic is much slower,*
- *there are many more signalized intersections and they are often closer together,*
- *there are many more pedestrians and bicycles,*
- *many delivery trucks double park because there are inadequate places for loading and unloading,*
- *many blocks with on-street parking and no driveways*
- *vacant land is not available for service drives,*
- *building setbacks are typically much less than in suburban areas,*
- *parking may be provided off-site or parking may be in a ramp instead of at ground level.*

Consequently, the sample language in Option 2 would need to be modified in the following ways to best fit each individual urban situation:

- *The driveway and intersection spacing standards in Section 2.2.D. may need to be reduced because of preexisting narrower and shallower lots that don't permit many opportunities for shared driveways, frontage roads or rear service drives.*

- *Some of the technical construction standards may need to be reduced (like driveway width) in keeping with reduced space (narrow lots) and slower speeds.*
- *Alternative access options in Section 2.3 may be less feasible because of narrow lot width, shallow lot depth, and a large number of shallow setback buildings.*
- *Pedestrian and service vehicle considerations may have a higher status which may affect the ability to apply some standards.*
- *Parking facility design will have different importance and ramps will impose new considerations.*
- *Signal spacing will be determined by existing blocks.*
- *Medians become landscaping opportunities as well as traffic control devices.*
- *The incentives in Section 2.6 may need to be relied upon more frequently, but will probably need to be modified as lot width is usually established and parking may be provided by the community.*
- *The process and standards for waivers and variances in Section 2.7 may need to be refined.*

Chapter 9
NEXT STEPS

Depending upon the size of your community and the amount, type and scale of development it faces, access management can appear to be a daunting task. This guidebook gives a comprehensive look at nearly all the features that can be involved. Some communities are ready and able to begin work on an access management program immediately. However, if your community is not prepared to begin a comprehensive program of access management, there are steps you can take without committing to the entire process. This chapter provides some ideas on how to get started and steps that you can take as the opportunity arises to improve access management in your community.

WHAT SHOULD YOU DO FIRST?

The first steps in many communities will depend on whether there is recognition of the need to act, and whether the community has professional planning (or other capable) staff available, or whether it does not.

1. **There is a Recognition of the Need to Act**
   If your community has congested roads and many crashes along major arterials, and if you are a planning commissioner or an elected official and you have planning staff or a consultant at your disposal, you know what you have to do: **make access management a priority**! If you don't have the staff, start working with neighboring communities to share resources to get the job done. There are very few actions that local government officials can take that have as great a potential to save lives, reduce injuries and crashes while at the same time better protect the investment we all have in the public road system. All these benefits can be achieved while accommodating new shopping and job development. But these benefits usually occur only after shifting staff and/or attracting other resources into the task of developing and implementing an access management program. Often a multi-agency, cost-sharing approach is possible. Chapter 6 presents a process to follow and Chapter 8 presents sample ordinance language.

2. **There is No Recognition of the Need to Act**
   If on the other hand, you are a planning commissioner, an elected official or a citizen in a community without professional staff or a consulting planner available (or if you are in a community with staff, but you are the only person that appears to be concerned about access management) then: **the first step must be to build a base of support!** Following are some steps you can take:
   - Share this guidebook with other planning commissioners and with road agency staff. Talk about how the traffic problems in your community can be improved by the access management techniques in this guidebook.
   - Explore the possibility of sponsoring a training program on access management in your community. The Michigan Department of Transportation has qualified trainers available to conduct local training programs (contact your local Transportation Service Center for information; see list in Appendix A). Contact neighboring communities that share the same major arterial and invite them to co-sponsor and participate in the training.
   - Gather and share key data that demonstrate problems and trends along major arterials such as:
     - Traffic crash data.
     - Existing and projected traffic volume data (emphasize change over time).
     - High traffic generating land uses proposed along the corridor.
     - Count the number of driveways per mile along major arterials. This is aided by use of aerial photographs taken at different points in time.

How does the number compare with the tables in Chapter 3?

- Identify key strategies that could be used to tackle the biggest or most obvious problems. For example: if the big problems stem from an overabundance of driveways that are too close together, consolidating driveways may achieve a large part of what the community needs. If the problem is traffic conflicts from cars stacked at intersections, then providing alternative access to corner properties may be a key initial target. If the obvious problem is preventing too many driveways in an undeveloped part of a major arterial, then adopting driveway separation standards, or "locking-in access points" may be a key technique to pursue.
- Find out if neighboring communities share your concerns. If they do, get them “on board”.
- Identify a "champion" for the cause. It could be yourself, or a key elected official. In some communities it is the chief administrative official (supervisor, or city manager), in others it is the police chief (whose staff must respond to all the crashes), in others it is the community planner, local public works director, or the road authority director.
- Identify and tackle a small problem successfully (also see the next section "Look for Opportunities") such as:
  - Closing an unneeded driveway into the township or city hall or other public property. It’s always important to set a good example.
  - Redesigning driveways at several sites and show the business owners how they can gain parking spaces, improve appearance with new landscaping, lessen motorist confusion and make the shopper more comfortable about coming back.
  - Establishing a coordinated site plan review process with the local road authorities (MDOT or county road commission) as outlined in Chapter 5.
  - Passing an ordinance provision to "lock-in access points" along undeveloped land abutting a state highway (see Option 1a in Chapter 8).
  - Adopting an ordinance amendment to collect an escrow fee for hiring professionals to review proposed site plans for the quality of access design and conformance with other ordinance requirements (see Chapter 8).

LOOK FOR OPPORTUNITIES

If none of the above listed strategies appear to fit your community, consider an opportunity based strategy that focuses on prevention and remediation when the opportunity arises.

The process of improving access management along an already developed corridor can take twenty-years or more. Don’t feel that you have to accomplish "everything" too quickly. It is often best to start slowly by thoroughly understanding the range of techniques and identifying what will work best in your community.

Always be on the alert for any opportunities to implement access management techniques. For example, when MDOT, the county road commission or the local road agency is planning on repaving or widening a major arterial, it is a perfect opportunity to make a joint effort to close unneeded driveways. Considerable money can be saved on engineering design, construction, labor, etc. to replace two or three driveways with one modern design when it is associated with a road improvement project rather than initiated as a separate project later. This is also a great time to purchase access rights or scenic easements with access limitations in targeted areas that have scenic, historic or other public values.

Another opportunity not to be missed is when a new master plan or thoroughfare plan, or an update to either is proposed. Even the addition of access management goals and objectives to these plans can be the springboard to future ordinance changes to implement access management techniques.

Look for other opportunities to prevent future problems or remediate existing ones, such as:

PREVENTION (is much cheaper than remediation)

1. "Lock-in" future access along major corridors before much land division occurs. Apply these standards during lot split review, plat review and site plan review processes.

2. Limit or prevent commercial and industrial development in strips along roadways. Instead provide for them in planned areas or nodes that extend back from the road, rather than stripped along it.

3. Provide for mixed use developments so people don't need to use cars as much and when they do, they won't have to go as many places.

4. Promote and provide incentives for shared access and interconnections between developments wherever possible. Include in corridor plans, zoning, condominium and subdivision regulations. Focus on joint driveways, parking lot cross access, frontage roads and rear access drives.

5. Build the following standards into the zoning ordinance and apply during the platting and site plan review processes:
   - Require wide lot widths along major arterials
   - Require deep setbacks from the right-of-way if frontage roads or rear access roads aren't going to be required.
   - Limit the number of driveways permitted
   - Establish driveway separation distances (between driveways and intersections)
   - Preserve clear sight distance
   - Provide for access off local or side streets instead of arterials wherever possible
   - Provide incentives for shared access and consolidation of driveways
   - Provide standards for improved access design elements: tapers, right-turn lanes, acceleration lanes, deceleration lanes, bypass lanes and channelized driveways (e.g. right-in and right-out only, etc.)
   - Prohibit parking and loading that requires backing out onto the road
   - Preserve space for safe and convenient transit and pedestrian access
   - Require improved access in "change of use" situations
   - Establish standards to phase in implementation of corridor plans.

6. Require traffic impact studies for large, high traffic generating land uses.

7. Prepare corridor plans and/or access management plans along key corridors. Include access management as an element of the transportation section of the local master or comprehensive plan.

8. Coordinate preparation of corridor plans, access management plans and local master or comprehensive plans with neighboring jurisdictions.

9. Engage in a partnership with all applicable road agencies to coordinate access permit decisions and the preparation of access management plans and local access management regulations: MDOT, county road commission, and municipal road authorities, metropolitan planning organizations and regional planning and development commissions.

REMEDIATION (for older, built-up parts of the community in need of road improvements)

1. Build the same standards as listed above into local ordinances but focus application on "change of use" situations.

2. Prepare detailed, phased, corridor plans with broad property owner participation on projects involving major physical changes (especially new rear access roads or frontage roads).

3. Integrate major access management remediation programs into a larger set of initiatives (economic redevelopment, adaptive reuse, community beautification, improved sign or landscaping controls, etc.).

Whichever approach you take, at some point you will have sufficient support and momentum to undertake a more ambitious effort -- creating a comprehensive access management program. Such a program is based on an access management plan (or a corridor plan with access management elements) and is coordinated with access management regulations. Or perhaps you will have achieved most of the elements of such a program without ever fully defining it, by seizing each opportunity that came along. Either way you will have achieved the benefits of access management as outlined in this guidebook.

The most important step is the first one. Don't delay--take a first step NOW!

ACCESS MANAGEMENT BIBLIOGRAPHY

Handbooks

- Center for Urban Transportation Research, *DRAFT National Access Management Guidebook,* 2000. [ONCE PUBLISHED IN 2002 THIS WILL BE THE "BIBLE" ON ACCESS MANAGEMENT, IT HAS A VERY EXTENSIVE BIBLIOGRAPHY.]
- Center for Urban Transportation Research, *Managing Corridor Development: A Municipal Handbook,* 1996.
- Center for Urban Transportation Research, *10 Ways to Manage Access*, October 1996.
- Iowa DOT, *Access Management Handbook*, Oct 1999.
- Maine DOT, *Access Management, Improving the Efficiency of Maine Arterials: A Handbook for Local Officials*, 1994.
- Maleck, Thomas, P.E. and Maki, Robert, P.E., *Introduction to Geometric Design,* for Michigan State University training session, November 2000.
- Metro Regional Services, *Creating Livable Streets,* November 1997.
- McKenna Associates and the WDBC Group, *Evaluating Traffic Impact Studies*, prepared for Tri-County Regional Planning, SEMCOG and Michigan DOT, 1994.
- Michigan DOT, *Improving Driveway & Access Management in Michigan,* 1996.
- Ministry of Municipal Affairs of Ontario, *Design Guidelines,* 1988.
- Minnesota DOT, *MnDOT Needs You As Partners in Corridor Access Management*, 1999.
- New York DOT, *Best Practices in Arterial Management*, 1997
- Oregon Department of Transportation, *Main Street Handbook*, November 1999.
- Planning & Zoning Center, Inc. for the Michigan Society of Planning Officials, *Community Planning Handbook,* 1992.
- Planning & Zoning Center, Inc. for the Michigan Society of Planning Officials, *Land Division and Access Controls,* April 1990.
- Planning & Zoning Center, Inc. for the Michigan Society of Planning Officials, *Site Plan Review,* 1988.
- Tri-County Regional Planning Commission, *Arterial Street Access Control Study*, 1981.
- Vermont Agency of Transportation, *Access Management on Roads and Streets: Handbook for Community and Transportation Planners,* 1996.

Technical Reports and Research Materials

- American Planning Association, *Creating Transit-Supportive Land Use Regulations*, PAS 468, 1996.
- Carlson, Ken and Munson, Steve, *Symbiotic, Opportunistic, Omnivores: A Perspective on New York's Arterial Access Management Initiative,* for the Portland Oregon Access Management Conference, August 2000
- Carr, John, Kentucky Transportation Cabinet; Heydel, Thomas, Wisconsin DOT; Brauer, Richard, Sear-Brown Group; *Corridor Case Studies*, for the National Conference on Access Management, 1998.

- Center for Transportation Research and Education Iowa State University, *Access Management: Current Policies and Practices in Iowa*, April 1997.
- Center for Urban Transportation Research, University of South Florida, *Economic Impacts of Access Management*, January 2000.
- CUTR, *Access Management and Site Planning*, for the National Conference on Access Management, 1996.
- Federal Highway Administration, *Highway Functional Classification,* Volume 20, Appendix 12, July 1974.
- Federal Highway Administration, *Access Management CD Library*, July 2000; presentation from Center for Urban Transportation Research entitled *Access Management and Site Planning*, 1997.
- Gluck, Jerome, Levinson, Herbert and Stover, Virgil. *Report 420: Impact of Access Management Techniques*, National Academy Press, 1999.
- Levinson, Herbert, *Access Spacing and Accidents—A Conceptual Analysis,* for the Portland Oregon Access Management Conference, August 2000.
- Levinson, Herbert and Gluck, Jerome; *Access Spacing and Safety: Recent Research Results,* for the Portland Oregon Access Management Conference, August 2000
- Levinson, Herbert, et al., *Indirect Left Turns-The Michigan Experience*, for the Portland Oregon Access Management Conference, August 2000.
- Levinson, Herbert and Gluck, Jerome, *The Economic Impacts of Medians,* for the Portland Oregon Access Management Conference, August 2000
- McCauley, Tim, "Preventing Unnecessary Driveways in Strip Commercial Areas, *Planning and Zoning News,* Sept. 1990.
- Michigan DOT, *M-59 Right-of-Way Preservation Study*, March 1993.
- Preston, Howard, *Statistical Relationship Between Vehicular Crashes and Highway Access*, for the Portland Oregon Access Management Conference, August 2000
- Reish, Robert and Normandin, Mike; *A Case Study of Access Control: The History and Findings of Sheridan Boulevard Access Planning*, for the National Conference on Access Management, 1996.
- S/K Transportation Consultants Inc. *National Highway Institute Course 15255: Access Location and Design*, 1998.
- Smith, Steven, *Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making*, National Academy Press, 1999.
- Transportation Research Board, Circular, *Driveway and Street Intersection Spacing*, March 1996.
- Tri-County Regional Planning Commission, *Guiding Land Subdividing-Part 3-Residential Standards,* 1964.
- Urbitran, Planning and Zoning Center, Inc., Levinson, Herbert; Demosthenes, Phil; *Improvement Options- Access Management Options,* produced for the Michigan Department of Transportation, 1996.
- U.S. Department of Transportation, *Land Use and Economic Development in Statewide Transportation Planning*, May 1999.
- U.S. Department of Transportation, *Corridor Preservation Volume I & II*, 1996.

- Williams, Kristine and Forester, J. Richard, *Land Development Regulations that Promote Access Management: Synthesis of Highway Practice 233,* National Academy Press, 1996

State Access Management Guidelines and Standards

- Colorado DOT, Colorado State Highway Access Code, Colorado Code of Regulations, 1992.
- Florida DOT, Use of the Access Management Standards, 1994.
- Florida DOT, *Basic Site Planning,* 1997.
- Michigan Department of Transportation, Administrative Rules Regulating Driveways, Banners, and Parades On and Over Highways, 1998.
- New Jersey DOT, New Jersey Highway Access Permit System, 2000.
- Oregon DOT, *Oregon Access Management Policy*, 2000.

Local Plans

- Ann Arbor Urban Area Transportation Study, *Huron-Whittaker Corridor Study*, 1999.
- Battle Creek Area Transportation Study, *Columbia Avenue Corridor Study*, 1990.
- Cape Cod Commission, *Old King's Highway Corridor Plan*, 1995.
- Charter Township of Oshtemo, *Oshtemo Charter Township Access Management Plan*, 1991.
- Genoa Township, *Grand River Avenue Corridor Plan,* 1995 (also have 1989 plan).
- Grand Valley Metro Council, "North East Beltline Joint Development Plan," 1998.
- McKenna Associates, *M-59 Corridor Plan,* funded by Michigan DOT, 1995.
- Progressive AE, *US-27 Sub-Area Plan*, prepared for Bingham Township, Clinton County, DeWitt Charter Township, Greenbush Township, Olive Township, City of St. Johns, 1999.
- Strader Group, Inc., *Village of Goodrich M-15 Corridor Plan*, 1999.
- Trans Systems Corporation, *135th Street Corridor Overland Park, Kansas*, October 1998.
- Wade-Trim, *M-20 Corridor Plan*, prepared for the M-20 Alliance, 1998.
- WDBC Group, *44th Street Corridor Land Use Plan*, prepared for the Grand Rapids Transportation Study, 1987.

Local Ordinances/Guidelines/Standards

- Alpine Charter Township Zoning Ordinance: *Service Drive Standards and Criteria*, 1989.
- Charter Township of DeWitt, Michigan: *Ordinance 60.41: Site Plan Standards,* 1996.
- Chesterfield, Virginia, *Zoning Ordinance: Access and Internal Circulation for Non-residential or Mixed Use Developments*, 2000.
- Delta Charter Township, Eaton County, Michigan, *Zoning Ordinance*, 1990.
- Fairfax County, Virginia: *Zoning Ordinance: Highway Overlay District*, 1999.

- Genoa Township: *Zoning Ordinance Article 15: Access Management and Private Road Standards,* 1995.
- Grand Blanc Charter Township, *Zoning Ordinance Section 2700: Driveway Standards,* 2001.
- Grand Traverse Bay Region, *Sample Regulations: Access Controls,* 1993.
- Hudsonville, Michigan: *Zoning Ordinance Driveway Location Standards,* 1999.
- Livingston County Road Commission, *Specifications and Administrative Rules Regulating Driveways, Road Approaches, Banners and Parades On and Over Highways*, 1999.
- Oshtemo Township, *Zoning Ordinance: Section 67 Access Management Guidelines,* 1991.
- Portland, Oregon: *Regional Accessibility Requirements,* 2000.
- Shiawassee County, *Zoning Ordinance: Section 6: Access Regulations,* 1999.
- Town of Farmington, New York: *Major Thoroughfare Overlay District*, 1998

Model Ordinances

- Center for Urban Transportation Research & Florida Department of Transportation, *Model Land Development & Subdivision Regulations That Support Access Management,* 1994.
- Iowa DOT, *Access Management Handbook*, October 1991.
- New York Department of Transportation, *Model Access Management Ordinance,* 1998.
- Ohio-Kentucky-Indiana Regional Council of Governments, *Access Management: A Policy for Local Communities,* 1988.
- Saginaw Metropolitan Area Transportation Study, *Zoning Ordinance Regulations for Tittabawassee Road Corridor Access Control Regulations,* 1990.
- Tri-County Regional Planning Commission, *Model Zoning Ordinance-Arterial Street Access Regulations,* 1981.

Other

- Colorado Department of Transportation, *Model Intergovernmental Agreement,* 2001.
- City of Kentwood, *Memorandum of Understanding*
- M-59 Multi-Jurisdictional Corridor, *Planning Memorandum of Understanding*
- NYDOT, *Memorandum of Understanding*
- Delta Township, "*Mutual Access Easement Agreement*"