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16. Abstract

This Guidebook explains the principles of access management for a variety of audiences The Guidebook discusses the benefits of access management and the three themes TxDOT is using as a foundation for the statewide program. It provides details and photographic examples of access management treatments for roadways. Text descriptions of access classifications for roads are also included in this Guidebook. The Guidebook is intended to be used by a wide variety of audiences, ranging from lay people to technicians to policy and decision makers.

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ACCESS MANAGEMENT GUIDEBOOK FOR TEXAS

by

William E. Frawley, AICP
Research Scientist
Texas Transportation Institute

and

William L. Eisele, Ph.D., P.E.
Associate Research Engineer
Texas Transportation Institute

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and the
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TEXAS TRANSPORTATION INSTITUTE
The Texas A&M University System
College Station, Texas 77843-3135

DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Texas Department of Transportation (TxDOT) or the Federal Highway Administration (FHWA). This report does not constitute a standard, specification, or regulation. The engineer in charge of this project was William L. Eisele (P.E. #85445).

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1 INTRODUCTION

1.1 WHO WILL BENEFIT FROM THIS GUIDEBOOK?

Everyone! This Guidebook is intended for a variety of transportation stakeholders who desire a greater understanding of access management and its specific applications to Texas. The Guidebook explains access management benefits to the motoring public and the roadway network. Individuals with various backgrounds will benefit from this Guidebook, including planners, engineers, and other technicians. Administrators, elected officials, and others with interests in economic and community development will gain an understanding of the principles of access management. Readers will also find information related to implementation policies is also included. Technical readers will find spacing standards and other guidelines for the implementation of access management treatments on roadways.

Photographic examples illustrate available access management techniques that may be implemented in Texas, either for the first time or on a wider scale. These photographs provide all readers, regardless of professional transportation experience, the opportunity to grasp the applications offered throughout the book. Almost everyone who has driven an automobile will be able to relate to scenarios depicted in the photographs and understand the problems and solutions presented.

Everyone should feel welcome to read and use this Guidebook!

Technical data in the form of tables, charts, graphs, and diagrams will help the technically oriented reader use the standards to solve and prevent transportation problems. The technical parameters for treatments included in this Guidebook are based on standards accepted and used by the American Association of State Highway Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and several states. Intersection spacing (driveways and public streets) requirements are provided for the various access management treatments on given types of roads, according to their access classifications. Additional technical information can be found in the TxDOT *Access Management Manual* and the TxDOT *Roadway Design Manual.*

The charts and technical information are necessary to explain the applications.

1.2 WHAT IS ACCESS MANAGEMENT?

While different practitioners may give a variety of specific responses to this question, the answer can be summed up by saying that access management is a set of tools used to balance the needs of mobility on a roadway with the needs of access to adjacent land uses. The level of mobility (or traffic movement) on a roadway is related to the functional classification—the technical term that defines the interrelated levels of access and movement on a given roadway (Figure 1-1).

Access management includes not only the physical treatments on the ground, but the policies to implement them as well. Policies must be implemented consistently, but with enough flexibility to consider the limitations of some specific situations.

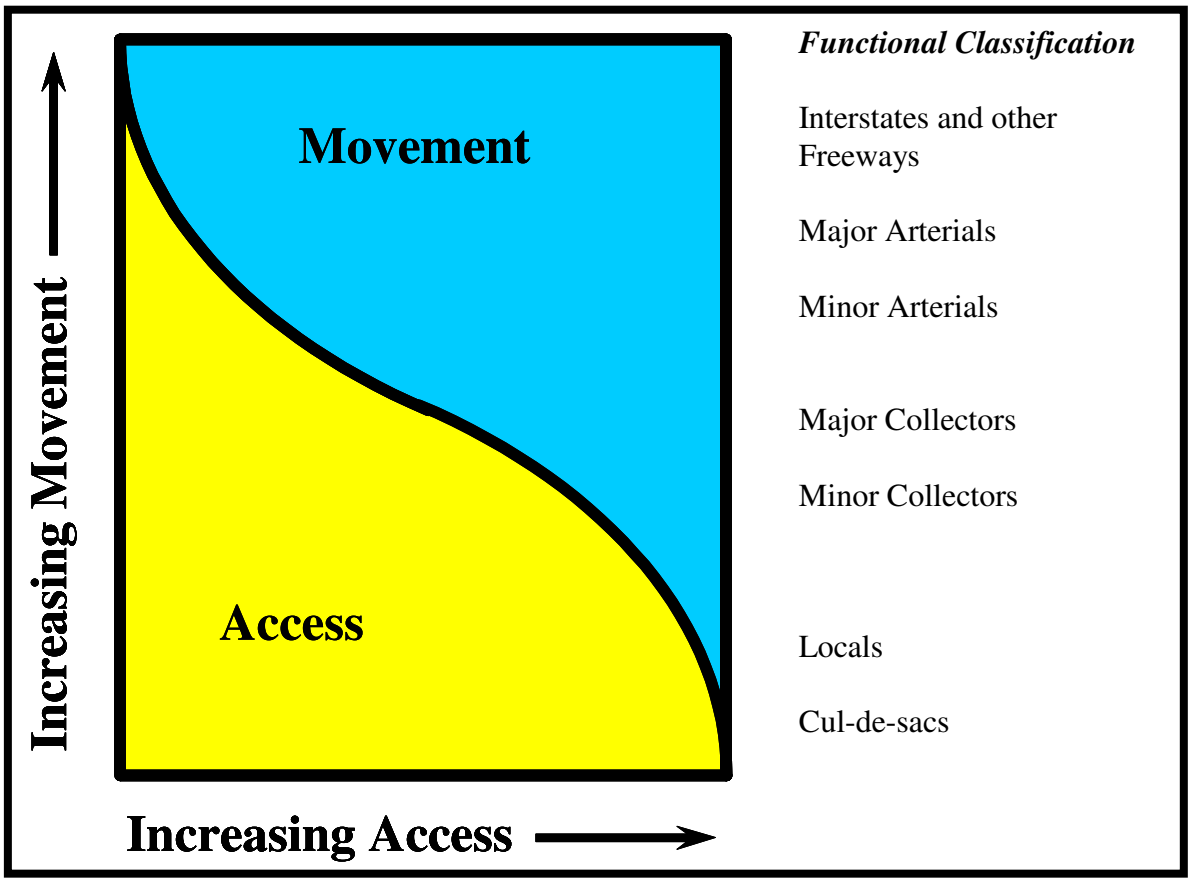


Figure 1-1. Relationship Among Functional Classification, Access, and Vehicle Movement.

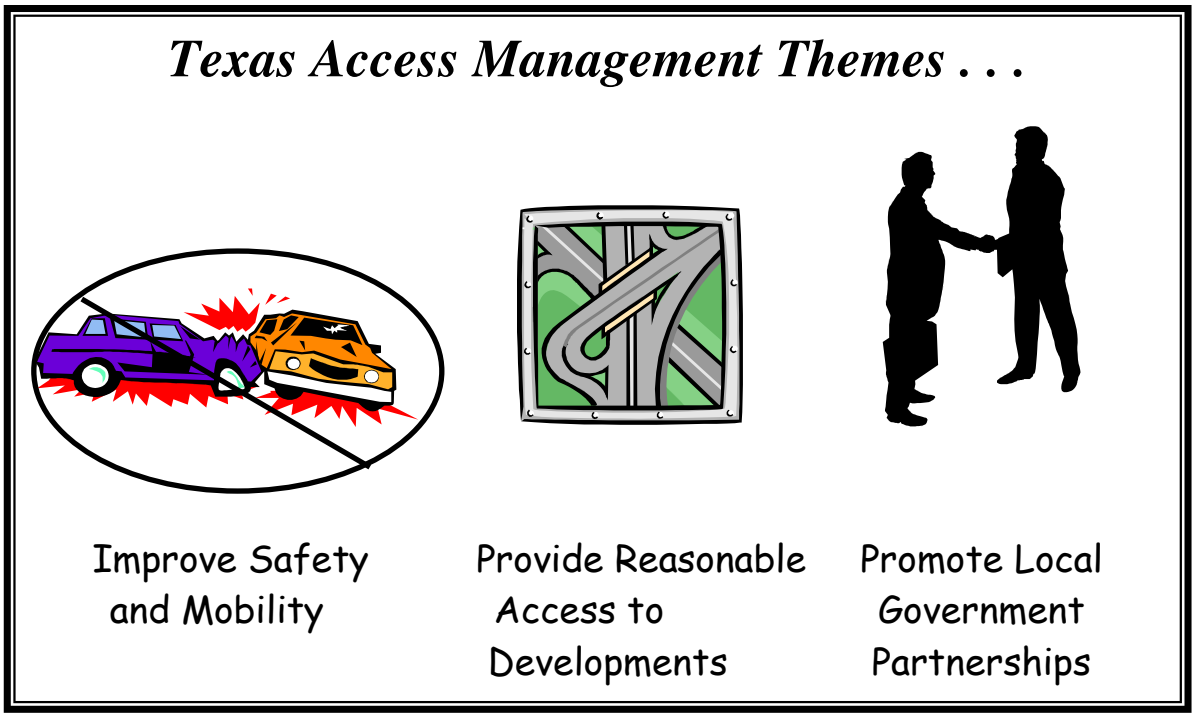
It is important to realize that access management is not "one-size-fits-all." For example, some of the physical treatments that work in rural West Texas may not suffice in the largest metropolitan areas and vice versa. Likewise, some treatments that solve and/or prevent problems on one corridor in a specific area may not be suitable for another similar corridor in the same rural or metropolitan area. As previously mentioned, consistent, statewide policy implementation is a vital program element.

Access Management Is . . .

- Balancing Access to Property and Roadway Mobility
- A Set of Roadway and Policy Tools
- Related to Functional Classification
- NOT One-Size-Fits-All

1.3 WHAT ARE THE GOALS OF ACCESS MANAGEMENT?

States that have successful access management programs typically have one or more themes on which the programs are based. The three Texas access management themes are: 1) improve safety and mobility, 2) provide reasonable access to developments, and 3) promote local government partnerships.



These themes provide consistency on which the entire access management program is based. Such consistency is important as TxDOT develops and implements the program across the entire state, with its geographic diversities. TxDOT can answer the "why are we doing this?" question by going back to one or more of the themes to support the policies and/or implementation of roadway treatments. Making decisions in the name of providing a safer roadway network, providing reasonable access between property and the highway system, and/or promoting partnerships with local governments provides TxDOT the justification it needs to carry out the program.

1.4 WHAT ARE THE BENEFITS OF ACCESS MANAGEMENT?

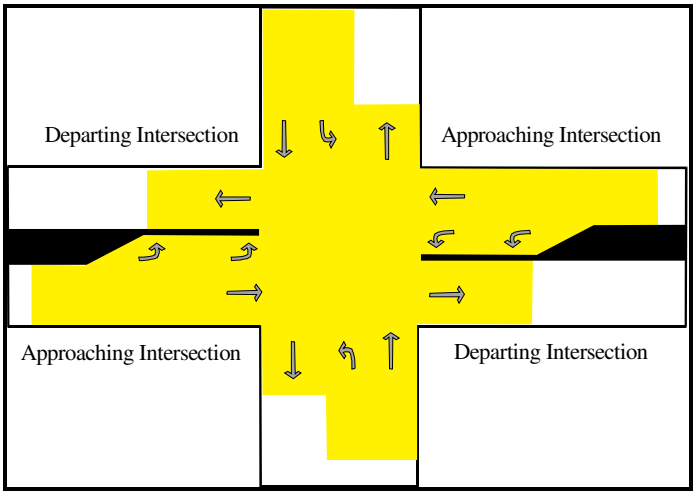
One might ask, "Why is it important to manage access to the arterial street system?" There are several answers to this question, some of which are provided in this section. A successful access management program will provide several types of benefits to TxDOT, the motoring public, and the community in general. Most of the benefits, if not all, are related directly to the themes established for the program in general; this statement again stresses the importance of having the themes and consistently basing decisions on them.

Previous research has shown that approximately half of all crashes occur in the functional areas of intersections, or are otherwise related to vehicle turning movements. In urban areas, more than half of the crashes are related to intersections, while in rural areas typically less than half are related to intersections.

Research has also shown that implementing access management treatments can decrease crashes by 30 to 70 percent, depending on specific situations. This decrease is accomplished by reducing

the number of conflict points on a roadway—opportunities for vehicle paths to cross—where crashes or evasive maneuvers may result.
It is important to realize that all driveways along the street are, in fact, intersections. Therefore, every driveway that is added to the street provides an additional set of conflict points—opportunities for crashes to occur. As driveway intersections are added, with minimal spacings, to a street, the functional areas of the intersections may overlap such that the drivers are continuously dealing with multiple intersections (and set of conflict points).

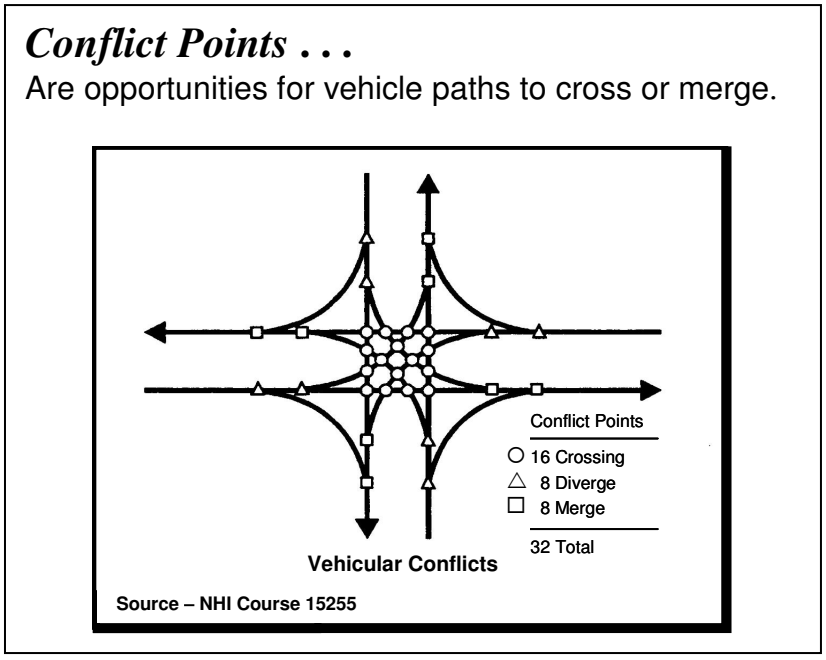
Functional Area of an Intersection



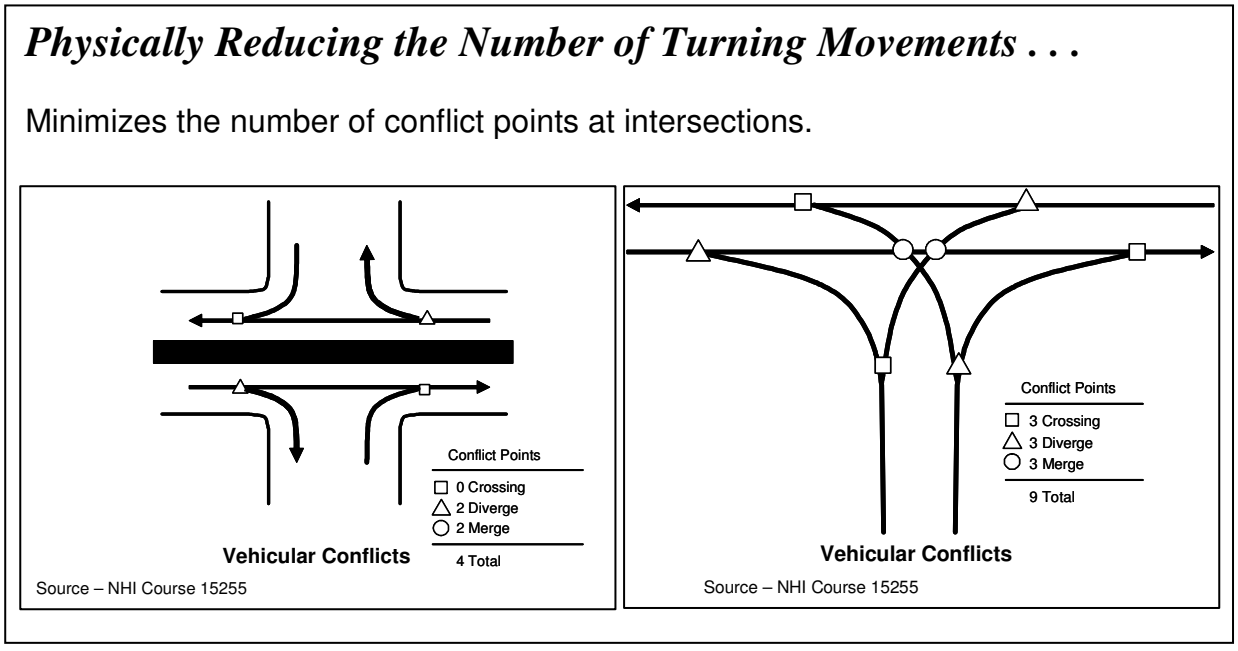
Yellow area = functional area

There are two basic ways to solve or prevent problems related to the intersections and resulting conflict points. One method is to space the intersections apart sufficiently such that the drivers can successfully negotiate each intersection and set of conflict points one at a time. Good intersection spacing increases drivers' expectations of where and how often conflict points will arise, as well as time to depart one intersection and begin to anticipate and negotiate the next one.

Another way to solve these problems is to physically minimize the number of turning movements at intersections. This goal can be accomplished by either minimizing the number of legs at each intersection (in the planning stages) and/or placing physical barriers to restrict turning movements (in retrofit situations).



When the number of legs or left-turn opportunities at intersections are reduced (either in the planning stages or through retrofit projects), the number of conflict points decreases. These scenarios provide a much safer driving environment by reducing or eliminating the opportunities for crashes to occur. Channelizing left turns into a driveway through a raised median can accomplish this safety goal. Left turns out of a driveway (and the resulting conflict points) can be prevented by forcing the driver to turn right through channelization of the driveway.



1.5 WHAT HAPPENS WITHOUT ADEQUATE ACCESS MANAGEMENT?

If steps are not taken to implement access management techniques on corridors with access problems, crashes will most likely continue or even increase in frequency along those corridors. Every access point provides its own set of conflict points—crash opportunities. Agencies responsible for access on each roadway need to minimize the number of conflict points at intersections, including driveways, while still providing reasonable access to adjacent properties.

Research shows that as traffic volumes on arterial streets rise beyond 20,000 vehicles per day, two-way left-turn lanes (TWLTLs) begin to decrease in functionality, often resulting in safety problems. This decrease in functionality occurs due to circumstances such as drivers using the TWLTL as havens as they turn left out of driveways and can only clear the first direction of cross traffic and another driver is using the TWLTL either to make a turn in the opposing direction, or also as a haven while waiting to merge in traffic going the opposite direction. Head-on and side-impact, as well as other types of crashes, can result. The typical solution to this type of safety problem is the installation of a raised median, to reduce conflict points. The TxDOT *Roadway Design Manual* addresses considerations for TWLTL to raised median conversion.

TWLTLs May Lose Functionality As Traffic Volumes Exceed 20,000 Vehicles Per Day . . .

Drivers may use them for conflicting purposes.

Crashes May Occur More Often When TWLTLs Are Used on High-Volume Roads with High Driveway Densities

Signalized intersections that are placed too close to one another can cause mobility problems. One type of mobility problem related to poor signal spacing is lack of progression, or the inability for groups of vehicles to make it through successive green phases in a series of signalized intersections. Another signal-related problem is due to queues that back up from one intersection to the previous upstream intersection.

Poor Signal Spacing May Result in Mobility Problems . . .

Such as queue backups.

Crashes (and resulting injuries and property damage) can be reduced by implementing access management techniques. Furthermore, without implementing good access management practices on arterial streets, additional investments of tax dollars may have to be made either through adding lanes to the street or by building parallel facilities. In many cases, the loss of street capacity due to increases in access points creates the need for such investments.

1.6 WHY DOES TEXAS HAVE AN ACCESS MANAGEMENT PROGRAM?

Traffic is growing rapidly on many parts of the Texas state highway system. Simultaneously, land is developing along state highways, creating numerous access points. Each access point on a road provides a set of conflict points where vehicle paths may cross and crashes can occur. For Texas to provide a safe highway system that minimizes the opportunities for crashes, TxDOT needs to manage the type, number, and spacing of access points to roads through policies and physical design features.

Managing access points along state highways also provides for better traffic flow because access points also create opportunities for through-traffic to brake and accelerate to accommodate vehicles entering and exiting the highway. Access management design features allow entering and exiting vehicles to more easily weave into through-traffic at properly designed locations. The result is less stop-and-go and less slow-and-go traffic in the through-lanes.

Texas has made substantial investments in the state highway system. By maximizing the amount of traffic that moves along an arterial street, the need for additional parallel streets decreases. Therefore, TxDOT can maximize the benefits from roadway construction investments.

TxDOT has developed and adopted the *Access Management Manual* that provides specific guidance for intersection (including driveways) spacing.

1.7 WHAT IS AN ACCESS CLASSIFICATION?

An access classification identifies which type of access controls and related standards are appropriate for a given road. The access classifications that TxDOT currently uses are:

- New Highways on New Alignments,
- Freeway Mainlanes,
- Frontage Roads, and
- Other State System Highways

These classifications are discussed in greater detail in Chapter 3, as well as the TxDOT *Access Management Manual*. The access classifications provide for consistent treatment of access requests in TxDOT districts and throughout the state.

2 THE SOLUTIONS

It is important to note that the TxDOT *Access Management Manual* provides specific guidance to intersection (including driveway) spacing, since access to the state highway system includes elements outside the TxDOT-owned right-of-way. The TxDOT *Roadway Design Manual*, provides design guidance for median treatments and auxiliary lanes, since they are elements of the roadway within the TxDOT-owned right-of-way.

2.1 PHYSICAL TREATMENTS ON THE ROADS

There are numerous types of access management treatments that can be implemented on roadways. Some of the treatments are already used in parts of the state, while others are not as common in Texas but are used frequently and successfully in other states. The photographs in this section show not only the treatments and the problems they solve, but in some cases how the business community succeeds when the treatments are present. Some treatments are used solely for the functions they serve, such as the typical auxiliary lane (an additional lane for acceleration or deceleration), while some treatments provide other benefits as well, such as the aesthetics of properly designed and landscaped medians.

Turn lanes (right and left) remove turning vehicles from the through-lanes of the street, thus reducing speed differentials, the differences in speed between through-traffic and turning vehicles. For instance, if a through vehicle is traveling at 50 mph and a turning vehicle slows to 15 mph, the speed differential is 35 mph. Speed differentials can result in through-traffic slowing, evasive maneuvers, and crashes. By reducing the speed differentials in the through-lanes, through-traffic is able to move at more constant speeds and turning vehicles are able to slow or stop with lower risks of being hit. Turn lanes provide safety for the turning vehicles, improve mobility for the through-traffic, and protect the investment in the street by maintaining or improving its capacity.

Turn Lanes . . .

Provide safety, improve mobility, and protect investment.

One of the goals of access management is to increase safety by minimizing the conflict points on the streets. This can be accomplished by limiting the number of access points located directly on the arterial streets. Limiting access points can be accomplished by providing reasonable, alternative access via perpendicular streets and by shared driveways. In some cases, all access for a development may be located on perpendicular streets resulting in no direct access to the arterial street. Examples exist around the country and throughout Texas where retail establishments succeed with no direct access to the arterial streets they adjoin.

No Direct Access to an Arterial . . .

Moves access points to perpendicular streets and eliminates conflict points on the arterial street.

It is sometimes not possible to completely deny direct access from retail establishments to arterial streets. Such cases should strive for maximum spacing between driveways. By spacing driveway intersections as far as possible from each other, as well as from street intersections, conflict points are minimized on the arterial streets. There are numerous examples that show big box and other retail establishments do succeed with shared access points on arterial streets.

Adequate Driveway Spacings . . .

Minimize conflict points on arterial streets through shared access.

When traffic signals are properly timed or synchronized, platoons (groups of vehicles) can move through consecutive signalized intersections without repeated stops. Proper signal timing can occur only when certain signalized intersection spacing requirements are met. Traffic signals are often requested for retail developments at locations that would not meet the spacing requirements for proper signal timing. Therefore, successful access management programs in other states include provisions for traffic signal locations.

Adequate Signal Spacing . . .

Provides for traffic progression on arterial streets.

Auxiliary Lanes . . .

Remove speed differentials and allow for weaving maneuvers.

Auxiliary lanes can be used between major street intersections, beginning and ending with channelized right-turn facilities at those intersections. Auxiliary lanes remove speed differentials from through-lanes for greater lengths than typical turn lanes. They can serve frequent driveways efficiently by providing opportunities for weaving maneuvers (vehicles changing lanes in short distances).

Raised medians allow left-turn and U-turn maneuvers at specific locations along arterial streets. Raised medians can provide left-turn bays that serve traffic for one direction only, as opposed to TWLTLs, which serve traffic in both directions. This attribute of raised medians prevents the opportunities for head-on collisions between two vehicles making left turns in opposing directions. The left-turn bay feature of the raised medians also removes turning vehicles from the through-traffic lanes. Drivers have increased expectations of where they will need to make turns, as well as where other drivers will be entering and exiting the through-lanes in front of them. Raised medians can be elements of new facilities and retrofit projects on existing streets.

Raised Medians . . .

Can provide aesthetic benefits while reducing conflict points.

It is important to keep in mind that the presence of a raised median typically requires the ability for at least passenger vehicles to be able to make a U-turn. This need may be accomplished by having enough travel lanes and/or a wide enough median that provide a large enough turning radius (the TxDOT *Roadway Design Manual* provides guidance on this issue). In some instances where the necessary turning radius for a U-turn cannot be provided, similar circulation may be provided on parallel streets. Consideration also needs to be given to how delivery trucks will be able to accommodate businesses.

Business owners are often concerned about economic impacts when retrofit median projects are proposed on the arterial streets they abut because medians minimize the number of direct access points. Research in Texas, however, shows that the installation of raised medians typically does not have negative impacts on adjacent businesses. Interviews with business owners revealed that retail sales are more dependent on the local economy and on factors the businesses owners and managers control (e.g., product pricing, customer service, or product quality) rather than on direct access from an arterial street.

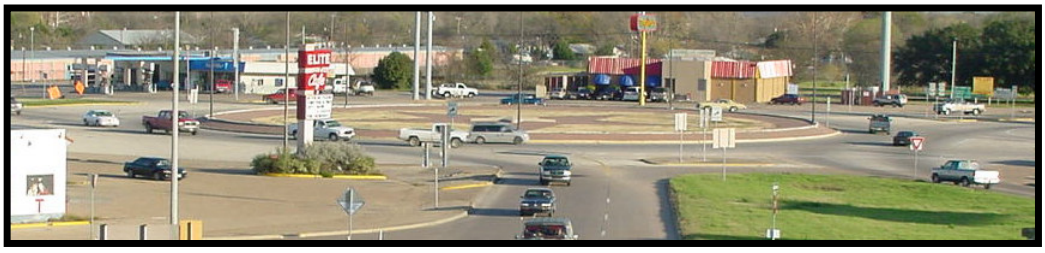
One retrofit treatment that helps attain access management goals is driveway consolidation/ closure. It can be a challenge to convince some neighboring businesses to share driveways and allow cross-access among their parking lots. However, consolidating and closing unnecessary driveways reduces the number of conflict points on the arterial streets and can eliminate the need for traffic to re-enter and re-exit the arterial street to access neighboring businesses. As the number of driveways decreases, drivers are exposed to fewer potential conflicts on the arterial street.

Closed/Consolidated Driveways . . .

Reduce conflict points on the arterial street.

There are locations throughout Texas where roundabouts were built decades ago to simplify complex, multi-leg intersections. While roundabouts are a very common major intersection treatment in European countries, their popularity is increasing in some parts of the United States. Specifically, interest in roundabouts as potential alternatives to traffic signal treatments for complex intersection design has recently increased in this country. In most roundabouts, traffic entering the circle yields to traffic already in the circle, but there are no stop signs or traffic signals. However, in roundabouts with extremely high volumes and many legs, there are sometimes stop signs, or even traffic signals that regulate traffic entering the circle.

Roundabouts . . .



Simplify complex, multi-leg intersections and can eliminate the need for traffic signals.

Larger retail developments will typically experience higher volumes of traffic entering them. As these volumes increase, the potential for traffic queues to back up onto arterial streets increases. Therefore, larger developments should accommodate these queues on-site by providing a longer throat (entrance drive) for entering traffic. Longer parking lot throats also give drivers a chance to separate the functions of exiting the street and maneuvering into the parking lot.

Good Shopping Center Throat Length . . .

Provides on-site queuing and allows vehicles to move off the arterial street before making driving decisions in the parking lot.

There are instances when new arterial streets need to be designed to allow for multiple access points, or when existing arterial streets need to be widened while providing access to multiple

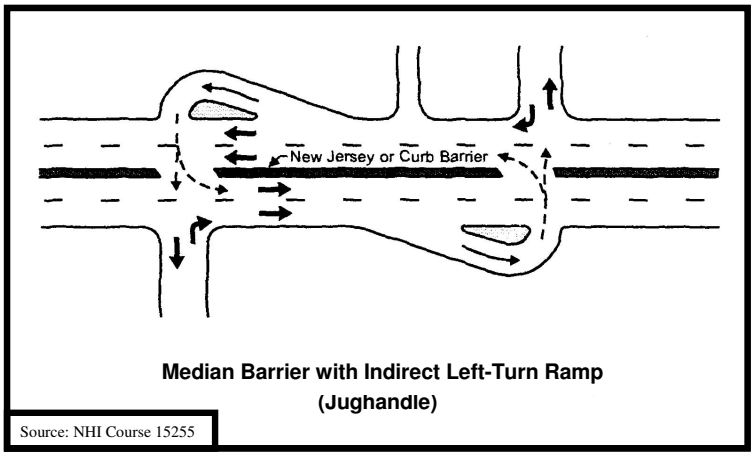
driveway intersections. Frontage roads can serve these purposes on arterial streets by completely removing turning vehicles from through-lanes. The design of frontage roads at intersections of streets perpendicular to the arterial street needs special attention. Otherwise, the functional areas of the intersection of the perpendicular street with the arterial street and the intersection of the perpendicular street with the frontage road can overlap if they are not adequately spaced.

Arterial Frontage Roads . . .

Maintain access for adjacent businesses (above), but can include intersection spacing problems if not designed properly (below).

Jughandles are alternative left-turn and U-turn treatments that eliminate the need for left-turn phases in traffic signals, as well as remove turning vehicles from through-traffic lanes. By eliminating left-turn phases from traffic signals, more "green time" (duration of the green light) can be provided for the through-traffic. On streets without adequate turning radius, jughandles can enable larger vehicles to make a U-turn in one maneuver. A jughandle can make mid-block U-turns possible when raised medians are installed on arterial streets with limited cross-sections.

Jughandles . . .



Median Barrier with Indirect Left-Turn Ramp (Jughandle)

Source: NHI Course 15255

Simplify traffic signals, remove left-turning vehicles from through-lanes, and provide alternative U-turn maneuvers.

The Michigan U-turn, named after the state in which it was developed and is most widely used, provides an alternative left- and U-turn treatment at intersections. Vehicles approaching the signalized intersection from the major street are not permitted to make left- or U-turns. Instead, vehicles on the major arterial street must continue through the intersection, then make a midblock U-turn at a designated location, and return to the signalized intersection to complete a left- or U-turn maneuver. On the minor street, vehicles turn right, weave toward the mid-block median opening, and perform a U-turn to complete their initial "left turn." As with a jughandle, this treatment removes all left- and U-turns from signalized intersections, thus simplifying signal operations and increasing green time for through-traffic.

Michigan U-turns . . .

Simplify signal phasing at signalized intersections.

3 ACCESS CLASSIFICATION AND DESIGN GUIDELINES

Portions of this chapter are taken directly from the *TxDOT Access Management Manual*.

3.1 ACCESS MANAGEMENT CLASSIFICATION SYSTEM

Classification Overview

This section describes the Department's access management classification system and provides guidance for assigning access management criteria to state highways. The criteria in the following sections are designed to preserve highway safety and to assure that each highway's importance to statewide mobility will be considered when evaluating requests for access to a roadway under the jurisdiction of TxDOT. The number, spacing, design, and location of access connections, median openings, turn lanes, and traffic signals have a direct and often significant effect on the safety and operation of the highway. The criteria are necessary to enable the highway to continue to function efficiently and safely in the future, while at the same time providing reasonable access to development.

The criteria and procedures for managing highway access differ for new highways on new alignments versus existing highways. Therefore, new highways on new alignments will be addressed separately.

The access management classification systems discussed in the following sections are:

- new highways on new alignments,
- freeway mainlanes,
- frontage roads, and
- other state system highways.

The following sections describe application of the access criteria and the purpose, function, and access management requirements for each of these roadway classifications.

3.2 NEW HIGHWAYS ON NEW ALIGNMENTS

Purpose and Functional Criteria

When a new highway is constructed on a new alignment, and the Commission determines that the new highway will be access controlled, direct access to the new highway will be determined prior to right-of-way acquisition and will be described in the right-of-way deeds. (For application of access connections where TxDOT controls the access, refer to TxDOT *Access Management Manual,* Chapter 2, Section 2, Application of Access Criteria).

Such new highways may initially have at-grade intersections, yet be intended for ultimate upgrade to full freeway criteria. In such cases, temporary access may be permitted where a property would otherwise be landlocked. When temporary access is permitted, the access permit will clearly state that the connection is temporary and will identify the terms and conditions of its temporary use and the conditions of the permanent access connection. The permit will also clearly state that the temporary connection will be closed and removed at such time that permanent access becomes available.

3.3 FREEWAY MAINLANES

Purpose and Functional Criteria

Freeways are intended to provide a very high degree of mobility. Accordingly, freeway mainlanes provide no direct access to property and access to the freeway mainlanes is provided only at interchanges and ramps. The spacing of interchanges and ramps needs to allow entering and exiting vehicles to weave safely and to provide adequate acceleration/deceleration.
The design of freeways is governed by the TxDOT *Roadway Design Manual*, Chapter 3.

3.4 FRONTAGE ROADS

Overview

This section describes the function and characteristics of freeway frontage roads, including how access connections will be applied along these frontage roads. Frontage roads are roadways that are constructed generally parallel to a freeway or other highway. Figure 3-1 shows a typical frontage road application.

Figure 3-1. Freeway with Frontage Roads.

Freeway frontage roads normally have at-grade interchanges with the arterial streets, which are generally perpendicular to the freeway and are grade-separated from the freeway mainlanes. Under fully developed conditions, the at-grade intersections of frontage roads and arterials are typically signalized.

Ramps provide connections between the frontage roads and the freeway. Traffic traveling from an arterial street to the freeway first turns from the arterial onto the frontage road and then travels along the frontage road to a freeway entrance ramp. Traffic traveling from the freeway to an arterial street leaves the freeway by means of an exit ramp that connects to the frontage road and then travels along the frontage road to its intersection with the arterial street.

Other streets may also intersect with frontage roads. By means of these intersections, access is provided between the freeway system and the developments that have access onto these streets.

Application of the Criteria

Frontage roads may be considered in order to provide direct access to abutting property where 1) alternative access is not available and the property would otherwise be landlocked, 2) it is not feasible for the Department to purchase the access, and 3) the frontage road allows for improved mobility together with the property access.

Direct access to the frontage road is prohibited in the vicinity of ramp connections, as described in the TxDOT *Roadway Design Manual*, Chapter 3. Otherwise, on roadways where TxDOT does not control the access, access connecting to the frontage road is typically permitted subject to the access connection criteria set forth in this manual. For application of access connections where TxDOT controls the access, refer to the TxDOT *Roadway Design Manual*, Chapter 2, Section 2, Application of Access Criteria.

Connection Spacing Criteria for Frontage Roads

Table 3-1 gives the minimum connection spacing criteria for frontage roads. However, a lesser connection spacing than set forth in this document may be allowed without deviation in the following situations:

- to keep from land-locking a property where such land-locking is solely the result of action by TxDOT (for example, design and construction modifications which physically prevent a driveway installation due to grade changes, retaining walls, or barrier installations) where TxDOT does not control the access; or

- replacement or re-establishment of reasonable access to the state highway system under highway reconstruction/rehabilitation projects.

Table 3-1. Minimum Connection Spacing Criteria for Frontage Roads.[1,2]		
Posted Speed (mph)	Minimum Connection Spacing (feet)	
	One-Way Frontage Roads	Two-Way Frontage Roads
30	200	200
35	250	300
40	305	360
45	360	435
50	425	510

[1]Distances are for passenger cars on level grade. These distances may be adjusted for downgrades and/or significant truck traffic. Where present or projected traffic operations indicate specific needs, consideration may be given to intersection sight distance and operational gap acceptance measurement adjustments.

[2]When these values are not attainable, refer to the deviation process as described in the TxDOT *Roadway Design Manual,* Chapter 3, Section 1 or Chapter 2, Section 2.

The above references to land-locking do not apply to circumstances where an existing larger tract of land is subsequently (after the effective date of this manual) further subdivided (and the subdivided lots sold to separate owners) and the original tract of land either already has an existing permitted access connection point, or would qualify for such an access connection point based upon the spacing requirements of this manual. Potential land-locking caused by subdivision and resale is the result of such subdivision process and will not alone justify variances or deviations in the spacing requirements contained in this manual. Therefore, as part of the subdividing process, the party proposing the subdivision (and the municipality approving such subdivisions) should require and provide some type of internal access easements to the existing access connection points (or to such access connection point locations that qualify for future permits based on this manual's spacing requirements).

It should be noted that for areas with conventional diamond ramp patterns the most critical areas for operations are between the exit ramp and the arterial street and between the arterial street and the entrance ramp. In X-ramp configurations, the most critical areas are between the exit ramp and the subsequent entrance ramp. While Table 3-1 gives minimum connection spacing criteria, the critical areas with respect to the ramp pattern may need greater spacing requirements for operational, safety, and weaving efficiencies.

The distance between access connections is measured along the edge of the traveled way from the closest edge of pavement of the first access connection to the closest edge of pavement of the second access connection. Additionally, the access connection spacing in the proximity of frontage road U-turn lanes will be measured from the inside edge of the U-turn lane to the closest edge of the first access connection (Refer to Figure 3-2).

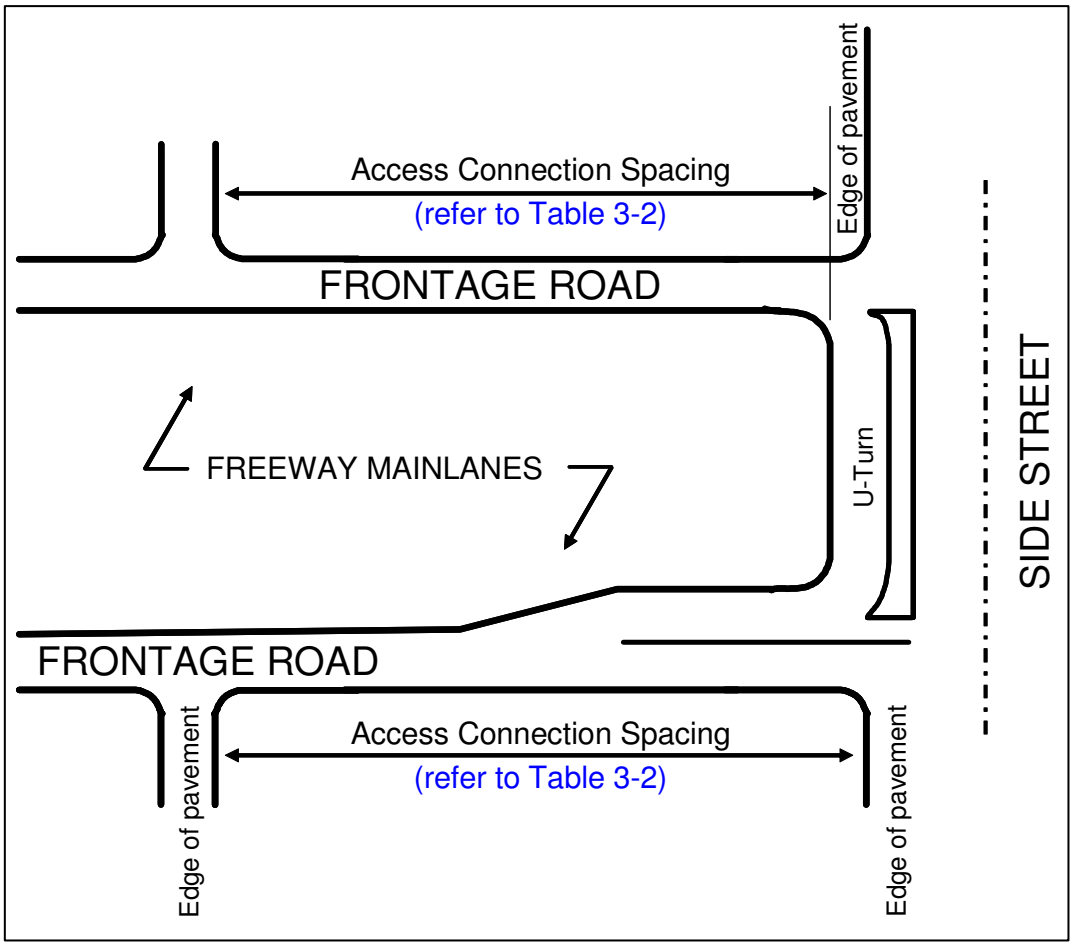


Figure 3-2. Frontage Road U-Turn Spacing Diagram.

3.5 OTHER STATE SYSTEM HIGHWAYS

Overview

This section provides a general description of this category and discusses specific spacing requirements. This classification applies to all state highway system routes that are not new highways on new alignments, freeway mainlanes, or frontage roads.

Connection Spacing Criteria

Table 3-2 provides minimum connection spacing criteria for other state system highways. However, a lesser connection spacing than set forth in this document may be allowed without deviation in the following situations:

- to keep from land-locking a property where such land-locking is solely the result of action by TxDOT (for example, design and construction modifications which physically prevent a driveway installation due to grade changes, retaining walls, or barrier installations) where TxDOT does not control the access; or

- replacement or re-establishment of reasonable access to the state highway system under highway reconstruction/rehabilitation projects.

Table 3-2. Other State Highways Minimum Connection Spacing.[1,2,3]	
Posted Speed (mph)	**Distance (ft)**
≤ 30	200
35	250
40	305
45	360
≥50	425

[1]Distances are for passenger cars on level grade. These distances may be adjusted for downgrades and/or significant truck traffic. Where present or projected traffic operations indicate specific needs, consideration may be given to intersection sight distance and operational gap acceptance measurement adjustments.

[2]When these values are not attainable, refer to the deviation process as described in Chapter 3, Section 1 or Chapter 2, Section 2.

[3]Access spacing values shown in this table do not apply to rural highways outside of metropolitan planning organization boundaries where there is little, if any, potential for development with current ADT levels below 2000. Access connection spacing below the values shown in this table may be approved based on safety and operational considerations as determined by TxDOT.

The above references to land-locking do not apply to circumstances where an existing larger tract of land is subsequently (after the effective date of this manual) further subdivided (and the subdivided lots sold to separate owners) and the original tract of land either already has an existing permitted access connection point, or would qualify for such an access connection point based upon the spacing requirements of this manual. Potential land-locking caused by subdivision and resale is the result of such subdivision process and will not alone justify variances or deviations in the spacing requirements contained in this manual. Therefore, as part of the subdividing process, the party proposing the subdivision (and the municipality approving such subdivisions) should require and provide some type of internal access easements to the existing access connection points (or to such access connection point locations that qualify for future permits based on this manual's spacing requirements).

Table 3-2 does not apply to rural highways outside of metropolitan planning organization boundaries where there is little, if any, potential for development with current ADT volumes below 2000. For those highways, access location and design will be evaluated based on safety and traffic operation considerations. Such considerations may include traffic volumes, posted speed, turning volumes, presence or absence of shoulders, and roadway geometrics.

Corner Clearance

Corner clearance refers to the separation of access connections from roadway intersections. Table 3-2 provides minimum corner clearance criteria.

Where adequate access connection spacing cannot be achieved, the permitting authority may allow for a lesser spacing when shared access is established with an abutting property. Where no other alternatives exist, construction of an access connection may be allowed along the property

line farthest from the intersection. To provide reasonable access under these conditions but also provide the safest operation, consideration should be given to designing the driveway connection to allow only the right-in turning movement or only the right-in/right-out turning movements if feasible.

3.6 AUXILIARY LANES

Overview

This section describes the basic use and functional criteria associated with auxiliary lanes. Auxiliary lanes consist of left-turn and right-turn movements, deceleration, acceleration, and their associated transitions and storage requirements. Left-turn movements may pose challenges at driveways and street intersections. They may increase conflicts, delays, and crashes and often complicate traffic signal timing. These problems are especially acute at major highway intersections where heavy left-turn movements take place, but also occur where left-turn movements enter or leave driveways serving adjacent land development. As with left-turn movements, right-turn movements pose problems at both driveways and street intersections. Right-turn movements increase conflicts, delays, and crashes, particularly where a speed differential of 10 mph or more exists between the speed of through traffic and the vehicles that are turning right.

Functional Criteria

Table 3-3 presents thresholds for auxiliary lanes. These thresholds represent examples of where left turn and right turn lanes should be considered. Refer to the TxDOT *Roadway Design Manual*, Chapter 3, for proper acceleration and deceleration lengths.

3.7 APPLICATION OF ACCESS CRITERIA

Overview

This section discusses the application of access connection criteria on the state highway system. The criteria are intended to provide reasonable access, while ensuring the safe and efficient operations of each roadway type.

Application of the Criteria

The access connection distances in the following sections are intended for application to state highways where municipalities have not been granted location permitting authority (as described in Chapter 3, Section 1). The access connection distances in the following sections are intended for passenger cars on a level grade. These distances may be increased for downgrades, truck traffic, or where otherwise indicated for the specific circumstances of the site and the roadway. In other cases, shorter distances may be appropriate to provide reasonable access, and such decisions should be based on safety and operational factors supported by an engineering study.

The distance between access connections is measured along the edge of the traveled way from the closest edge of pavement of the first access connection to the closest edge of pavement of the second access connection.

Table 3-3. Auxiliary Lane Thresholds.

Median Type	Left Turn to or from Property		Right Turn to or from Property[5]	
	Acceleration	Deceleration	Acceleration	Deceleration
Non-Traversable (Raised median)	(2)	All	Right turn egress > 200vph[4]	• >45 mph where right-turn volume is >50 vph[3] • ≤45 where right-turn volume is >60 vph[3]
Traversable (Undivided Road)	(2)	(1)	Same as above	Same as above

[1]Refer to Table 3-11, TxDOT *Roadway Design Manual*, for alternative left-turn bay operational considerations.

[2]A left-turn acceleration lane may be required if it would provide a benefit to the safety and operation of the roadway. A left-turn acceleration lane is generally not required where the posted speed is 40 mph or less, or where the acceleration lane would interfere with the left-turn ingress movements to any other access connection.

[3]Additional right-turn considerations:

- Conditions for providing an exclusive right-turn lane when the right-turn traffic volume projections are less than indicated in Table 3-3:
  - High crash experience
  - Heavier than normal peak flow movements on the main roadway
  - Large volume of truck traffic
  - Highways where sight distance is limited
- Conditions for NOT requiring a right-turn lane where right-turn volumes are more than indicated in Table 3-3:
  - Dense or built-out corridor where space is limited
  - Where queues of stopped vehicles would block the access to the right-turn lane
  - Where sufficient length of property width is not available for the appropriate design

[4]The acceleration lane should not interfere with any downstream access connection.

- The distance from the end of the acceleration lane taper to the next unsignalized downstream access connection should be equal to or greater than the distances found in Table 3-2.
- Additionally, if the next access connection is signalized, the distance from the end of the acceleration lane taper to the back of the 90th percentile queue should be greater than or equal to the distances found in Table 3-2.

[5]Continuous right-turn lanes can provide mobility benefits both for through movements and for the turning vehicles.[1] Access connections within a continuous right-turn lane should meet the spacing requirements found in Table 3-2. However, when combined with crossing left in movements, a continuous right-turn lane can introduce additional operational conflicts.

4 IMPLEMENTATION OF ACCESS MANAGEMENT PROGRAM IN TEXAS

This chapter describes the administrative procedures for implementing the access management program in Texas. Most of this chapter is excerpted from Chapter 3 of the TxDOT *Access Management Manual* that provides these administrative procedures.

4.1 APPROVAL PROCESS FOR LOCAL GUIDELINES

Overview

Municipalities, upon request, may use their own access management guidelines to determine appropriate access connection locations. Local access management guidelines will then apply to all or part, as stated in the guidelines, of the state highway system within that municipal jurisdiction, except where the Department controls the access. The local access management guidelines or plans should be based on sound engineering practices and accepted access management principles. There are two approaches for municipalities to apply their local access management plans or guidelines to state highways within that municipal jurisdiction.

Application of Local Access Management Plans (TxDOT as Permitting Authority)

TxDOT will apply a local access management plan when the municipality provides in writing its local access management plan to the TxDOT district office with an indication of its desire that the plan be applied within its jurisdiction and an implementation date. TxDOT will implement any subsequent changes to the local access management plan when the municipality submits the changes to TxDOT with a proposed implementation date for the changes. The approval of the design and engineering of the access location will be handled by TxDOT. TxDOT will issue the access location permits.

Application of Local Access Management Plans (Municipality as Permitting Authority)

A municipality that desires to undertake the access permitting process on highways on the state highway system within their jurisdiction shall submit in writing its proposed permitting procedures and an implementation date to TxDOT. If TxDOT determines that the proposed procedures adequately address the engineering and design of access locations as described in this manual in Chapter 3, Section 1, Engineering Access Locations, TxDOT will transfer to the municipality the access permitting function within the municipality's jurisdiction. The municipality will then issue the access permits.

The municipality shall submit to the Department a copy of each approved access permit on the state highway system within 10 working days of its approval and prior to initiation of any access construction on the state highway system. The contractor installing the access connection should have a copy of the permit at the site.

A municipality may also choose to adopt the department's guidelines as their own and retain access connection location permit authority. Access location permit authority may be transferred to the municipality by letter from the TxDOT district engineer and then, at the next opportunity, incorporated into the municipal maintenance agreement between TxDOT and the participating authority. For example, if a city actively applies its subdivision regulations within its extraterritorial jurisdiction (ETJ), the municipal maintenance agreement may also extend the municipality's access permitting authority to the ETJ rather than the corporate limits.

Assumption of Permitting Function Optional

Municipalities are not required to take over the access permitting function for state highways within their jurisdictions.

Engineering Access Locations

Granting location permit authority to municipalities does not preclude the need to properly engineer access locations. Any impacts to drainage or hydraulics on highways on the state highway system resulting from access connections must be coordinated with TxDOT prior to any local access approval. Issuance of access permits must address driveway geometrics, utility location/relocation, compliance with the Americans with Disabilities Act (ADA) and Texas Accessibility Standards (TAS), environmental requirements, wetland considerations if appropriate, and all other applicable state and federal laws, rules, and regulations.

Deviation Process (Municipality as Permitting Authority)

Any deviation from the municipality's criteria shall be handled by the appropriate local appeals procedure (which shall be determined by the municipality). While the municipality will approve/disapprove individual deviations to the local access management plans or guidelines, the deviation should be coordinated with TxDOT prior to resolution of the deviation request to evaluate impacts to the state highway system.

Submission of Local Access Management Plans

Once the TxDOT district has transferred to the municipality the access permitting function within the municipal jurisdiction, a copy of the local access management plan and implementation date will be sent to the Design Division for record purposes. Also, when TxDOT will be the permitting authority and apply a local access management plan within a municipal jurisdiction, a copy of that local access management plan and implementation date will be sent to the Design Division.

Subsequent changes or updates to local access management plans and new implementation dates will be sent to the Design Division for record purposes.

The Design Division can be consulted on local access management plan development or implementation at the TxDOT district's request.

4.2 DISPUTE RESOLUTION

Dispute Resolution Process (TxDOT as Permitting Authority)

It is preferable that access requests to the state highway system be resolved at the district level. However, a dispute over a request for an access permit to the state highway system may be elevated through the Design Division to TxDOT administration for final resolution. Such elevation may be initiated either by the District, or by the permit applicant through the district office.

When an access connection request has been denied by the district, the appeal, if requested, must be submitted to the Design Division. The Design Division will coordinate the information needed for final resolution and make a recommendation for the administration to consider in determining a final resolution.

In the case where a municipality has access permitting authority, the permit requestor cannot appeal a denial of access to the Department as described above.

Data Requirements for Final Administrative Resolution (Design Division)

While the data will vary based on the individual request or location, information required for submission of an access request for final administrative resolution should include:

1. district, county, city, highway, and location;

2. dated chronology of correspondence, meetings, or discussion concerning the access request;

3. participants in the request process, including city, county, developers, consultants, legal counsel, etc.;

4. Status of municipal platting/zoning requests and any city council actions or resolutions;

5. highway layout showing the requested access site and the upstream/downstream roadway system and associated access (including roadway/driveway geometrics if applicable to resolution);

6. TIA as indicated in Chapter 3, Section 4 of the *TxDOT Access Management Manual*;

7. the requestor's proposed access solution;

8. the District's proposed access solution; and

9. district discussion/comments with respect to the access request.

TxDOT administration will determine final resolution of the access request and the district will issue the access permits based on the administration's final resolution. Once the administration has determined a final resolution of the access request, no additional appeal or dispute resolution will be granted.

4.3 CORRIDOR ACCESS MANAGEMENT PLANS

Overview

Any municipality or Metropolitan Planning Organization may, in cooperation with TxDOT, develop an access management plan for a specified state highway segment for the purposes of preserving or enhancing that highway's safe and efficient operation. Once adopted by the affected agencies, such plans will form the basis for all future access connection locations. Priority in developing corridor access management plans should be placed on those facilities with high-traffic volumes or those that provide important statewide or regional connectivity and mobility, such as hurricane evacuation routes, relief routes, and North America Free Trade Agreement (NAFTA) corridors.

Functional Criteria

The corridor access management plan will provide comprehensive area-wide traffic and mobility solutions, while providing reasonable access to abutting property. Each plan should include a combination of policy, design, and improvement actions aimed at achieving access management objectives. These plans should emphasize the host of access management techniques: shared access, cross access, internal street circulation, properly space collector system, proper driveway design, and median design techniques.

The corridor access management plan may include the following elements:

- existing and future access locations,
- all major access-related roadway design elements,
- lots or parcels currently having frontage on the highway segment,
- pedestrian and bicycle amenities and associated safety implication,
- transit facility considerations, and
- all supporting technical materials, if applicable.

TxDOT and any local government within the plan area should be parties to the plan, which will then be adopted by agreement among the agencies. After an access management plan is in effect, all action taken in regard to access will be in conformance with the plan and any modifications to the plan must be approved by the affected local governments and TxDOT.

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