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1. Introduction

The intent of this report is to provide the Waco Metropolitan Planning Organization (MPO) with a set of guidelines that can serve as a benchmark for proper access requirements. One of the primary goals of any access plan is to provide and manage access to land development, while at the same time preserving the flow of traffic in terms of safety, capacity, and speed. These guidelines will generally apply to future thoroughfares; however, retrofitting raised medians and driveway control may occur during a major widening or redevelopment. The implementation of these guidelines will be the responsibility of the Waco MPO and their partnering cities.

There are two ways to assign access requirements to roadways: by facility type or by access classification. Given the choice, the Waco MPO decided to assign access guidelines based on access classifications. Section four (4) outlines the results of our recommendations. The classifications contained in this report were developed using the existing and future roadway functional classifications combined with land use intensity identified within the corridors. Each access class has various guidelines associated with it. The guidelines outlined below are intended to improve public safety of vehicular and pedestrian travel, preserve roadway level of service, and enhance community character.

The network of major thoroughfares, highways, and arterials within the Waco MPO service area serves to move people and goods in an efficient manner. In addition, the network provides access to businesses and homes, and has functioned as the focal point for commercial and residential development. Access to major and minor thoroughfares needs to be designed properly to ensure that roadways will operate the way they were intended. These guidelines were formulated to properly balance reasonable access to private property with efficient and safe travel.

Good access management assists in protecting the substantial public investment in transportation by preserving the roadway level of service, thus reducing the need for expensive improvements. Furthermore, these guidelines serve to reduce traffic accidents, personal injury, and property damage, as well as promote the orderly layout and sustainability of the community.

The following report outlines What is Access Management, Applicability, Definitions, Access Classes, Guidelines, Land Use Measures, and finally Other Considerations.

1.1. What is Access Management?

Access management is a comprehensive approach to the management and regulation of driveways, medians, median openings, traffic signals, and freeway interchanges. In addition, access management can have important impacts and benefits to the community, including

- Delaying or preventing costly highway improvements
- Improving safety conditions along highways (reduced accident rates)
- Reducing delay and congestion
- Promoting desirable land use patterns
- Providing property owners with safe access to roadways
- Reducing air pollution
- Making pedestrian and bicycle travel safer

Access management creates a seamless connection between land use and transportation; therefore, it requires intergovernmental cooperation relating to land development and transportation decisions.

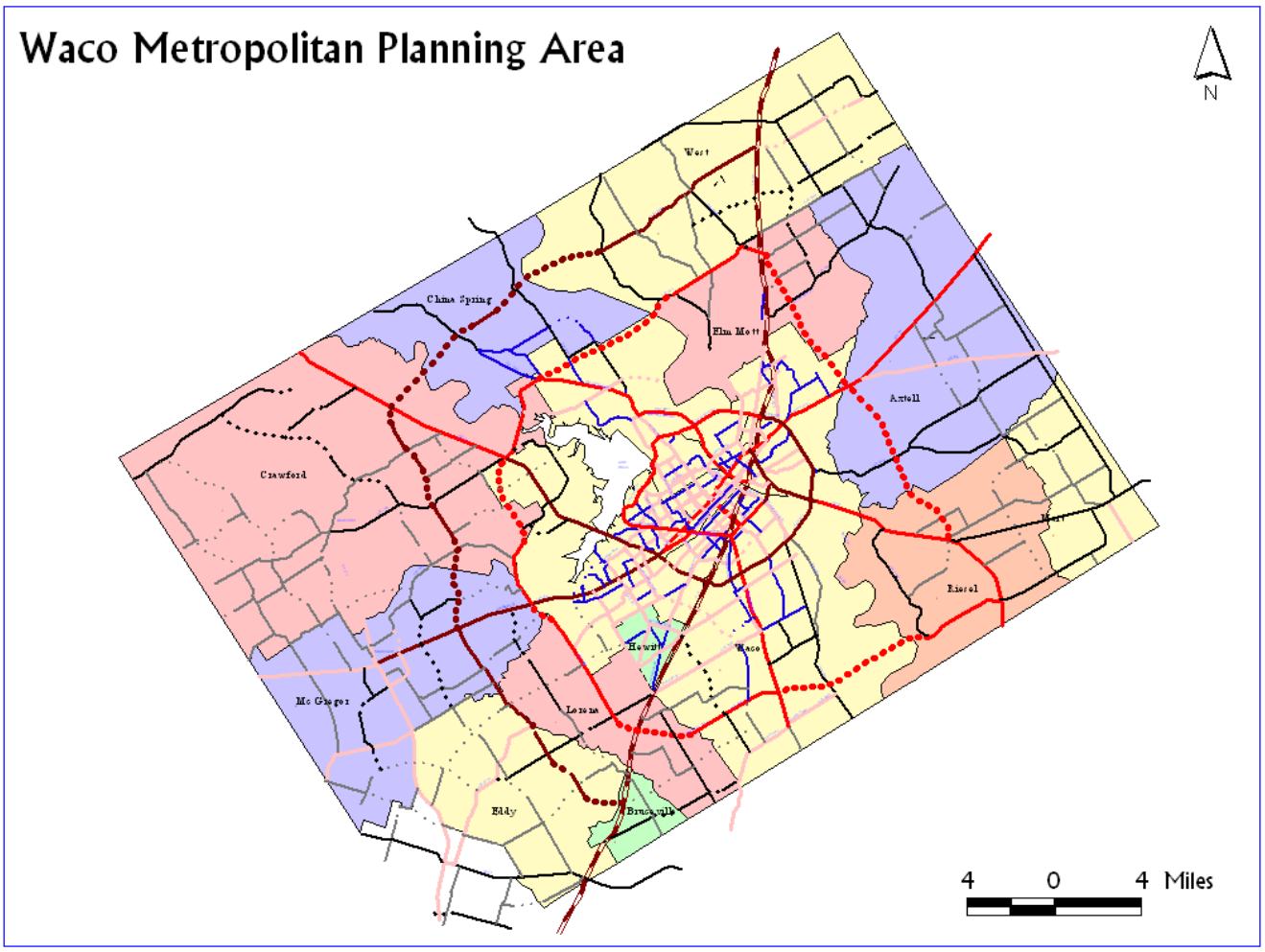
1.2 Access Management and Business

Access management procedures have the ability to provide several positive contributions to the local business community. For instance, by practicing good access management the capacity of the roadway is increased, thus allowing for superior circulation and access to development. Improved aesthetics and safety are an additional benefit of good access management. Finally, studies have been conducted of businesses within areas where access management procedures have been implemented and only on rare occasions did this result in a negative economic impact.

2. Applicability

These guidelines shall apply to thoroughfares located within the Waco Metropolitan Planning Organization (MPO). The cities of Bellmead, Beverly Hills, Hewitt, Lacy-Lakeview, Lorena, McGregor, Robinson, Waco, and Woodway, Texas are all part of the Waco MPO.

As stated in the introduction, these guidelines will generally apply to new or improved thoroughfares. When final design of a thoroughfare occurs, spacing of medians and driveways will require looking at each site specifically to identify the locations of actual median openings. The spacings identified in this report should serve as a guide only, not as a rigid requirement.



3. Definitions

Access - A way or means of approach to provide vehicular or pedestrian entrance or exit to a property.

Access Classification - A ranking system for roadways which is used to determine the appropriate degree of access management. Factors considered include median type, travel speeds, subdivision abutting properties, the appropriate local government's adopted plan for the roadway, and the existing level of access control.

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

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

Connection - A driveway, street, turnout, or other means of providing for the right of access to or from controlled access facilities.

Connection Spacing - The distance between connections, measured from the closest edge of pavement of the first connection to the closest edge of pavement of the second connection along the edge of the traveled way.

Corner Clearance - The distance from an intersection of a public or private road to the nearest access connection, measured from the closest edge of pavement of the connection along the traveled way.

Controlled Access Facility - A transportation facility in which the governmental entity with jurisdiction over the facility regulates access. The permitting authority also determines at which points and in which manner owners or occupants of the abutting lands and other persons have access rights.

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

Directional Median Opening - An opening in a restrictive median, which provides for specific movements and physically restricts other movements. Directional median openings for two opposing left or "U-turn" movements along a road segment are considered one directional median opening.

Frontage Road - A public or private drive which generally parallels a public street between the right-of-way and the front building setback line. The frontage road provides access to private properties while separating them from the arterial street.

Full Median Opening - An opening in a restrictive median that allows all turning movements from the roadway and the intersecting road or access connection.

Functional Classification - A system used to group public roadways into classes according to their purpose in moving vehicles and providing access.

GLA - Gross leaseable area

Joint Access (or Shared Access) - A driveway connecting two or more contiguous sites to the public street system.

Lot - A parcel, tract, or area of land whose boundaries have been established by some legal instrument. This land is recognized as a separate legal entity for purposes of transfer of title, has frontage upon a public or private street, and complies with the dimensional requirements of these guidelines.

Lot, Corner - Any lot having at least two contiguous sides abutting upon one or more streets, provided that the interior angle at the intersection of two such sides is less than one hundred thirty-five (135) degrees.

Lot Depth - The average distance measured from the front lot line to the rear lot line.

Lot, Through (also Double Frontage Lot) - A lot that fronts upon two parallel streets or two streets that do not intersect at the boundaries of the lot.

Lot Frontage - That portion of a lot extending along a street right-of-way line.

Lot Width - The horizontal distance between lot lines measured parallel to the front lot line at the minimum required front setback line.

Non-restrictive Median - A painted center line or median, including continuous center turn lanes and undivided roads, that does not provide a physical barrier between traffic traveling in opposite directions or turning left.

Parcel - A division of land comprised of one or more lots in contiguous ownership.

Private Road - Any road or thoroughfare, privately owned and maintained, that provides for vehicular travel the principal means of access to an abutting property.

Public Road - A road which is under the jurisdiction of a public body and provides the principal means of access to an abutting property.

Reasonable Access - The minimum number of access connections, direct or indirect, necessary to provide safe access to and from a thoroughfare, as consistent with the purpose and intent of these guidelines and any applicable plans and policies of the corresponding city within the Waco MPO and corresponding county.

Restrictive Median - A physical barrier in the roadway, such as a concrete barrier or landscaped island that separates traffic traveling in opposite directions.

Service Road - A public or private street or road, auxiliary to and normally located parallel to a controlled access facility, that maintains local road continuity and provides access to parcels adjacent to the controlled access facility.

Shared Access - See Joint Access.

Temporary Access - Provision of direct access to the controlled-access facility, until that time when adjacent properties develop in accordance with a joint access agreement or frontage road plan.

TxDOT - Texas Department of Transportation

4. Access Management Classification System

Access classification is determined by combining roadway classifications with future or current land development intensity. There are five access management classifications tailored for Waco, with Access Class 1 being the most restrictive and Access Class 5 the least. The access classes are defined as follows:

4.1. Access Class 1 (Limited Access)

These limited-access highways do not provide direct property connections. Highways in this class provide for efficient and safe high-speed and high-volume traffic movements serving interstate, interregional, intercity, and to a lesser extent, intracity travel needs.

4.2. Access Class 2

These are highly controlled access facilities characterized by their ability to serve high-speed and high-volume traffic over long distances in a safe and efficient manner. Characteristics of this access class include a highly controlled, limited number of connections, median openings, and infrequent traffic signals. This class is distinguished by its use of existing or planned restrictive medians and is a rural, somewhat undeveloped corridor.

4.3. Access Class 3

These facilities are controlled access facilities where direct access to abutting land will be controlled to maximize the operation of the through traffic movement. This class will be used where existing land use and roadway sections are not completely built out to the maximum land use or roadway capacity, or where the probability of major land use change in the near future is high. This class is distinguished by its use of existing or planned restrictive medians.

4.4. Access Class 4

This class will be used where the existing land use and roadway sections have been built out to a larger extent than those roadway segments classified as Access Class 3. Also, the probability of significant land use change is not as high as those roadway segments classified in Access Class 3. This class is also distinguished by its use of existing or planned restrictive medians.

4.5. Access Class 5

Valley Mills

This class is for use in urban areas, where the existing land use and roadway sections have been built out to the maximum intensity feasible, and where significant widening of the roadway or changes to the land use are limited. This class is assigned only on those roadway segments where there is little need to provide for high-speed travel. This class of roadways can have either a restrictive or non-restrictive median barrier.

Assigning access classes to individual roadways within the Waco Metropolitan Planning area will be the responsibility of the MPO and should include coordination with local agencies and TxDOT. The following section outlines the Access Management Guidelines that should be applied to each access class.

5. Access Management Guidelines

One of the most influential access management tools at the MPO's disposal consists of median and driveway spacing, corner clearance distances and signal spacing. *Table 5* contains general spacing requirements that can serve as a guide for future corridor development. It is important to note that while these guidelines are comprehensive, spacing of medians and driveways should be resolved on an individual basis using accepted engineering and planning principles.

5.1. Median Spacing

There are basically three types of medians that can be used for access management: full opening, directional, and two-way left-turn lanes. The use of restrictive medians and regulating the spacing between median openings helps to decrease the number of conflicts and improve traffic operations. Restrictive medians prevent vehicles from crossing easily into traffic lanes of the opposite direction. Two-way left-turn lanes are **not** considered restrictive medians. *Figure 5.1* depicts various median types and the conflict points that exist within each scenario.

A directional median opening allows only specific turns, which translates into fewer potential conflicts, as shown in *Figure 5.1*. Therefore, directional medians' spacing guidelines are less stringent. The distance for *directional median* openings is measured from the closest median opening, either full or directional (see *Figure 5.1.1*). The distance between *full median* openings is measured from the center line of each of the full median openings (see *Figure 5.1.2*).

The rows shown in *Table 5* contain spacing guidelines for median openings, signal spacing, and connection spacing (driveways), while the columns represent the various access classes and their corresponding spacing guidelines. Where appropriate, the spacing guidelines are further broken down by median type and speed limit greater than, or less than or equal to forty-five (45) miles per hour.

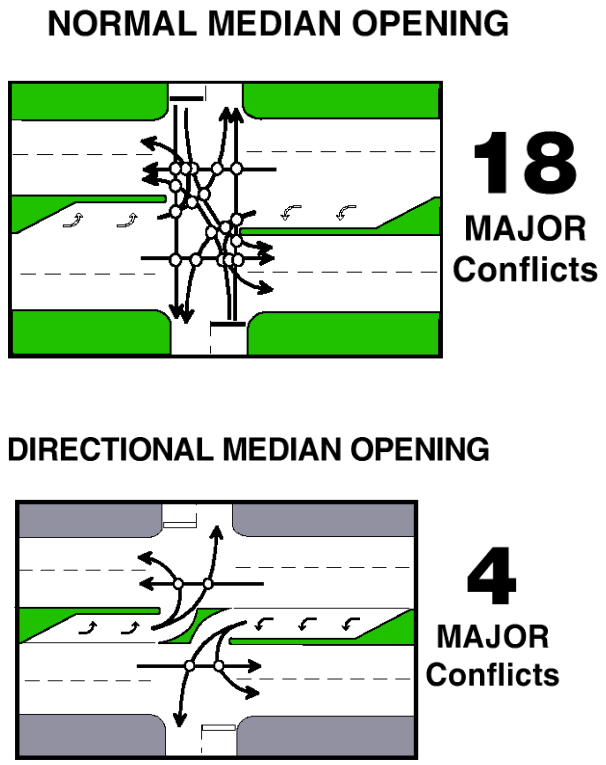


Figure 5.1 Median Conflict Points

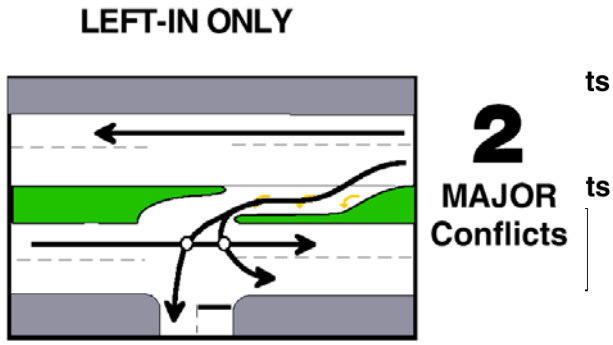


Figure 5.1.1

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Figure 5.1.2

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5.2. Signalized Intersection Spacing

Spacing between traffic signals is a strategy employed to increase the level of service (LOS) of both the roadway segment and the signal. Optimum signal spacing will provide for greater signal progression and higher arterial speeds. The distance between traffic signals is measured from the center point of the signalized intersection to the center point of the next signalized intersection (see *Figure 5.2*).

5.3. Driveway Spacing Guidelines

Driveway spacing guidelines are determined based on a variety of factors including roadway speed and volume. The distance between driveway connections is measured from the edge of pavement on one connection to the closest edge of the neighboring connection (see *Figure 5.3*). Driveway spacing guidelines limit the number of driveways on a roadway by mandating a minimum separation distance between driveways, (see *Table 5)*. These spacing requirements have the potential for reducing the probability of an incident as vehicles enter or exit the roadway, as well as encouraging the sharing of access when appropriate.

Table 5. ARTERIAL CLASSIFICATIONS AND GUIDELINES

	Median Type → ↓	Speed	Access Class 2 Restrictive	Access Class 3 Restrictive	Access Class 4 Restrictive	Access Class 5 Both
Minimum Median Opening Spacing (feet)	Directional		1320	1320	660	330
	Full	> 45 mph	2640	2640	2640	660
		≤ 45 mph			1320	
Minimum Signal Spacing (feet)		> 45 mph	2640	2640	2640	1320
		≤ 45 mph			1320	
Minimum Connection Spacing (feet)		> 45 mph	1320	660	440	125
		≤ 45 mph	660	440	245	

Figure 5.2

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Figure 5.3

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5.4. Frontage Roads

Frontage roads are generally characterized by one-way and two-way frontage. Both types of frontage roads have the same characteristics as a minor arterial, described in *Access Class 5* (see section 4.5). Spacing criteria illustrated in *Table 5* are applicable for frontage road design. Consideration must be given to driveways located within the proximity of exit or entrance ramp terminals. TxDOT's operations and procedures design manual must be used to locate and evaluate driveway locations and proximity as they relate to exit and entrance ramps. Frontage roads serve a multitude of purposes other than controlling or providing access. Urban frontage roads serve as an extension to the local grid street system, providing circulation and continuity for the roadway system. *Figure 5.4* demonstrates an excerpt from TxDOT's design manual regarding exit and entrance ramp terminal access controls. Physical dimensions for the design of driveways are also illustrated in the TxDOT's *Regulations for Access Driveways to State Highways*.

Figure 5.4

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5.5. Corner Clearance Guidelines

Corner clearance is measured similarly to connection spacing, from the closest edge of the driveway connection to the closest edge of the parallel road (see *Figure 5.5*). Corner clearance should ideally have the same requirements as that of the connection spacing requirements for the given access management class. Research has shown that traffic near signalized intersections can have an impact on safety and capacity. In instances where corner properties cannot meet or exceed the minimum connection spacing requirements as specified in *Table 5*, there is a special designation called "isolated corner properties." *Table 5.5* provides the guidelines for "restricted movement driveways" that occur near intersections. The guidelines vary, depending upon the median type of the abutting roadway and whether the vehicles are approaching or departing the intersection at the property frontage. Access Class 5 allows for less strict requirements for certain categories than the other access classes.

Table 5.5 CORNER CLEARANCE AT INTERSECTIONS WITH ISOLATED CORNER PROPERTIES

Median Type	Position	Allowed Access	Minimum Corner Clearance (feet)	
				Class 5
Restrictive	Approaching Intersection	Right In Only	75	
	Approaching Intersection	Right In/Out	115	
	Departing Intersection	Right Out Only	100	
	Departing Intersection	Right In/Out	230	125
Non Restrictive (Without Restrictive)	Approaching Intersection	Right In Only	100	
	Approaching Intersection	Full Access	230	125
	Departing Intersection	Right Out Only	100	
	Departing Intersection	Full Access	230	125

Because the use of restrictive medians greatly reduces the number of conflict points, the corner clearance requirements for medians with restrictive barriers are not as stringent. These guidelines are also less stringent when a driver is approaching the intersection, since a driver is generally more aware of the conflicts and the conflict area into which he or she is entering. When a driver is departing an intersection, he or she is typically positioning him or herself for the through movement and higher speed, and thus is not anticipating conflicts. *Figures 5.5.1* and *5.5.2*, respectively, illustrate isolated properties with and without restrictive median openings.

The connection should always be placed as far away as possible from the intersection. In addition, connections should not be put in exclusive right-turn lanes, and those near signalized intersections should have their movements restricted as much as possible.

Figure 5.5

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Figure 5.5.1

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Figure 5.5.2

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6. Interim Guidelines

As it requires time to identify and classify roads into the access management system, interim guidelines have been used in many communities, based principally on posted speed. These interim guidelines can be seen in *Table 6* below. A "special case" classification is also included in the interim guidelines; this refers to roads that have a posted speed of less than or equal to thirty-five (35) MPH and a high level of driveway development. A high level of driveway development is defined by an average of at least fifty (50) driveway connections per mile on the side of the roadway for which the connection is requested, based on an actual count of connections one quarter (0.25) of a mile in each direction. The reasoning and definitions for the guidelines found in the proceeding sections are applicable to the interim guidelines.

Table 6. INTERIM GUIDELINES

		Posted Speed (mph)			
		≤ 35 Special Case	≤ 35	36-45	> 45
Minimum Median Opening Spacing	Directional (feet)	330	660	660	1320
	Full (feet)	660	1320	1320	2640
Minimum Signal Spacing	(feet)	1320	1320	1320	1320
Minimum Connection Spacing	(feet)	125	245	440	660

7. Land-Use Controls

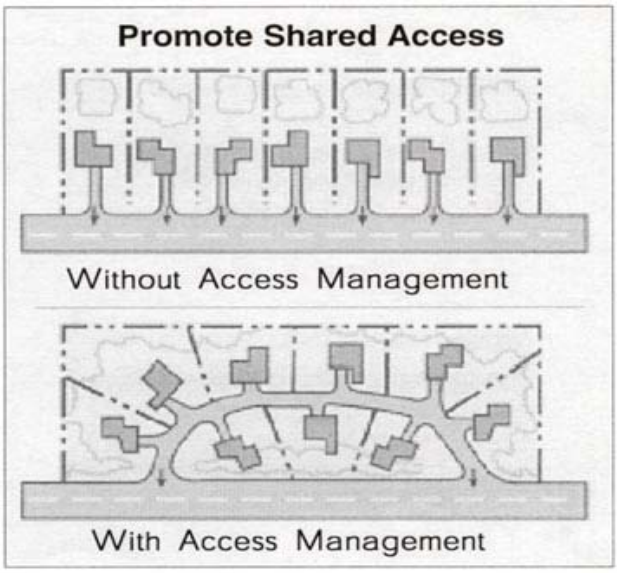
Coupled with good access-control guidelines for median and driveway spacing, land-use controls can also be an excellent tool to encourage development that will maximize access management principles. Several simple access tools that can be implemented into local comprehensive plans as a way to improve access are listed below.

7.1. Lot Width-to-Depth Ratios

Long and narrow or irregularly-shaped lots can lead to circulation and access problems. In order to prevent the creation of irregularly-shaped parcels and to provide for proper site design, the depth of any lot or parcel should not exceed three (3) times its width (or four (4) times its width in rural areas). For example, in a rural area a parcel with 100 feet of frontage may not be deeper than 400 feet.

7.2. Shared Driveway Access

Developments with frontage on roadways shall be designed to minimize access points to that roadways. Also, developments served by a single access point should be avoided. Often, single-access developments may inhibit emergency access and increase traffic congestion during the peak period. Where possible, shared access should be encouraged to minimize adverse impacts to traffic and safety.



7.3. Connectivity

The proposed street system within a development shall coordinate with existing and proposed streets outside the development. Providing access to and from an adjacent development will encourage greater connectivity, mitigate adverse circulation problems, and provide greater access to and from developments.

8. Other Considerations

8.1. Landscaping Considerations

Martin Luther King Jr. Blvd.
Lake Brazos Dr.

Well-designed and access managed roadways can have an aesthetically pleasing benefit for the community. As a result of access management, there are fewer numbers of median openings and driveway connections; thus, a greater area is usually available to be landscaped. Landscape architects are afforded greater opportunity in designing efficient and practical landscaping plans. Scenic and environmental features can be protected and the appearance of asphalt reduced.

Attention must be paid to any TxDOT or American Association of State Highway Transportation Officials (AASHTO) requirements regarding sight distance and planting area and spacing in medians. Criteria to consider include sight distance, stopping sight distance, tree caliper, tree spacing, area of vehicle seen, and design speed.

8.2. Pedestrians and Bicycles

Providing safe and efficient travel for pedestrians and bicyclists is important. Access management encourages the use of restrictive medians, which provide a refuge for pedestrians crossing the roadway. Much effort should be put forth in order to separate pedestrians and bicyclists from the motoring public while preserving each as an efficient travel mode.

Good spacing and definition of driveways improves bicycle and pedestrian safety, by reducing the potential for conflicts with turning vehicles. In addition, driveways tend to overtake the pedestrians' and bicyclists' areas. Access management reduces the number of driveways, thereby preserving pedestrian and bicyclist space.

8.3. Driveway Design

Vehicles will be unable to quickly and comfortably maneuver off the roadway if the driveways are too narrow or have an inadequate turning radius. On the other hand, if the driveway width or turning radius is too large, then rapid maneuvers

onto the site pose safety hazards for vehicles, pedestrians, and bicycles. In addition, the storage length of a driveway must be long enough so as not to make vehicles wait in the roadway's through lanes to enter the site. Also, driveway grades shall conform to the regulations of TxDOT standards. *Table 8.3* illustrates standard driveway design per the *Regulations for Access Driveways to State Highways*, TxDOT standards.

The length of driveways, or rather throat length, shall be designed in accordance with the anticipated traffic volumes entering and exiting the development. Extensive research has been done to address general throat length requirements. It should be noted that driveway design and throat length are site-specific applications; therefore, traffic volumes and development intensity should be considered upon approval. Also, these measures are not intended for minor driveway design.

Table 8.3 Driveway Throat Lengths

Shopping Centers	> 200,000 GLA	200’
Smaller Developments	< 200,000 GLA	75’-95’
Unsignalized Driveways		40’-60’

8.4 Turn Bays

Turn bays are important in access management because they have the ability to move vehicles out of the through lanes and into safe dedicated turn bays. It is always necessary for turn bays to posses the appropriate queue lengths to accommodate the traffic without backing up into the through lanes. Queue lengths should be resolved on an individual basis for each bay, based upon analysis using sound references such as the *Highway Capacity Manual*. In addition, turn bays must also posses the appropriate deceleration and taper lengths. Standards for these lengths are regulated by TxDOT and or local ordinances. *Table 8.4* below is an excerpt from TxDOT's *Operations and Procedures Manual.*

LENGTHS OF LEFT TURN LANES - URBAN STREETS * * *

Design Speed (mph)	Taper Length (feet) minimum	Storage Length (feet) * * * *			
		Signalized		Non - Signalized	
		min.	des.	min.	des.
30	80	*See	170	50	170
40	125	note	245	75	245
50	180	below	320	100	320

* Based on design hour volume, Storage Length = 0.63 to 0.83 multiplied by left turn peak hour volume.

* * Total length of left turn lane = Storage Length + Taper Length

* * * Applicable to speed change lanes to accommodate left or U-turns at median openings or intersections; applies also to speed change lanes for right turns where desired.

* * * * Block spacing may dictate lesser values

Figure 8.4

9. Closing

Access management can prove to be an invaluable tool for improving the overall safety and efficiency of the roadway network and community within the Waco MPO service area. The access classification system, guidelines, land-use controls, and other guidelines laid out in this report should allow the Waco MPO to begin implementing the proper access requirements. The combination of these access controls can provide a low cost method for Waco to gain additional roadway capacity and improve public safety, while at the same time improving air quality and aesthetics. Serving only as a guide, these guidelines should be implemented on a case by case basis. In addition, sound engineering and planning judgement should always accompany any specific access requirement in the final engineering phases of a project.

References

"Access Management Guidelines for Activity Centers," National Cooperative Highway Research Program, Report 348, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., 1992.

Access Management/Systems Management Interactive Library, ver. 1.0.: CD-ROM Software, October 1998.

Ewing, Reid. "Pedestrian and Transit Friendly Design," Joint Center for Environmental and Urban Problems, 1996.

"Median Handbook," State of Florida Department of Transportation, 1997.

"Model Land Development Regulations that Support Access Management," Center for Urban Transportation Research, 1994.

"Operations and Procedures Manual," Highway Design Division, State of Texas, State Department of Highways and Public Transportation.

"Regulations for Access Driveways to State Highways," Texas Department of Transportation, adopted 1953, revised 1996.

"Rules of the Department of Transportation, Chapter 14-97, State Highway System Access Management Classification System and Standards", State of Florida Department of Transportation, 1990.

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

"Use of the Access Management Standards," State of Florida Department of Transportation.

Williams, K., Marshall, M. "Managing Corridor Development," Center for Urban Transportation Research, 1996.