Access Control

Appendix D

US 54 /400 Study Area

Proposed Access Management Code

City of Andover, KS

Table of Contents

Section 1: Purpose

The Transportation Research Board Access Management Manual 2003 defines access management as "the systematic control of the location, spacing, design, and operations of driveways, median opening, interchanges, and street connections to a roadway." Along the US 54/US-400 Corridor, access management techniques are recommended to plan for appropriate access located along future roadways and undeveloped areas. When properly executed, good access management techniques help preserve transportation systems by reducing the number of access points in developed or undeveloped areas while still providing "reasonable access". Common access related issues which could degrade the street system are:

- Driveways or side streets in close proximity to major intersections
- Driveways or side streets spaced too close together
- Lack of left-turn lanes to store turning vehicles
- Deceleration of turning traffic in through lanes
- Traffic signals too close together

Why Access Management Is Important

Access management balances traffic safety and efficiency with reasonable property access. Access that may seem reasonable given today's roadway configuration and traffic volumes may be perceived differently in the future. The roadway system should function in the present and the future. Arterial streets are the key to mobility within the city and connection to local properties should be limited on arterial streets. Direct local property access is intended for collector and local streets. The ultimate responsibility for implementing access management concepts is dependent on multiple disciplines including traffic engineering, land use planning, and transportation planning, among others. Access management should be understood and accepted by transportation professionals, but there should also be a level of understanding and acceptance by the public and local elected officials.

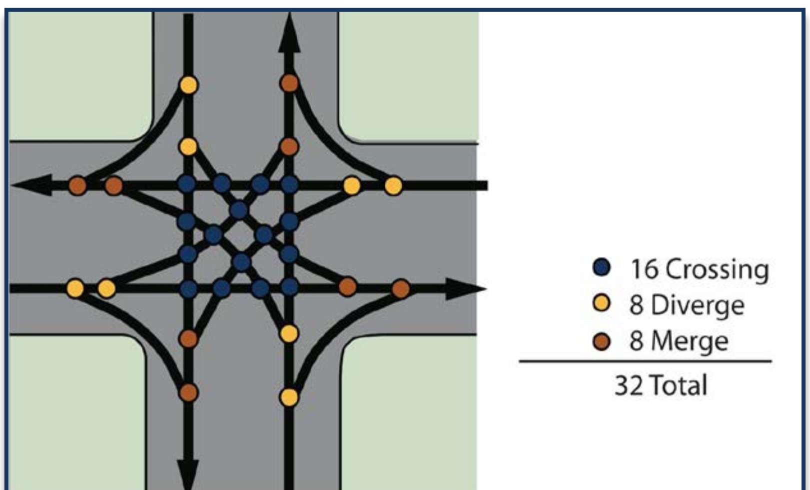

Figure 1: Vehicular Conflict Points in a Typical Four Leg Intersection (Without Access Management)

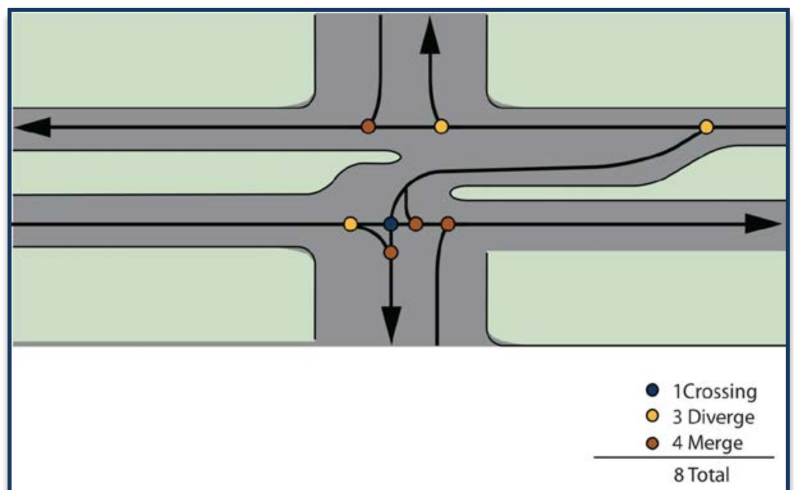

Figure 2: Vehicular Conflict Points in a Directional Median Opening (Managed Access)

The benefits of access management are imparted on motorists, pedestrians, businesses, and the government among others. Motorists benefit from fewer decision points and traffic conflicts (Figures 1 and 2). Pedestrians benefit by a reduced number of vehicle paths to cross due to fewer driveways. Businesses benefit from a more efficient road system which expands their market area. Government benefits from being able to deliver a safe and efficient transportation system at a lower cost.

<u>Section 2: Applicability</u>

This code applies to all roadways and roadway right-of-ways (public and private) within the study area as designated in the City of Andover US 54/400 Corridor Study August 2011 as well as to all properties adjacent to these roadways. This code is in addition to other state or local standards and requirements that may be in force on these roadways (such as the Access Management Policy of the Kansas Department of Transportation (KDOT) for US 54/400). Refer to Section 4 of this document when there are conflicts between this code and other documents. The general access management policy of the City of Andover will apply to all areas outside of the designated study area. Once the City of Andover has updated the Comprehensive Plan, it is recommended that this study area be designated as an overlay district for which this code specifically applies.

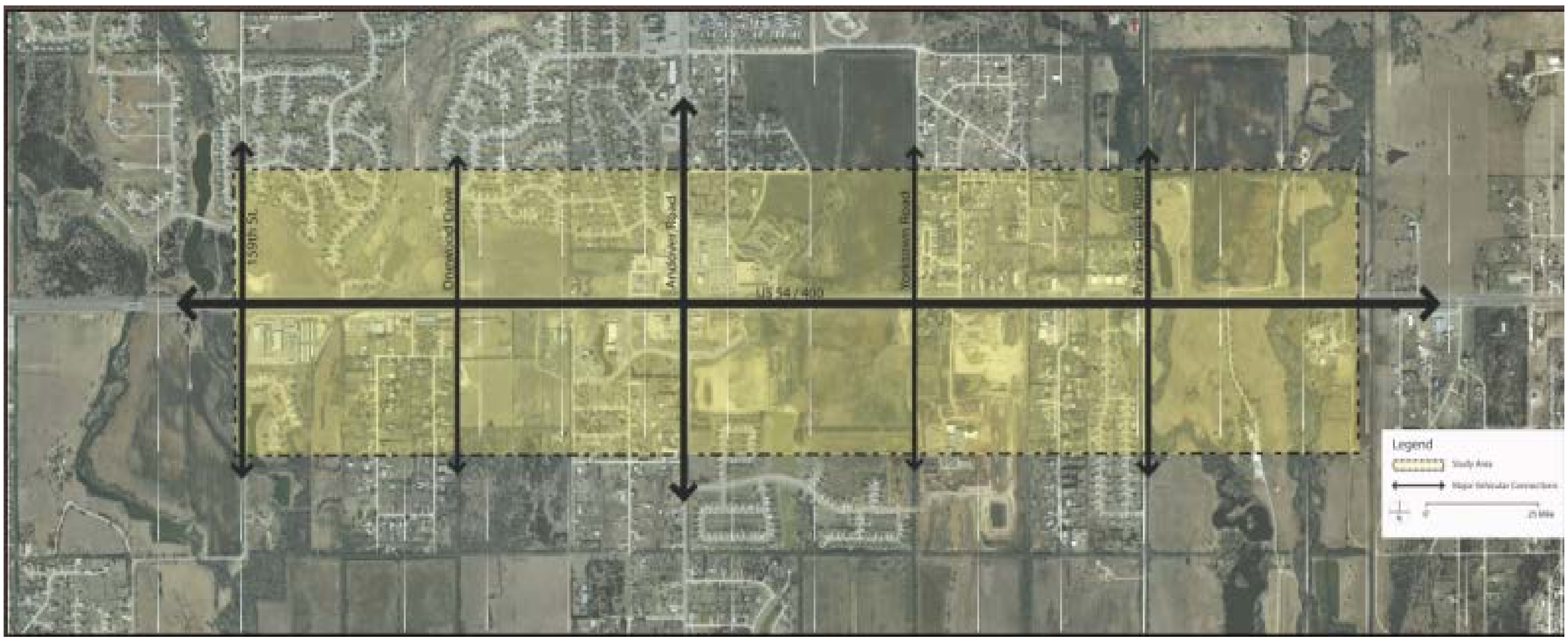

Figure 3: US 54/400 Study Area

Section 3: Conformance with Plans, Regulations, and Statutes

This code is adopted to implement the plans and policies as set forth in the City of Andover US 54/400 Corridor Study August 2011. In addition, this Code is intended to conform to, support, and supplement policies and plans of KDOT and the Wichita Area Metropolitan Planning Organization (WAMPO).

Section 4: Conflicts and Revisions

While efforts have been made to make sure that this Access Management Code does not conflict with the Andover Municipal Code, Subdivision Regulations, Zoning Ordinance, Technical Specifications for Public Improvements, and other City of Andover planning and design regulations or documents, there may be occasions where discrepancies between these documents arise. Upon such an occasion, the City of Andover shall determine the more restrictive provision and it shall apply. This decision can be appealed to the City Planning Commission. If there are conflicts between this code and the requirements or standards of another agency, city staff will coordinate with staff from the other agency to determine which standards or requirements control.

Section 5: Functional Classification for Access Management

Many cities, including Andover, use a functional classification system to separate roadways in their network from each other. Andover currently uses three primary classifications as described in the City's "Resolution 04-09, Resolution of Street Policy". These three classifications are residential, collector, and arterial streets which each contain further subcategories describing right-of-way width and construction materials among other variables. These three classifications align well with aspects of both the Federal Highway Administration (FHWA) categories and the Transportation Research Board's (TRB) Access Management Manual, 2003. This planning study incorporates additional roadway classifications within the City of Andover that should be added to the list. The additional roadway classifications are: Freeways, One-way frontage roads on a freeway system, and Backage or reverse access roads.
At a high level, the differences between interstate, arterial, collector and residential roadways represent a trade-off between providing mobility and providing access (Figure 4).

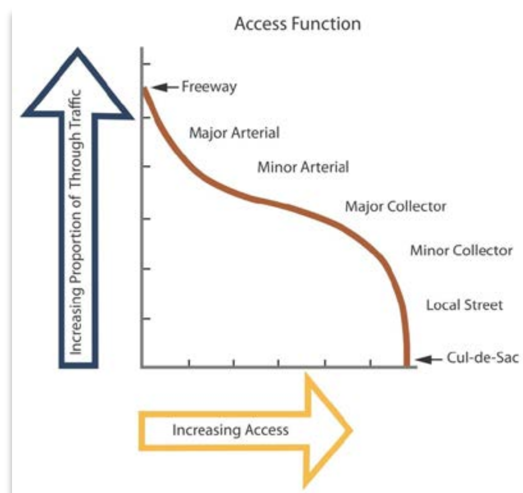

Figure 4: Conceptual Roadway Functional Classifications (Mobility vs. Access)
Source: 2003 TRB Access Management Manual

Street Types
The roadway alternatives for the US 54/400 corridor are made up of six street typologies: freeway, frontage roads, backage roads or reverse access roads, six-lane arterial, five-lane arterial, and four-lane collector. The freeway, frontage roads, and backage roads would provide east/west travel. The arterials would provide north/south travel.

Freeway
A freeway is a divided highway with full access control except at grade separated interchanges. US 54/400 is the only designated freeway in the study area. It would have six, 12-foot travel lanes (three lanes in each direction) and each direction will have two, 12-foot shoulders on each side of the travel lanes. (See Figures 5 and 6)

Frontage Road
A frontage road is a partially limited access road running parallel to the freeway (See Figures 5 and 6). It feeds traffic to the freeway at appropriate points of access such as at arterials and interchanges. The alternatives look at the impact of having two-lane, one-way frontage roads on each side of US 54/400. Each lane is proposed to be 12-feet wide. Planting strips of various widths would be provided between US 54/400 and the frontage roads and between the frontage roads and pedestrian pathways. Access from the frontage roads will be limited to the north/south streets. Access to parcels adjacent to the frontage roads and US 54/400 will be accomplished through backage or reverse access roads.

Backage/Reverse Access Roads
Backage/reverse access roads are non-limited access roads providing full access to adjacent properties as well as accommodating general traffic circulation. The backage roads will have one travel lane in each direction with a shared center turn lane. They will also have a 10-foot parking lane on each side, a 6-foot tree zone, and 10-foot sidewalks. Backage roads will not only provide access to the parcels adjacent to US 54/400 and frontage road rights-of-way, but will create additional opportunities to travel east/west through the corridor – without having to travel on the frontage roads or US 54/400. The desired outcome is to create a pedestrian-friendly "main street" roughly parallel to US 54/400. (See Figure 7)

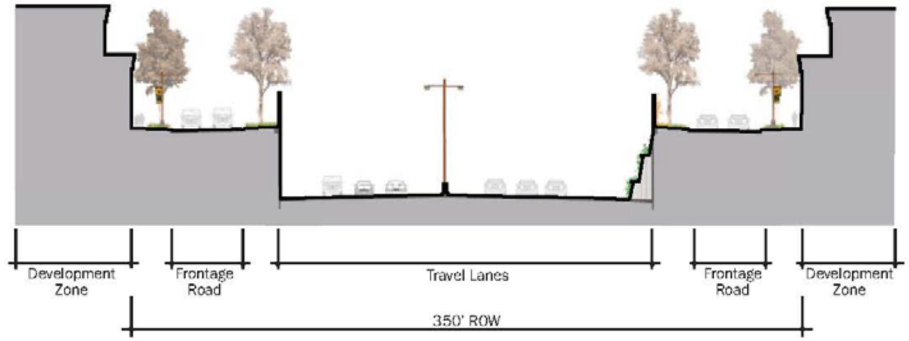

Figure 5: Depressed Freeway

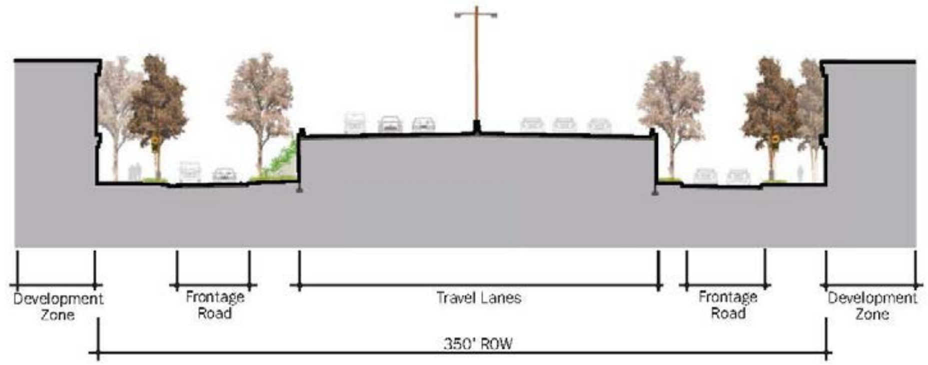

Figure 6: Elevated Freeway

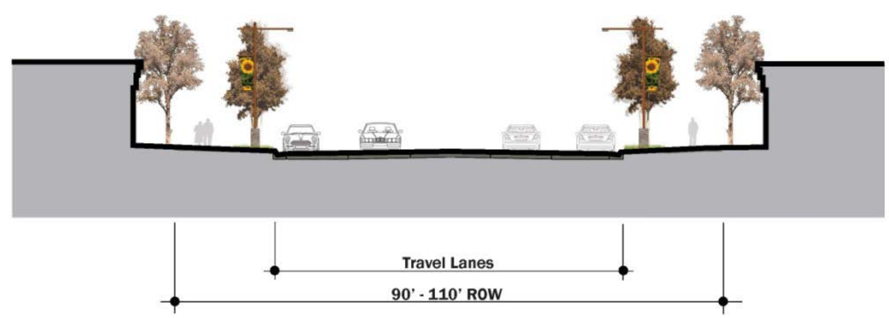

Figure 7: Backage Road

Arterials/Collectors
Arterials/collectors are high capacity urban roads delivering traffic from the backage and local roads to the freeway. Andover Road would become a six-lane arterial. It would have a 12-foot landscaped median; three, 11-foot travel lanes in each direction; a five-foot sidewalk on one side; a ten-foot sidewalk on the other; and tree zones on each side separating the roadway from the sidewalk. (See Figure 8)

159th Street and Prairie Creek Road are proposed to be five-lane arterials. They would have an 18-foot landscaped median; two, 11-foot travel lanes in each direction; ten-foot sidewalks on each side of the roadway; and tree zones on each side separating the roadway from the sidewalk. (See Figure 9)

Onewood Drive and Yorktown Road are proposed to be four-lane collectors. They would have two, 11-foot travel lanes in each direction; a five-foot sidewalk on one side; a ten-foot sidewalk on the other; and tree zones on each side separating the roadway from the sidewalk. (See Figure 10)

Local Roads
Local roads include all remaining roads in the system. Local roads provide the highest frequency of access, connections to the collectors, and primarily serve short trips.

Figure 11 shows the City of Andover's future roadway network with the designated roadway classifications within the study area. Please note that the classifications are based on the projected future function and operation of each roadway. US 54/400 is the only highway within the city limits and is classified according to the state classification system as "B" Route and is also designated on the National Highway System. US 54/400 is designated as a protected corridor in KDOT's District 5 Corridor Management Plan because of critical role in the east-west movement of people and goods in the region and because of pressures of development.

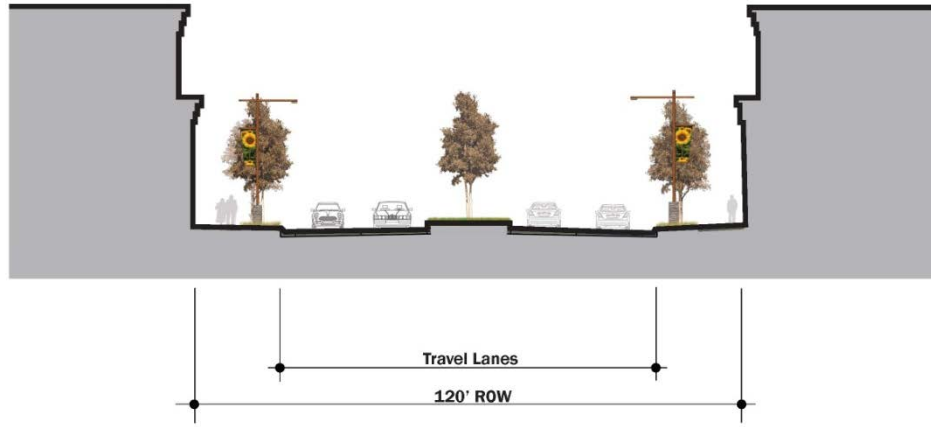

Figure 8: Six-lane Arterial

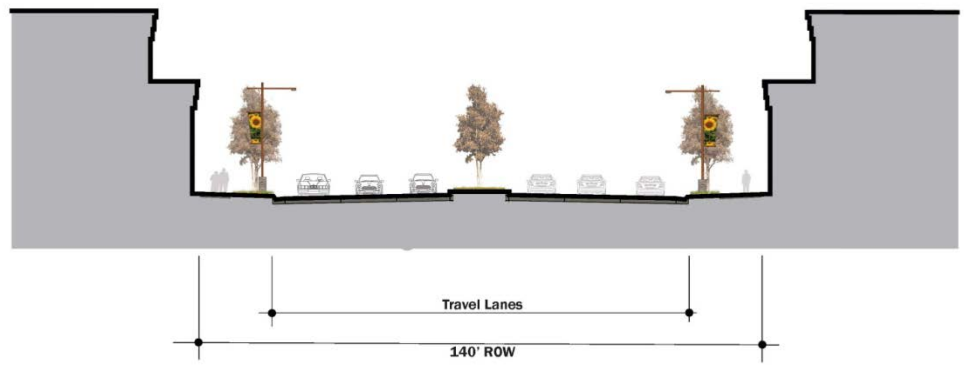

Figure 9: Five-lane Arterial

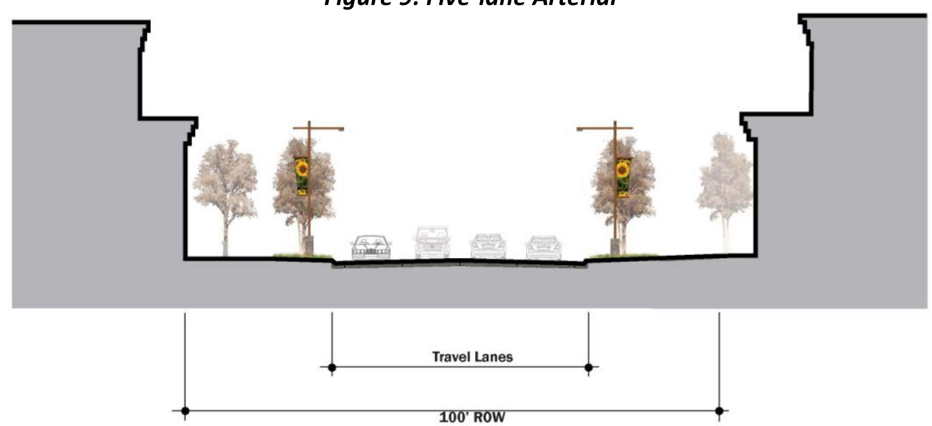

Figure 10: Four-lane Collector

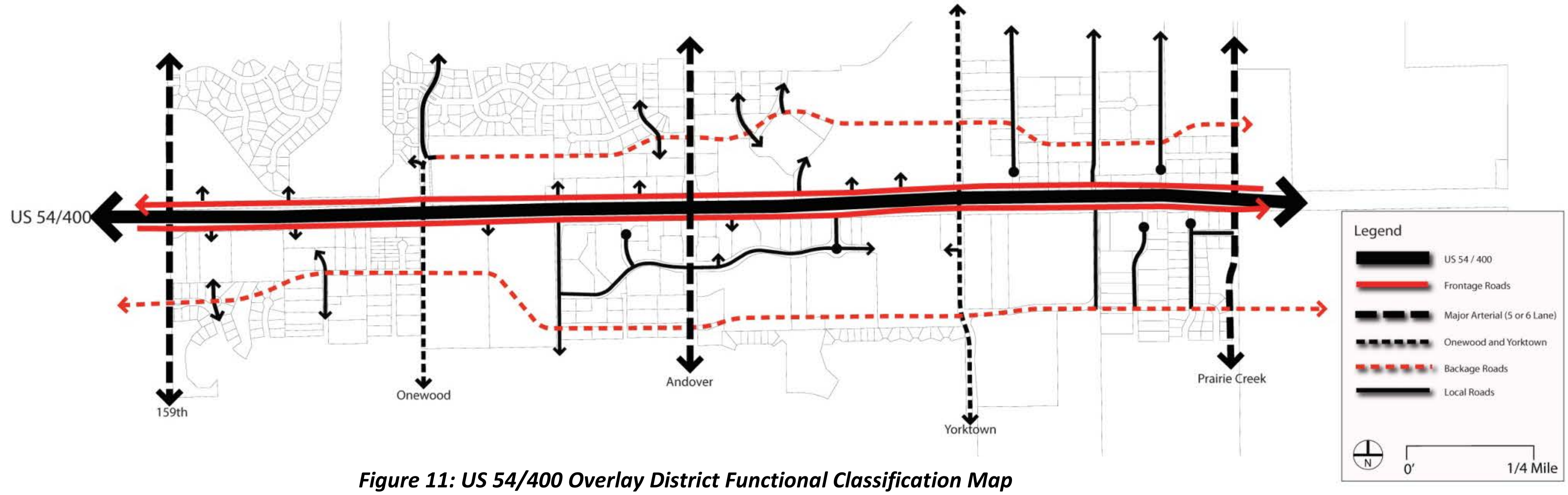

Figure 11: US 54/400 Overlay District Functional Classification Map

Section 6: Access Control Recommendations

Roadway Recommendations

The traffic circulation system designed for the study area from the freeway to nearby businesses is provided through various roadway classes. The freeway is for through traffic travelling long distances. The one-way frontage roads traffic travelling alongside the freeway to the nearest north/south arterial or collector, which are streets platted by the city. Private access or driveways should be limited along the frontage roads and located outside of the function area of the interchanges and adjacent intersections. The backage roads are accessed through north-south arterials, collectors, or platted local street connections. The backage roads provide access to properties. A function of traffic circulation is the nodal spacing or distance between intersections. The recommended distance between the frontage road and backage road intersections with north/south arterials and collectors are provided in Table 1. The distances shown were adopted for design and simulation analysis for efficient traffic operations. Figure 12 shows recommended locations for signalized full access intersections.

	Roadway			
	North Backage Road		South Backage Road	
	*Recommended Distance (ft.)	**TRB Calculated Distance (ft.)	*Recommended Distance (ft.)	**TRB Calculated Distance (ft.)
Roadway				
159th Street	825	860	820	960
Onewood	570	905	570	540
Andover	735	1115	1160	940
Yorktown	850	990	1020	945
Prairie Creek Road	800	1060	985	800

Note: All distances are measured in feet from East - West Section Line to Centerline of Backage Road and are based upon the recommended roadway alignment and geometrics of this report.

* Nodal distances (distance between intersections) adopted for design and simulation analysis based upon existing development, available developable property and drainage considerations

** Nodal distances (distance between intersections) calculated using the methods described within the TRB Access Management Manual 2003.

Table 1: Intersection Spacing on Arterial Streets

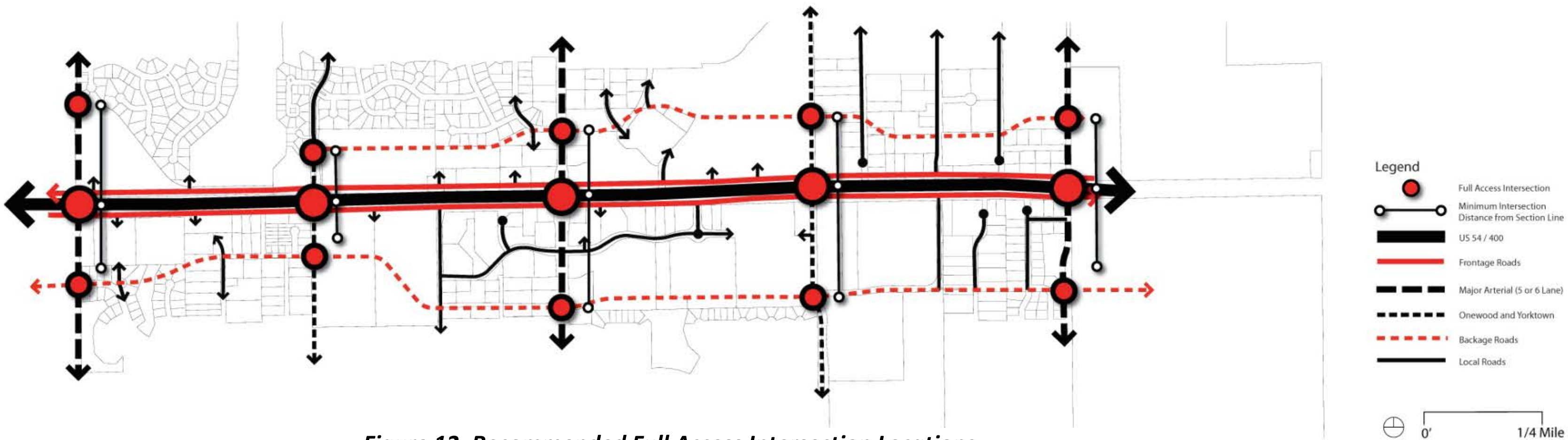

Figure 12: Recommended Full Access Intersection Locations

The functional area of an intersection is the area where additional connections or access points can negatively impact safety and decrease the traffic flow through the intersection and along the two intersecting roads. Access should be denied within the defined functional area of a roadway. The functional area of interchanges and intersections includes not just the immediate junction, but distances up and down-stream on each intersecting road. The guidance in this section would apply to areas where development has not yet occurred and roads have not yet been constructed. However, existing access locations should be reviewed during any redevelopment or changes in land use to see if modifications can be made to bring the roadway into compliance with these recommendations. The spacing suggested in this study are recommended values; however, if a traffic impact study or other approved analysis shows other distance values are acceptable they should be considered.

Interchange Functional Areas

Interchanges are any location where two grade separated roads are connected by on and off-ramps or slip ramps. Interchange functional areas apply to the future US 54/400 freeway configuration where ramps connect to the one-way frontage roads. Separation should be provided between slip ramps and local streets along the frontage road. At locations where an existing local street access point would be within the future interchange functional area, adjustments should be made to prohibit access within the designated functional area. The required and desirable functional areas based on the recommended interchange locations (159th Street, Andover Road, and Prairie Creek Road) are shown in Table 2. Figure 13 shows the range of functional areas for proposed ramps.

Intersection Functional Areas

The functional area of an intersection is determined by the deceleration, turning, merging, and stopping distances of vehicles (Figure 14). The functional area will vary for each intersection based on traffic volume, speed limit, and the traffic control at the intersection. Typically the upstream functional area (approach) is longer than the downstream functional area (departure). The functional areas for arterial and frontage roads within the study areas were calculated using the methods described within the TRB Access Management Manual 2003 for the upstream distance in combination with Stopping Sight Distance (SSD) from AASHTO's "A Policy on Geometric Design of Highway and Streets" (2004), better known as the "Green Book," for the downstream distance. These distances are measured from the end of the curb return and not from center-line. The functional areas for backage streets and unsignalized intersections within the study areas were calculated using Stopping Sight Distance (SSD) from the 2004 Green Book. Because the backage roads are intended to emphasize access over mobility, TRB's guidance for upstream functional areas is less applicable given the intended function and design of the backage roads. Using SSD on the backage roads for locations where the backage road intersected with an arterial for both the approach and departure was used. The SSD for 30 mph is 200 feet while the SSD for 40 mph is 305 feet. The study acknowledges that due to existing development, available developable property, and drainage considerations, access points may be located within intersection functional areas as calculated using the methods described within the TRB Access Management Manual 2003. Placing the access points in suggested locations that would meet the functional area guidance was not feasible. In these cases access points were located on the city streets as far as possible from each other. These access locations were included in the traffic simulation analysis which under ultimate development conditions provided efficient traffic operations. The information provided in Table 3 shows both the calculated functional areas, based on TRB's guidance and the recommended functional areas based on traffic analysis.

	Interchange Functional Area			
	East Bound Fronatage		Westbound Frontage	
	Full Access Control Required Range Distance from Section Line (ft.)	Full Access Control Desired Range Distance from Section Line (ft.)	Full Access Control Required Range Distance from Section Line (ft.)	Full Access Control Desired Range Distance from Section Line (ft.)
Section Line / Direction				
159th Street / West	1165 to 1670	755 to 1870	1460 to 1760	1260 to 2050
159th Street / East	775 to 1075	575 to 1275	545 to 850	345 to 1050
Andover Road / West	670 to 975	470 to 1175	740 to 1040	540 to 1240
Andover Road / East	580 to 885	380 to 1085	835 to 1140	635 to 1340
Priarie Creek Road / West	730 to 1035	530 to 1235	820 to 1125	620 to 1325
Prairie Creek Road / East	630 to 935	430 to 1135	N/A	N/A

Note: All distances are measured in feet from identified North - South Section Line and are based upon the recommended roadway alignment and geometrics of this report and are supported by study traffic analysis/modeling

Table 2: Interchange Functional Areas

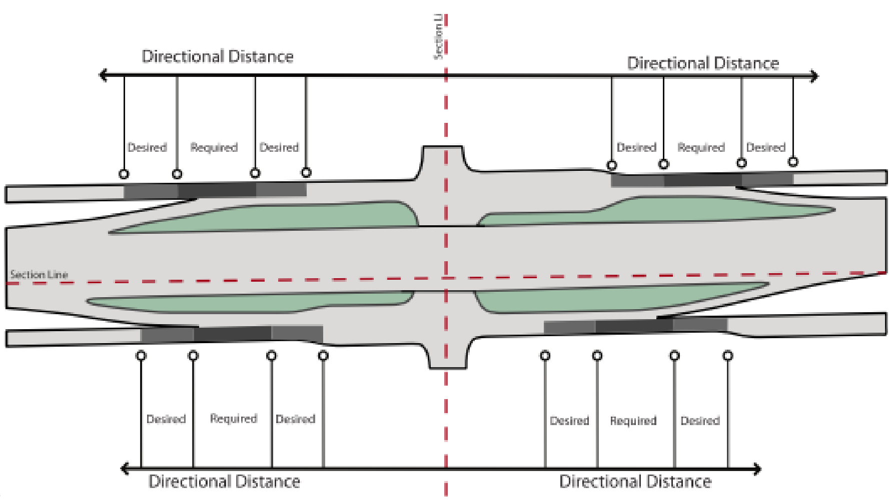

Figure 13: Functional Interchange Recommendations

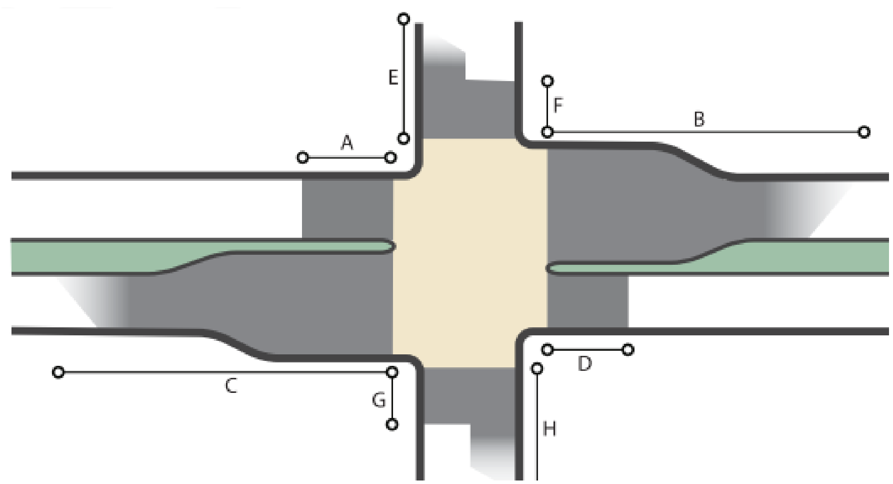

Figure 14: Functional Intersection Recommendations

	Intersection Functional Area															
	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)	*Required Distance (ft.)	#Desired Distance (ft.)
Intersection	A		B		C		D		E		F		G		H	
159th & North Backage (NB)	265	200	245	200	270	235	245	200	***	715	***	305	***	305	***	880
159th & North Frontage (NF)	1760	305	1130	1040	N/A	N/A	N/A	N/A	810	620	470	305	N/A	N/A	N/A	N/A
159th & South Frontage (SF)	N/A	N/A	N/A	N/A	635	660	430	305	N/A	N/A	N/A	N/A	490	305	905	720
159th & South Backage (SB)	240	200	260	200	240	200	260	200	***	305	***	305	***	305	***	305
Onewood & NB	220	200	310	200	225	200	310	200	***	305	***	305	***	305	***	305
Onewood & NF	300	305	800	675	N/A	N/A	N/A	N/A	555	630	530	305	N/A	N/A	N/A	N/A
Onewood & SF	N/A	N/A	N/A	N/A	1105	1065	450	305	N/A	N/A	N/A	N/A	480	305	550	765
Onewood & SB	210	200	300	200	200	200	300	200	***	305	***	305	***	305	***	305
Andover & NB	320	200	315	440	330	515	330	200	***	800	***	305	***	305	***	730
Andover & NF	440	305	1035	920	N/A	N/A	N/A	N/A	720	800	715	305	N/A	N/A	N/A	N/A
Andover & SF	N/A	N/A	N/A	N/A	1170	1060	430	305	N/A	N/A	N/A	N/A	540	305	520	710
Andover & SB (Cloud)	310	200	320	200	310	200	310	200	***	305	***	305	***	305	***	305
Yorktown & NB	295	200	215	200	295	200	220	200	***	305	***	305	***	305	***	305
Yorktown & NF	445	305	760	710	N/A	N/A	N/A	N/A	835	650	590	305	N/A	N/A	N/A	N/A
Yorktown & SF	N/A	N/A	N/A	N/A	880	750	365	305	N/A	N/A	N/A	N/A	370	305	790	705
Yorktown & SB (Cloud)	320	200	N/A	200	320	200	N/A	200	***	305	***	305	***	305	***	305
Yorktown & SB (East Leg)	295	200	220	200	295	200	220	200	***	305	***	305	***	305	***	305
Prairie Creek & NB	260	200	260	590	265	355	260	200	***	620	***	305	***	305	***	465
Prairie Creek & NF	420	305	880	785	N/A	N/A	N/A	N/A	785	765	540	305	N/A	N/A	N/A	N/A
Prairie Creek & SF	N/A	N/A	N/A	N/A	940	855	410	305	N/A	N/A	N/A	N/A	440	305	750	615
Prairie Creek & SB	265	200	N/A	200	265	200	N/A	200	***	305	***	305	***	305	***	305

Note:
* Required intersection Functional Area distances are measured from identified North - South Section Line and are based upon the recommended roadway alignment and geometrics of this report and supported by study traffic analysis/modeling.
** Required intersection Functional Area distances are measured from identified East - West Section Line and are based upon the recommended roadway alignment and geometrics of this report and supported by study analysis/modeling.
*** TRB desired distances are recommended.
# Intersection Functional Area distances calculated using the methods described within the TRB Access Management Manual 2003 and are measured from end of intersection return.

Table 3: US 54/400 Study Intersection Functional Areas (See Figure 14 for Labels A-H)

Section 7: Medians

Median openings are used to provide access to other roads, driveways or access points. Medians can be restrictive (also called non-traversable), painted, or two-way left-turns medians. Medians can improve the safety of the roadway by limiting the number of conflict points on a roadway and make traffic flow more smoothly by only allowing turning movements at specific locations. In general, raised medians should be considered on all major arterial roadways (four-lane or six-lane with channelized left-turn lanes) and major collectors. Efforts should be made to reduce the number of access points on the roadway by utilizing shared-use or joint-use driveways and access points before construction of a two-way left-turn lane.

Research conducted as part of NCHRP Report 420 showed that crash rates at restrictive medians for non-traversable medians in urban and suburban areas were 5.6 crashes per million vehicle miles travelled (VMT) while roadways with no medians have 9.0 crashes per million VMT. Two-way left-turn medians have a crash rate of 6.9 crashes per million VMT. Restrictive medians are recommended for use on multi-lane arterial roadways in Andover.

Median openings may allow up to four types of movements. These possible turning movements include left-in, left-out, right-in, and right-out. A full access median opening would include all four movements (Figure 15). A directional, or restricted, opening would include less than all four possible turning movements and possibly only one turning movement (Figures 16 and 17). Often when turning movements are restricted they only allow right-in and right-out turns.

The proposed right-in right-out movement on Andover Rd. at Cloud St. is an example of a restricted driveway access. A drawing of this potential access can be seen in Figure 17, part a.

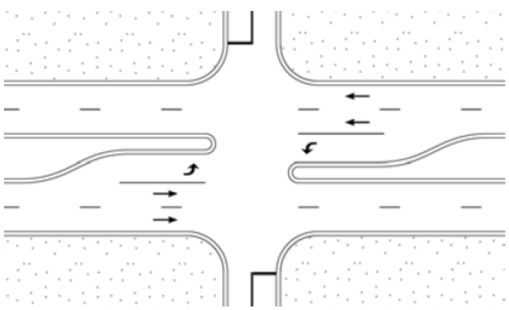

Figure 15: Full Access Median
Source: Lee's Summit, MO Access Management Code 2004

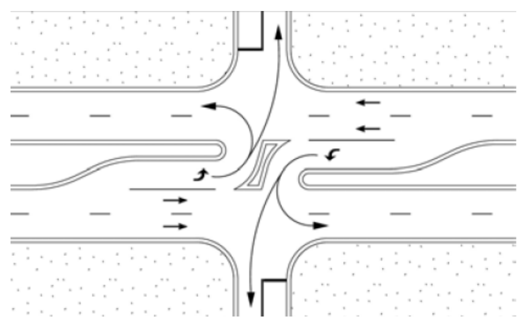

Figure 16: Restricted Access Median (Left-Out Restricted)
Source: Lee's Summit, MO Access Management Code 2004

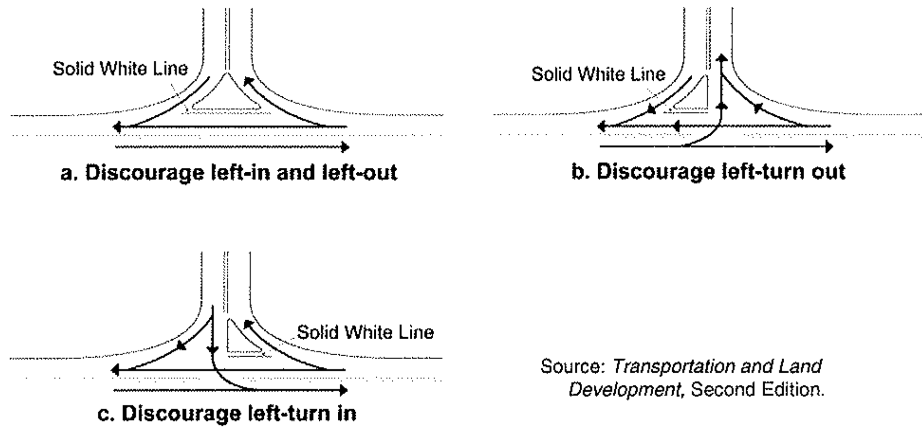

Figure 17: Restricted Access Driveway Islands
Source: Transportation and Land Development, 2nd Ed.

Section 8: Street and Connection Spacing Requirements

Adequately spacing access points along the street improves traffic safety, flow, and mobility. Access points should avoid intersection functional areas as mentioned in the previous section, but also be appropriately spaced from other access points.
Roadways with higher functional classes typically have higher spacing requirements than roadways in lower functional classes. Higher functional class roadways often have higher speed limits and higher volumes of traffic than lower functional class roads. If access is provided on higher functional class roadways, a small number of turning vehicles can disrupt a large number of through vehicles, limiting the capacity of the roadway.

One method to prevent this from happening is to limit access by the level of access (Table 4). This method should still be checked against the functional area of any individual intersection nearby.

With access to local businesses being provided by backage roads with two-way left-turn lanes (TWLTL), there is still a need to provide adequate spacing between access points. It is desirable to align driveways so that drivers in the TWLTL are not trying to make left turns while each blocking the other’s movement. If driveways are aligned on opposite sides of the backage road from each other or spaced far enough apart, this is less likely to occur.

Functional Class of Roadway	Undivided Roadway	Divided Roadway		
		Full Median Opening	Right In/Out Only	Directional Median Opening
Strategic Arterial	Not Applicable	2640	Typically Not Permitted	Typically Not Permitted
Principal Arterial	2640	2640	1320	1320
Minor Arterial	660	1320	330	660
Collector	330		Not Applicable, Medians Typically Not Used	
Local Road	100			

[a]Typically designed for left turns from the major roadway or left turns and U-turns.
[b]Not applicable; strategic arterials are divided roadways with nontraversable median.

Table 4: Example of Guidelines for Access Spacing (ft) on Suburban Roads
Source: TRB Access Management Manual 2003, Page 156

Section 9: Auxiliary Lanes

Auxiliary lanes are additional lanes added parallel to the through lanes for turning movements. Auxiliary lanes are composed of a taper, deceleration length, and storage length (Figure 18). Left and right-turn lanes provide vehicles a way to turn without excessive disruption to through traffic flow. Auxiliary lanes provide an intersection with additional vehicular capacity and assist with providing safe turning movements. Auxiliary lanes should be at least as wide as the through lane on the same approach (typically 12 feet).

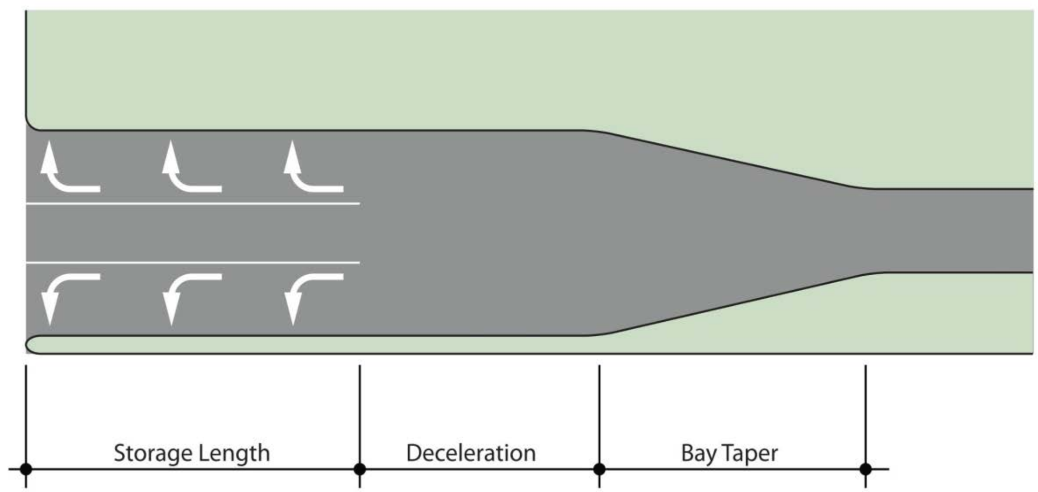

Figure 18: Auxiliary Lane Composition

Jurisdictions use different criteria for requiring auxiliary lanes and the length of those auxiliary lanes. Often the criteria for requiring auxiliary lanes are based on the posted speed limit, the volume of approaching vehicles, opposing vehicles, and the volume of turning vehicles. Those same criteria of speed and volume also determine the taper, deceleration, and storage lengths.

Tapers

Tapers may be a fixed length or depend on the posted roadway speed. Some jurisdictions use a fixed length for all tapers, often 100 feet. Other jurisdictions use a straight line ratio (length:width) for entering tapers based on the speed limit of the roadway.

Short tapers may be advantageous as they may appear a better target for drivers while longer tapers may mislead through vehicles into thinking it is a through lane. The 2004 Green Book states that most tapers are between 8:1 and 15:1 and that they can be straight line tapers or symmetrical-reverse curve tapers. Taper ratios shown in Table 5 shall be used for auxiliary lane design unless constraints are present such that a reduced bay taper length is needed (with approval by the City Engineer).

Posted Speed (mph)	Bay Taper Ratio
30 or less	8:1 (100ft taper)
35 to 45	15:1

Table 5: Bay Taper Ratios for Auxiliary Lanes in Developed Areas
Source: AASHTO's A Policy on Geometric Design of Highways and Streets, 2004.

Deceleration Length

It is desirable that the deceleration length be long enough to account for drivers' perception and reaction time along with the braking distance required for stopping sight distance. All deceleration will occur within the deceleration portion of the turn lane unless specific constraints are present such that this is not practical. This may not be possible, particularly in urban areas or in areas where previous developments make it unrealistic. As a result, a 10mph speed reduction in the through lane will be allowed. AASHTO's Green Book (2004) is often used to determine deceleration lengths. One option for uncontrolled right turns is to provide deceleration to 15 mph if the vehicle does is not required to stop. Such instances occur on uncontrolled right turning movements, and would shorten the deceleration length required.

Posted Highway Speed (MPH)	Recommended Deceleration Distance (ft) (to stop)	Minimum Deceleration Distance (ft) (to turn at 15 mph)
65	570	540
60	530	500
55	480	450
50	435	405
45	375	350
40	315	295
35	270	240
30	235	185

Note: Dimensions do not include required storage lengths
Recommended decelerations lengths are used for left-turn lanes and signalized right-turn lanes
Minimum deceleration lengths are used for non-signalized right-turn lanes

Table 6: Guideline to Determine Deceleration Lane Lengths
Source: AASHTO's A Policy on Geometric Design of Highways and Streets, 2004.

Table 6 provides both recommended and minimum deceleration distances which are based on all deceleration occurring in the deceleration lane. These values shall be used for auxiliary lane design unless prior approval is obtained by the City Engineer.

Storage Length

At unsignalized intersections, storage length is calculated based on the number of vehicles arriving in an average two minute period within the peak hour and assuming each vehicle occupies 25 feet of space. A minimum storage length of 100 ft will be used in urban areas. Where truck percentages exceed 10% of the total volume, the minimum storage should provide for one truck and one passenger car equaling approximately 110 feet. At signalized intersections, storage length is base on the signal cycle length (seconds), signal phasing arrangement, and the rate of arrivals and departures of turning vehicles.

Output from various capacity analysis programs including Highway Capacity Software (HCS) and/or Synchro/SimTraffic is also used to compute storage length at both unsignalized and signalized intersections. These programs often provide various confidence intervals for the maximum queue length with the 95th percentile queue length often being used to determine the storage length.

The storage length is a function of the probability of occurrence and should usually be one and a half to two times the average calculated storage length. As a result, the storage length used for auxiliary lane design shall be twice the calculated average queue length to avoid spillover into the through lanes.

Section 10: Land Development Access Guidelines

The way land is developed impacts the transportation network. Poor land use planning may limit the ability of the road network to safely support current and expected traffic and properties.

Land uses that may be subdivided should be divided by so they do not create "flag" lots as shown in Figure 19.

Lots that are subdivided should be divided so all lots are accessed through the lower functional classification road if two different roadway classifications are available.

Single lots should be accessed through a lower classification road if two different roadway classifications are available.

Residential driveway access to individual one-family and two-family lots should be prohibited on arterial and collector streets unless approved by the City Engineer.

Figure 19: "Flag" Lots

Source: City of Gardner, KS Proposed Access Management Code

Supporting streets such as collectors and arterials should still provide a balanced network so that people can travel from one land use to another without necessarily requiring the use of arterials when the two land uses are close by. Without an interconnected street network and proper land use planning, all local trips are forced onto arterials resulting in unnecessary congestion and capacity issues on arterial streets. Residential streets should not be designed to encourage through traffic, but should encourage connectivity to the network as a whole. Figures 20 and 21 show a small street network that has improved connectivity after the redesign when compared with the original version.

The poorly designed road network impedes walking, bicycling, and transit use. It also increased local trip which must use higher classified roads (arterials) causing congestion. It also impedes development as some properties are unable to be developed properly.

The well designed road network enables shorter trips which may be more multimodal. It increases the opportunities for internal site access for multiple developments. The well designed network also spreads the traffic throughout the network and does not force all trips to use arterial roads. The well designed network utilizes a backage road to provide access to the local businesses and removes access points from the main road which provides higher mobility around the city.

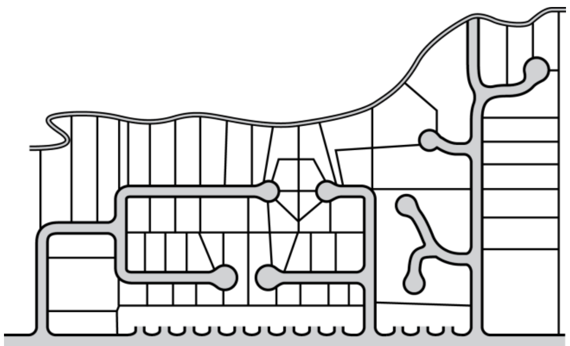

Figure 20: Poor Network Connectivity

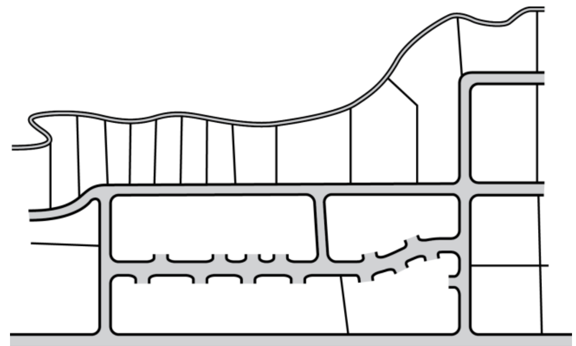

Figure 21: Improved Network Connectivity

Section 11: Circulation and Unified Access

The circulation system designed for Andover from the freeway to nearby businesses is provided through various roadway classes. The freeway is for through traffic travelling long distances. The one-way frontage roads are provided to move traffic travelling alongside the freeway to the nearest north/south arterials and collectors which are streets platted by the city. Platted streets should be limited along the frontage roads and located outside of the function area of the interchanges and adjacent intersections. The backage roads are accessed through the arterials or collectors running north/south and the backage roads provide access to properties. Where possible, groups of businesses should be accessed using a limited number of shared driveways on the backage road.

Unifying access and circulation between adjoining properties reduces the number of access points on the adjacent road and may eliminate turning movements onto and off of the adjacent road, especially when drivers plan on accessing the adjacent property if they are trip-chaining. This shared, joint, or cross-access is particularly applicable to commercial development.

Shared or joint access is where two or more properties each utilize a single access point, often on the line dividing the two properties. The access point entrance may be on property “A”, while the exit may be on property “B”, but both properties have full use of the access. A cross-access is where two or more properties may need to traverse an adjoining property to gain access to the road network. This is often done through either the site’s internal road network or a parking lot isle. Unified accesses reduce the number of access points on the roadway network which increase the safety and mobility of drivers. Travel speeds are often higher on access controlled roads which increases the market area of the businesses.

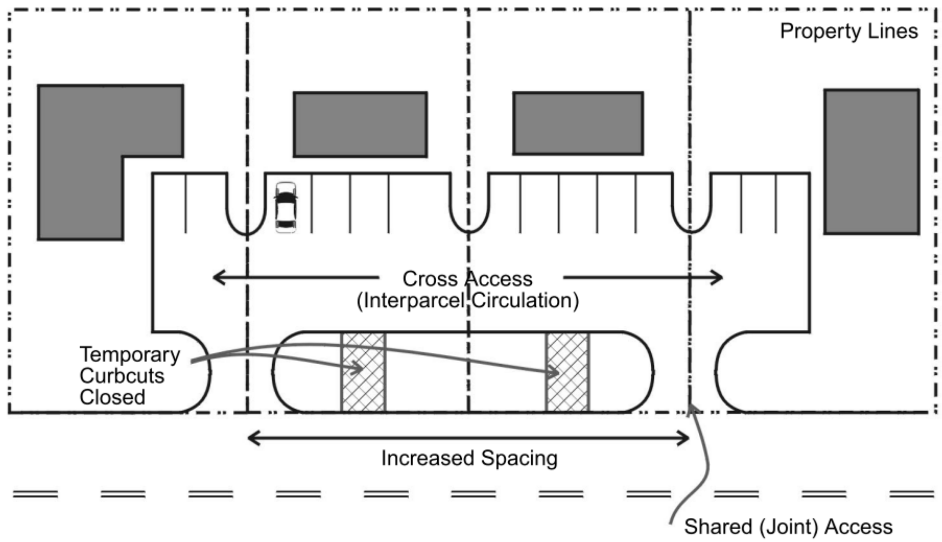

Figure 22: Joint and Cross-Access
Source: TRB Access Management Manual 2003, Page 315

Adjacent commercial properties should have joint or cross-access to and from their properties. Site developers should limit the number of access points to their development and encourage cross-access to other sites within their development.

New developments or redevelopments should be allowed the minimum number of access points to provide reasonable access and not the maximum number possible given the frontage available along the road.

Outparcels on a development shall be provided access through the development's internal roadway circulation and not from the external public roadways.

All joint, shared, and cross-access agreements should be recorded in writing and attached to the property deed.

Section 12: Driveway Connection Geometry

Driveway design affects the speed at which vehicles enter and exit a property. A large speed differential is created between turning traffic and thru traffic when auxiliary lanes are not provided. Large speed differentials are associated with higher crash rates and decreased traffic flow. Inadequate or poorly designed areas for vehicles to continue traversing a property create the potential for spill-back queues onto the road network.

The corner radii at intersections or driveways is often affected by the design vehicle's off-tracking characteristics. Off-tracking occurs most noticeable with semi-trucks when turning a corner where the front wheels successfully navigate a corner, but the trailing wheels run over the curb, green space, or sidewalk. This can be avoided by increasing the radius of the corner. Figure 23 shows the wheel path of a semi-truck when turning a corner.

Lower functional class roadways such as collector and residential roads may have features such as bike lanes or on street parking which create a larger effective radius than the physical curb radius. The actual turning radius of vehicles may be closer to the effective radius due to parked cars or a bike lane (Figure 24). This may enable the city to reduce the curb radius requirements at intersections or driveways where such features are located which may improve the function of pedestrian facilities adjacent to the roadway. Pedestrian facilities may be improved due to the decreased driveway pavement which must be crossed when walking along the road.

The design of driveways should meet the following guidelines:

- Driveways should align with driveways on the opposite side of the roadway where the medians are traversable.
- Driveways allowing two-way access to the property should be aligned at as close to a 90 degree angle to the main roadway as possible. The minimum allowable angle for two-way access driveways is 80 degrees. A driveway which only allows one-way access to or from the property may be aligned with a minimum angle of 60 degrees.
- The width of the driveway required for a given design vehicle is a combination of the corner radius and the width of the driveway. A smaller radius requires a larger width driveway, whereas a larger radius requires a smaller driveway width.
- Corner radii should be large enough for vehicles to turn the corner at 10 mph to 15 mph. Increasing the corner radius should be balanced with the roadway speed limit, land use, sight distance, and the increased time it will take pedestrians to cross the driveway.
    - AASHTO's Green Book suggests driveway corner radii of 10 to 15 feet for urban areas, but 15 to 25 feet for minor cross streets. As the functional classification of the roadway increases, corner radii also typically increase, up

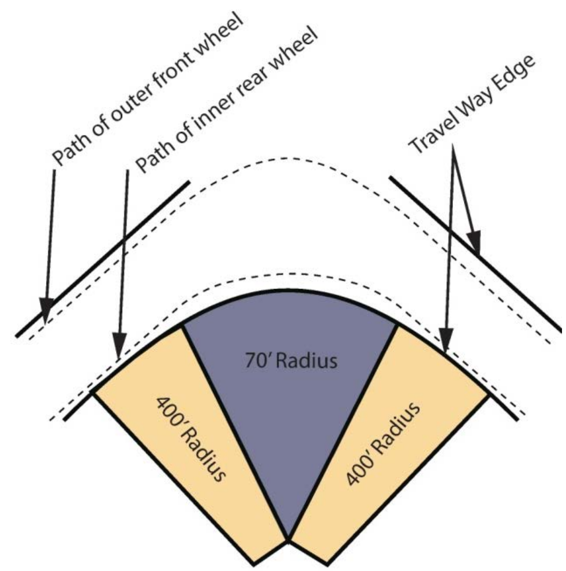

Figure 23: Vehicle Off-tracking when turning
Source: Florida DOT Driveway Information Guide, 2008

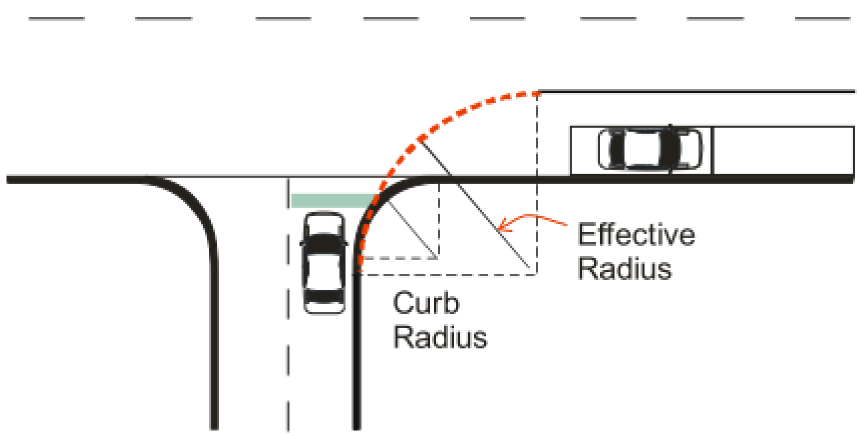

Figure 24: Effective Radius vs. Curb Radius
Source: Florida DOT Driveway Information Guide, 2008

to 50 feet. If a radius greater than 50 feet is needed, a compound radius, 3-centered curve, or a taper-radius-taper combination would be suggested to eliminate excess pavement.
    - The TRB Access Management Manual (2003) suggests driveway radii of between 10 to 40 feet which varies with the width of the driveway.
    - Table 7 from NCHRP Report 659, Guide for the Geometric Design of Driveways, suggested driveway widths and corner radii for different categories of land use and roadway speeds.
- Driveways should accommodate pedestrians using sidewalks or paths. Crosswalk and ramps should be placed so pedestrians do not cross an inordinate amount of pavement while exposed to vehicles, yet also not deviate excessively from the natural path the sidewalk. If pedestrians crossing a driveway must cross four or more lanes an island should be added between entering and exiting traffic as a refuge.
- Driveways should have a minimum throat length to minimize or eliminate vehicles queuing back onto the main street when multiple vehicles attempt to enter the property at once. There are multiple different equations or suggestions for the throat length including: equations for signalized driveways, parking lot size, or the entry or exit condition. A simplified throat length may be based on the following and is shown in Figure 25.
    - Driveways should provide at least 50 feet of throat length adjacent to local streets and 100 feet adjacent to collector and arterial streets.
    - Driveways with more than one exit lane typically have longer throat lengths, but the lengths required can vary by 50% depending on the jurisdiction or publication.
- Driveways should be designed for trucks or busses when the driveway serves more than two or three trucks or busses per hour.
- Driveways should be designed to meet sight distance requirements as defined by AASHTO.
- Driveways should be aligned so they are across from each other, and not offset minimally.

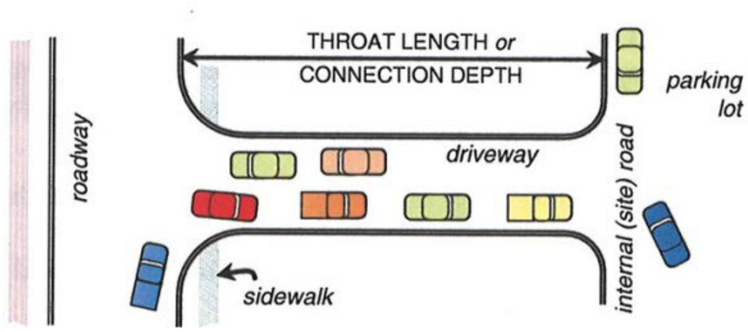

Figure 25: Driveway Throat Length
Source: NCHRP 659, Page 57

Category	Description of Common Applications (Note: These descriptions are intended to help the designer form a mental image of some of the more common examples of the category.	Driveway Width	Driveway Curb Radius (in ft)		
			Higher Speed Road	**Moderate Speed Road**	**Lower Speed Road**
STANDARD DRIVEWAYS					
Very High Intensity	Urban Activity Center, With almost constant driveway use during hours of operation.	Many justify two lanes in, two to three lanes out. Refer to street design guides	30-50	25-40	NA
Higher Intensity	Medium-size office or retail (e.g., community shopping center) with frequent driveway use during hours of operation.	One entry lane: 12-13 ft wide Two exit lanes: 11-13 ft wide.	25-40	20-35	NA
Medium Intensity	Smaller office or retail, with occasional driveway use during hours of operation. Seldom more than one exiting vehicle at any time	Two lanes: 24-26 ft total width	20-35	15-30	NA
Lower Intensity	Single-family or duplex residential, other types with low use on lower speed/volume roadways. May not apply to rural residential.	May be related to the width of the garage, or driveway parking. Single lane: 9-12 ft Double: 16-20 ft	15-25	10-15	5-10
SPECIAL SITUATION DRIVEWAYS					
Central business district	Building faces are close to the street.	Varies greatly depending on use.	NA	20-25	10-15
Farm or ranch; Field	A mix of design vehicles; some may be very low volume.	Min. 16 ft, desirable 20 ft Affected by widths of field machinery.	30-40	20-30	NA
Industrial	Driveways are often used by large vehicles.	Minimum 26 ft	50-75	40-60	40-60

NOTES:

These widths do not include space for a median or a parallel bike lane or sidewalk.
Additional width may be needed if the driveway has a curved horizontal alignment.
For a flare/taper design, use the radius as the dimension of the triagular legs.
For industrial or other driveways frequented by heavy vehicles, consider a simple curve with a taper or a 3-centered curve design.
For connection angles greatly different than 90 degrees, check the radius design with turning templates. For connection corners at which turn is prohibited, a very small radius is appropriate. Also see the section, Driveway Horizontal Alignment and Angle.
Driveways crossing an open ditch should have a minimum 2 ft shoulder on each side. (source: Statewide Urban Design and Specifications, Iowa State U., Ames IA (October 21, 2008) p. 4.)
If the roadway has a usable shoulder, a somewhat smaller radius may perform acceptably.

Table 7: Driveway Widths and Corner Radii

Source: NCHRP Report 659, Page 40

Section 13: Outparcels and Shopping Center Access

Unified access and circulation plans shall be prepared for all development sites that consist of more than one building site. This applies to sites with one owner as well as sites with multiple owners that are consolidated for the purposes of development. In addition, the following shall apply:

- The number of connections shall be the minimum number necessary to provide reasonable access to the overall development and not the maximum available for the development's frontage.
- Direct outparcel access shall be provided from the development's interior roadways and aisles and not from the development's external frontage.
- All necessary easements and agreements shall be recorded in an instrument that runs with the deed to the property.
- Unified access for abutting properties under different ownership and not part of an overall development plan shall be addressed through the Joint and Cross-Access provisions below.

Joint and Cross-Access

Joint and cross-access policies promote connections between major developments, as well as between smaller businesses along a corridor. These policies help to achieve unified access and circulation systems for individual developments under separate ownership that could not otherwise meet access spacing standards or that would benefit from interconnection, e.g., adjacent shopping centers or office parks that abut shopping centers and restaurants.

Adjacent commercial or office properties and major traffic generators, e.g. shopping plazas, shall provide a cross-access drive and pedestrian accessway to allow circulation between adjacent properties. This requirement shall also apply to a building site that abuts an existing developed property unless the City Engineer finds that this would be impractical.

To promote efficient circulation between smaller development sites, the City Engineer may require dedication of a 30-foot easement that extends to the edges of the property lines of the development site under consideration to provide for the development of a service road system. The service road shall be of sufficient width to accommodate two-way travel aisles and incorporate stub-outs and other design features that make it visually obvious that abutting properties may be tied in to it. Abutting properties shall be required to continue the service road as they develop or redevelop in accordance with the requirements of this policy. The easement may be provided to the front or rear of the site or across the site where it connects to a public roadway.

Property owners shall record all necessary easements and agreements, including an easement allowing cross-access to and from the adjacent properties, an agreement to close driveways provided for access in the interim after construction of the joint use driveway(s) or service road system, and a joint maintenance agreement defining maintenance responsibilities of property owners that share the joint-use driveway and cross-access system.

Joint and cross-access requirements may be waived when, in the City Engineer's judgment, such a waiver is warranted. Instances in which a waiver may be warranted include incompatible uses (e.g., a gas station next to a child care center), or major physical constraints (e.g., significant change in grade between properties).

Where properties are under the same ownership or consolidated for the purposes of development, the local street shall be constructed by the developer. Where the street will serve properties under separate ownership, a method will be established by the City Engineer to apportion the costs of initiating and constructing the street. In either case, the street shall be constructed prior to issuing building permits for the site.

Section 14: Redevelopment Application

The access management requirements of this code do not affect existing access along existing roadways. Existing access connections are "grandfathered" in based on the requirements in place when they were constructed. This protects the existing property owners' rights and recognizes the expense of bringing non-conforming properties into conformity. However, the goal of this document is to bring the roadway system into compliance over time. A parcel of land shall be required to adhere to the access management guidelines as described in the following sections.

Requirements

Properties with non-conforming access connections shall be brought into compliance with the Access Management Code to the maximum extent possible when one or more of the following conditions occur.

Otherwise, the existing access connection shall be allowed to continue.

- When the roadway with the access connections is modified
- When a new access connection is requested or required
- When a preliminary and/or final development plan is required
- When a proposed redevelopment, in comparison to the existing use, is forecasted to experience an increase of 50 trips or more, as determined by one of the following methods:
  - An estimation based on the ITE Trip Generation manual (latest edition) for typical land uses, or
  - Traffic counts made at similar traffic generators in the metropolitan area, or
  - Traffic counts conducted during the peak hour of adjacent roadway traffic for the property.
- If the principal activity on a property is discontinued for a period of one year or more, or construction has not been initiated for a previously approved development plan within a period of one year from the date of approval, then the property must be brought into conformance with all applicable access management requirements of this policy, unless otherwise exempted by the City Engineer. This shall include the need to update any previously approved transportation impact study where new traffic projections are available. For uses or approved plats in existence upon adoption of this policy, the one-year period for the purposes of this section begins upon the effective date of these requirements.
- Access to all change-in-use activities shall be approved by the City Engineer. All relevant requirements of this code shall apply.

Section 15: Traffic Impact Study Requirements

The purpose of this section is to clearly outline the minimum requirements for Traffic Impact Studies (TIS) prepared as part of the land development approval process in the City of Andover. A TIS identifies and quantifies the potential impacts of site development on the local and regional transportation system and specifies the measures necessary to mitigate those impacts.

TIS Process - Flow Chart

The general process for scoping and preparing a TIS is outlined in Figure 26. The completed draft TIS should be submitted to the City Engineer 14 days prior to the preliminary plan submission. The revised TIS must be submitted 14 days prior to the planning commission meeting requesting plan approval. Failure to meet these submittal deadlines shall be cause for rejection of the submittal and/or rescheduling to a later Planning Commission meeting. The subsequent sections present more detailed information on the TIS preparation requirements.

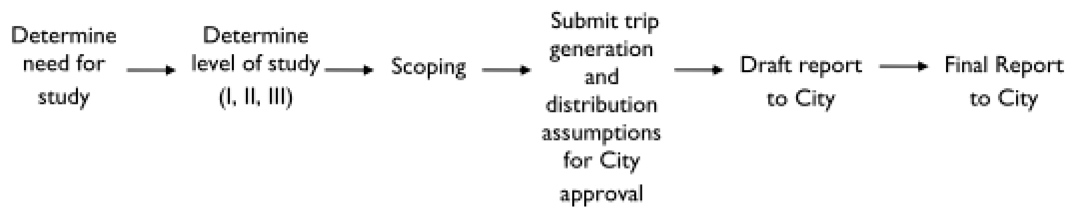

Figure 26: TIS Process Flow Chart

Study Triggers and Thresholds

The following situations will require a TIS:

- A currently undeveloped property proposed for development and/or rezoning
- A currently developed property proposed for expansion, intensification, or redevelopment to a level that requires City approval
- A previously approved project in either category above that has not been developed within time frames specified in this section and is re-starting the development process

The final determination of whether a traffic study is required shall be made by the City Engineer.

The scope of the traffic study for a proposed development is a function of the amount of new traffic trips the development, redevelopment, or expansion is expected to add to Andover's roadway system. The City has established three Levels of study, depending on the magnitude of traffic generated. The thresholds for these Levels are shown in Table 8. The City Engineer can request a TIS and/or modify the scope requirements of a TIS based on local conditions and knowledge.

Level of Study	Threshold	Typical Scope
Level 1	20-99 vph[1]	trip generation and site review
Level 2	≥100 vph	full study
Level 3	≥500 vph	full study with extended study area

Note: vph = vehicles per hour - new trips generated by the development during traffic peak hours

Table 8: Traffic Impact Study Thresholds

Study Scope

The specific scope of a study will vary depending on the level of study. At the outset of the study, the applicant (or their authorized representative) should contact the City to begin the scoping process. The City Engineer must approve the scope of work and technical approach.

Study Area

Level 1: Site only

Level 2: To the nearest arterial or collector intersection in either direction bordering the site

Level 3: At least to the nearest arterial in all major directions of travel, further if necessary to adequately assess the potential traffic impacts

The City Engineer shall make the final determination as to the extent of the study area.

Study Scenarios

Level 1: No analysis scenarios. The study needs to provide a forecast of the project trip generation and a review of the site to ensure compliance with the City's Access Management Code.

Level 2: Existing, Opening Day/Full Build (with and without project), 20-year horizon (with project)

Level 3: Existing, Opening Day/Full Build (with and without project), Near-Term (5 years after build-out with and without project), 20-year horizon (with project)

If a project is phased, the opening day for each major phase should be studied as well as the full build-out. For later-year phases, an updated traffic study will be required if the original study is more than two years old, unless the applicant can demonstrate that the nature of the proposed development, and the near-term and long-term forecasted background traffic conditions, have not changed substantially, as determined by the City Engineer.

Traffic Analysis Methodology

Other items to be considered and approved either during the scoping phase or as the study progresses include: time periods to be analyzed (daily, am/pm peak periods, other peak periods), trip generation assumptions, trip distribution and assignment assumptions, planned public and private roadway and intersection improvement assumptions, baseline traffic counts, traffic projection methods, signal timing/phasing assumptions, acceptable mitigation measures, and the Study Elements listed in Section 15 shall be considered unless otherwise approved by the City Engineer.

Study Elements

The TIS shall be prepared according to generally acceptable professional practice and shall address the following study elements. The City Engineer must approve all major assumptions. The ITE Trip Generation Handbook: An ITE Recommended Practice (2nd edition, 2004 or latest edition) should be used as the primary reference if further detail is needed on study elements. The ITE document "Transportation Impact Analysis for Site Development: An ITE Recommended Practice" should be reviewed when conducting Level 3 studies.

Executive Summary

This section should summarize all of the key findings of the study, including the identified impacts and proposed mitigation.

Introduction and Study Scope

This section should explain the context of the study and the scope of the work.

Project Description

This section should provide the following information:

- Proposed project description including site location, layout, access, land-uses, and phasing
- Existing access and land-uses
- Information on nearby parcels' access and land-use and their relationship to the proposed project

Existing Conditions

The TIS will document the existing traffic conditions at the study intersections and on the study roadways. This will include the following:

- Description of the existing roadway system (street classifications, number of through lanes, number of turn lanes, intersection controls, etc.)
- Traffic Volumes (daily and study peak hours)
- Current operational results (Levels of Service, queueing, etc.)
- Safety analysis
- Parking conditions (if appropriate)
- Pedestrian and bicycle conditions
- Public transit conditions

Opening Day Conditions (No Project)

The TIS should present the background traffic conditions on the assumed opening day. The background conditions must include background traffic growth between the existing year counts and the expected opening day year. Background growth will address approved but not completed or occupied developments and background growth from other sources (based on historic traffic growth and other variables). All of the items addressed in the existing conditions section should be addressed here to the extent applicable.

Opening Day Conditions (With Project)

This section will present the opening day conditions with the proposed project. Key items will include:

- Trip Generation – The trip generation calculations will be based on the most recent version of ITE's Trip Generation: An ITE Informational Report (8th Ed, 2008 or latest edition) unless otherwise approved by the City Engineer.
- Trip Distribution and Assignment – The trip distribution and assignment will be based on available local data and will be approved by the City Engineer. Both the distribution and assignment should be clearly shown in figures with explanatory test as necessary.

The topics addressed in the Existing Conditions section should be addressed in this section. In addition, potential impacts to any facility or mode should be highlighted.

Near-Term Conditions (5 years after build-out, with and without project)

This section will present conditions 5 years after project build-out, and shall analyze conditions both with and without the project. If any project trip generation or distribution patterns are anticipated to change in this time horizon, the study should incorporate those assumptions.

The 5-year horizon should include background traffic growth assumptions based on a methodology approved by the City Engineer. Typically, a combination of growth factors plus forecasted trip generation from approved or anticipated development will be adequate to develop these assumptions.

Long-Term (20-Year) Conditions (with project only)

For most studies, this scenario should be based on traffic forecasts provided by the City. The goal of this analysis is to provide the City with a clear picture of how the proposed project affects the City's long-range roadway and land-use planning. A detailed impact comparison is not required. For large projects (more than 500 peak-hour trips), the applicant should develop a forecasting methodology subject to approval by the City Engineer.

Proposed Mitigation

This section will outline the improvements required to address the identified impacts. These improvements could be on- or off-site and could affect any of the study modes (auto, truck, bus, bicycle, or pedestrian). Typical mitigation measures include the addition of turn lanes, installation of traffic signals (if warranted), provision of sidewalk connections, or other such improvements. The study shall demonstrate that the proposed measures will restore operations to acceptable levels.

Technical Approach Information

The following items outline key methods and requirements for preparing a TIS for the City of Andover.

Data Collection

The applicant is responsible for collecting all of the required traffic data. The applicant should check with City staff regarding available data in the City's possession. Both peak hour and daily counts should be less than two years old and should have been conducted on a Tuesday, Wednesday, or Thursday (except for special studies when weekends or Monday/Friday counts are needed). Typically, both the a.m. and p.m. peak hours should be studied. If it can be demonstrated that the project will not generate traffic during one of the peak hours (for example, a restaurant that is only open for lunch and dinner), the City Engineer may waive the requirement to analyze one of the peak hours.

Trip Generation

Trip generation calculations will be prepared using the most recent version of the ITE's Trip Generation: An ITE Informational Report (8th Ed, 2008 or latest edition). For redevelopment or rezoning projects, the applicant should calculate both the total project trip generation and the net difference. The trip generation assumptions and calculations must be approved by the City Engineer prior to initiation of the operational analysis.

Trip Distribution and Assignment

The applicant will clearly present and support the assumed trip distribution. Similarly, the major assignment assumptions will be presented and explained. For redevelopment or rezoning projects, the applicant will need to determine whether the distribution of the proposed project differs from that of the previously approved or zoned use, because the assignment will need to represent the net difference. Pass-by, diverted linked trips, and multi-use developments should be analyzed using information available in the ITE Trip Generation Handbook if a notable impact is expected on any of the trip generation, distribution, and assignment phases of the TIS. All assumptions must be reviewed by the City Engineer for comments prior to initiation of the detailed operational analysis.

Operational Analysis Methods

Highway and intersection operational analyses will be performed using the methods described in the most recent version of the Transportation Research Board's Highway Capacity Manual. If required by the City Engineer, the applicant shall perform a traffic simulation for closely spaced intersections, improvements relying on signal timing/phasing, or complex traffic conditions.

Impact Thresholds

The impact thresholds in use in the City of Andover are as follows:

- Level of Service (LOS) A – C are acceptable on all arterials and collectors
- LOS A – C are acceptable on all other roadways (the highest class of road defines an intersection)

Final acceptable Level of Service will be determined by the City Engineer.

Queuing

The study will include queuing analyses for each study intersection. 95th percentile queues should be reported along with the existing (or proposed) queue storage.

Access Management Review

The applicant will compare the proposed site access to the City's Access Management Codes as outlined in this document as well as other applicable design standards and guidelines, and shall submit a proposal that meets the City's Access Management Codes. If the applicant wishes to deviate from the Access Management Code, the applicant should submit a concept plan to the City Engineer for review and comment prior to making application.

On-Site Circulation

The analysis will include a section evaluating and commenting on the on-site circulation. This will include an assessment of on-site intersections and driveways/roadways with respect to operations and safety (including driveway throat length, vehicle turning radii, sight distance, etc.). Shared access and cross-parcel traffic flows should also be considered. It will also address on-site truck circulation and parking.

Multi-modal Considerations

Includes bicycle, pedestrian, transit, and truck considerations. Describe current and proposed: transit services, transit facilities, bicycle facilities and pedestrian facilities in and around the site. Describe any impact trucks or other large vehicles may have on traffic operations in and around the study area.

Responsibility and Qualifications

It is the applicant's responsibility to prepare the traffic impact study, including all necessary data collection. The individual preparing the traffic study must be a registered engineer, qualified in preparing traffic impact studies. The City Engineer will make the final determination as to whether a particular individual is qualified.

For all traffic studies, the City of Andover recommends the usage of the above outline format for consistency. The City Engineer must approve other formats prior to submittal.

A minimum of two copies of a draft report shall be submitted to the City Engineer for review. After the applicant receives the City's comments, a minimum of two copies of a final report shall be submitted to the City Engineer. The report shall contain, in Appendices, any detailed calculations supporting the main body of the report such as intersection LOS analysis.

Any deviations from the above guidance should be approved by the City Engineer.

Section 16: Review / Exceptions Process

Flexibility is essential when administering access spacing requirements to balance access management objectives with the needs and constraints of a development site. The following administrative procedures are intended to provide flexibility, while maintaining a fair, equitable and consistent process for access management decisions. The exception/waiver process described below applies to all of the guidelines in this code.

Approval Required

No person shall construct or modify any access connection to a roadway within the City of Andover without approval from the City. Approval is typically granted through the preliminary and final development plan processes and/or engineering approval of construction plans for roadways. All requests for connections to a roadway within the City after the date of adoption of the Access Management Code shall be reviewed for conformance with this Access Management Code, except as noted below.

Access connections that do not conform to this policy and were constructed before the effective date of this code shall be considered legal nonconforming connections and may continue until a change in use occurs as described in Section 14. Temporary access connections are legal nonconforming connections until such time as the temporary condition expires.

Any access connection constructed without approval after the adoption of this policy shall be considered an illegal nonconforming connection and shall be issued a violation notice and may be closed or removed.

Requests for Modification

Access connections deemed in conformance with this policy may be authorized by the City Engineer. Any requests for modification shall require approval by the City Engineer.

The City Engineer may reduce the connection, median opening, traffic signal, or roadway spacing requirements by up to 10 percent or 100 feet (whichever is less) where it is impractical to meet the standards, except where prohibited by this code.

Modifications greater than those described in the above paragraph shall require documentation justifying the need for the modification and an access management plan for the site that includes site frontage plus the distance of connection spacing standards from either side of the property lines. The analysis shall address existing and future access for study area properties, evaluate impacts of the proposed plan versus impacts of adherence to standards, and include improvements and recommendations necessary to implement the proposed plan.

Variances

Based on an engineering study, the standards outlined in this code may be altered or waived by the City Engineer to accommodate existing street or property limitations or extraordinary conditions.

Waiver for Nonconforming Situations

Where the existing configuration of properties and driveways in the vicinity of the subject site precludes spacing of a connection in accordance with the spacing standards of this code, the City Engineer, in consultation with appropriate City departments, shall be authorized to waive the spacing requirement if all of the following conditions have been met:

- No other reasonable access to the property is available.
- The connection does not create a potential safety or operational problem as determined by the City Engineer based on a review of a transportation impact study (TIS) prepared by the applicant's professional engineer.
- The access connection along the property line farthest from the intersection may be allowed. The construction of a median may be required on the street to restrict movements to right-in/right-out and only one drive shall be permitted along the roadway having the higher functional classification.
- Joint access shall be considered with the property adjacent to the farthest property line. In these cases:
    - A joint-use driveway with cross-access easements will be established to serve two abutting building sites,
    - The building site is designed to provide cross-access and unified circulation with abutting sites; and
    - The property owner agrees to close any pre-existing curb cuts after the construction of both sides of the joint use driveway.

Interim Access

A development that cannot meet the connection spacing standards of this policy and has no reasonable alternative means of access to the public road system may be allowed an interim connection. When adjoining parcels develop where joint or cross-access can be provided, permission for the interim connection shall be rescinded and the property owner must remove the interim access and apply for another connection. Conditions shall be included in the approval of an interim connection including, but not limited to the following:

- Applicants must sign an agreement to participate in any future project to consolidate access points.
- Applicants must sign an agreement to abandon the interim access when adequate alternative access becomes available.
- The transportation impact study should consider both the interim and final access/circulation plan.

A limit may be placed on the development intensity of small corner properties with inadequate corner clearance, until alternative access becomes available.

Section 17: Glossary

AASHTO: American Association of State Highway and Transportation Officials

Access Point: See definition for "Connection"

ADT: Average Daily Traffic. The average number of vehicle trips generated over a specific time period.

Connection: Any street or driveway intersection with a public street. It also includes median openings on public streets.

City Engineer: The City Engineer can authorize a designee to make decisions where the text authorizes the City Engineer to make decisions

Driveway throat: The portion of the driveway extending back from the public street, uninterrupted by any internal site access points (through physical prohibition by raised islands)

FHWA: Federal Highway Administration

Flag lots: Lots created such that each parcel has access to the main roadway instead of the preferred method in which the parcels connect on a private drive or local roadway

KDOT: Kansas Department of Transportation

LOS: Level of service. A measure of effectiveness that determines the quality of service on transportation infrastructure.

Outparcels: Lots on the perimeter of a larger parcel that break its frontage along a roadway. They are often created along arterial street frontage of shopping center sites, and leased or sold separately to businesses that desire the visibility of major street locations.

Queue: A line of vehicles

Trip Generation: Prediction of the amount of traffic originating from a particular location

V/C: The ratio of demand flow rates to capacity for a given type of transportation facility

WAMPO: Wichita Area Metropolitan Planning Organization