Lee's Summit, Missouri
Access Management Code

March 2018

Originally Drafted by TranSystems Corp. and Adopted by Ordinance #5832 on November 4, 2004
Revisions Drafted by Staff and Amended by Ordinance #XXXX on Date, 2018

Section 1 - Introduction

1.1. Introduction

Throughout the country, problems on our street system such as midblock crashes and delays to through traffic caused by turning vehicles can be traced to the access provided to abutting property via side streets and driveways. Historically, decisions to allow access were typically made relative to individual properties and not the function and characteristic of the street to which access was allowed. This piece-meal approach to access planning has frequently resulted in an illogical and excessive number of access points that have led to increased congestion and crashes.

"Access management" takes a comprehensive view of property access relative to the function of the streets from which it is provided. The objective of access management is to optimize, or find that right balance, between property access and traffic safety and efficiency, particularly along arterial streets. In other words, access is viewed in the context of the street system instead of just the individual property. Even further, access should be viewed in the context of the ultimate traffic volumes. What might appear acceptable one day may well be perceived differently in a long-term perspective.

Access management is the careful planning and design of driveways, median openings, interchanges, and street connections to a roadway. It also involves the application of median treatments and turning lanes, and the appropriate separation of traffic signals. This is done to maintain the viability of major roadways to safely and efficiently accommodate traffic volumes commensurate with their function. It is the arterial street network that is key to the success of transportation within a community and it represents perhaps the greatest financial infrastructure investment.

Access management requires that all properties have reasonable access to the public roadway system. Existing access may be improved as to comply with best practices in access management as redevelopment, surrounding development or capital projects occur, but due to existing constraints, some access may never be fully improved. The objective of this Access Management Code is to avoid further degradation caused by access in already developed areas and to prevent the creation of problems in the future. The net effect of access management along arterial streets is that the supporting networks of collector and local streets, and even inter-parcel connectivity, become more critical to effective circulation and property access.

The ultimate configuration of a street and its function are typically the result of land use planning, transportation planning, and traffic engineering. The concept of access management integrates these activities in order to optimize the safety and performance of the public street network, a significant infrastructure investment vital to the public health, safety and well-being of the community.

1.2. Experience

Every community has experienced safety and traffic operational problems associated with too much or poorly planned access to abutting properties. Many have also found it necessary to retrofit solutions to solve these problems. In the course of this experience, it has been discovered that managing access to major roadways has significant positive effects, including reducing crash frequency, minimizing crash severity, lessening congestion, facilitating economic growth, enhancing community character, and improving air quality.

Studies to date indicate that an effective access management program can result in significant decreases in crashes and travel delays. Obviously the degree of impact will vary based on the specific circumstances of any street segment, but this experience has provided valuable insight into the factors that have a negative influence on traffic safety and efficiency. Some of these factors include:

- 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; and
- Traffic signals too close together.

Sometimes congestion and crash experience on major streets have unintended and undesirable consequences such as encouraging drivers to find alternate routes on collector and local streets.

Requirements for well-designed road and access systems further the orderly layout and use of land and help improve the design of residential subdivisions and commercial circulation systems. However, the "change" to a system of shared or unified access to property along major roadways often causes concern among property owners or business operators, due to the perception that loss of individual driveway access could adversely impact property values or income.

The appearance of corridors and gateways is also critical to the image of a community and its overall attractiveness to investors. Minimizing the number of curb cuts, consolidating access drives, constructing landscaped medians, and buffering parking lots from adjacent thoroughfares results in a visually pleasing and efficient corridor that, in turn, can help attract new investment. Effective management of roadway corridors also protects property values over time and fosters healthy economies.

1.3. Conflicts and Revisions

While every effort has been made to ensure that this Access Management Code has no conflicts with the Code of Ordinances, Unified Development Ordinance or the Design and Construction Manual, there may be occasions where discrepancies between these documents arise. Upon such an occasion, the City Engineer (or designee) shall determine the more restrictive provision and it shall apply. This decision can be appealed to the City Council.

Should a discrepancy be identified, city staff will work to modify the affected ordinances in a timely manner.

Section 2 - Glossary

AASHTO - The American Association of State Highway and Transportation Officials.

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

Access Management - Measures to assure the appropriate location, design, and operation of driveways, median openings, interchanges, and street connections to a roadway, as well as the application of median treatments and turning lanes in roadway design, and the appropriate separation of traffic signals for the purpose of maintaining the safety and operational performance of roadways.

Access Management Program - The whole of all actions taken by a governing council, board, or agency to maintain the safety and traffic carrying capacity of its roadways.

At Grade - When two or more facilities that meet in the same plane of elevation.

Auxiliary Lane - A lane adjoining a roadway that is used for acceleration, deceleration, or storage of turning vehicles.

Average Daily Traffic (ADT) - The average two-way daily traffic volume on a route.

Backage Road - A local road that is used to provide alternative access to a road with higher functional classification; backage roads typically run parallel with the main route and provide access at the back of a line of adjacent properties. Also known as a "Reverse Frontage Road" or "Parallel Access Road".

Change in Use - A change in use may include, but is not limited to, structural modifications, remodeling, a change in the type of business conducted, expansion of an existing business, a change in zoning, or a division of property creating new parcels, but does not include modifications in advertising, landscaping, general maintenance or aesthetics that do not affect internal or external traffic flow or safety.

City Engineer - City staff position that is responsible for directing the technical engineering element of the Public Works Department. Staff position in responsible charge of design and construction criteria and specifications, inspections and interpretations for public transportation infrastructure.

City Traffic Engineer - City staff position established by ordinance with powers and duties with respect to traffic. Staff position that is responsible for determining and directing the installation and operation of traffic control devices and management of transportation, including access management, development related traffic/transportation impacts, traffic engineering, transportation planning, operations and maintenance for transit, bicycle, pedestrian, and vehicular transportation/traffic operations. The City Engineer shall act as the City Traffic Engineer in his or her absence. The City Traffic Engineer may delegate duties with respect to this code to a qualified professional engineer as appropriate.

Commercial - Property developed for the purpose of retail, wholesale, recreation, med- and high-density multi-family, educational or industrial activities. Generally, not residential property as residential is defined with limited uses herein.

Conflict - A traffic-related event that causes evasive action by a driver to avoid a collision.

Conflict Point - Any point where the paths of two through or turning vehicles diverge, merge, or cross and create the potential for conflicts.

Congestion - A condition resulting from more vehicles trying to use a given road during a specific period of time than the road is designed to handle with what are considered acceptable levels of delay or inconvenience.

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

Connection Spacing - The distance between connections, measured from centerline to centerline (center of right-of-way for public streets) along the edge of the traveled way.

Controlled-Access Highway - Every highway, street or roadway in respect to which owners or occupants of abutting lands and other persons have no legal right of access to or from the highway, street or roadway except at such points only and in such manner as may be determined by the public authority having jurisdiction over the highway, street or roadway.

Cross Access - A service drive that provides vehicular access between two or more abutting sites so that the driver need not enter the public street system to move between them.

Deceleration Lane - A speed-change lane that enables a vehicle to leave the through traffic lane and decelerate to stop or make a slow-speed turn.

Directional Median Opening - An opening in a raised median that provides for specific traffic movements and physically restricts other movements. For example, a directional median opening may allow only right turns at a particular location.

Design Traffic Volume - The traffic volume which a roadway or driveway was designed to accommodate, and against which its performance is evaluated.

Downstream - The next feature (e.g. a driveway) in the same direction as the traffic flow.

Downtown Core - An area defined in the Unified Development Ordinance for Downtown Central Business District (CBD).

Driveway - A (typically) private roadway or entrance used to access residential, commercial, or other property from an abutting roadway.

Driveway Density - The number of driveways divided by the length of a particular roadway.

Driveway Spacing - (see Connection Spacing)

Driveway Width - The width of a driveway measured from one side to the other at the point of tangency.

Easement - A grant of one or more property rights by a property owner. For example, one property owner may allow a neighbor to access public roads across his or her property.

Entering (or Intersection) Sight Distance - The distance of minimum visibility needed for a passenger vehicle to safely enter a roadway and accelerate without unduly slowing through traffic.

Facility - A transportation asset designed to facilitate the movement of traffic, including roadways, intersections, auxiliary lanes, frontage roads, backage roads, bike paths, etc.

FHWA - The Federal Highway Administration of the U.S. Department of Transportation.

Flag Lot - A lot not meeting minimum frontage requirements where access to a public road is provided by a narrow strip of land carrying a private driveway.

Frontage - The length of a property that directly abuts a highway.

Frontage Road - A roadway that is used to provide alternative access to property from a roadway with higher functional classification; frontage roads typically run parallel to the mainline roadway and provide access at the front of a line of adjacent properties.

Functional Area - The area surrounding an interchange or intersection that includes the space needed for drivers to make decisions, accelerate, decelerate, weave, maneuver, and queue for turns and stop situations.

Functional Classification System - A system used to categorize the design and operational standards of roadways according to their purpose in moving vehicles; higher functional classification implies higher traffic capacity and speeds, and typically longer traveling distances.

Functional Integrity - Incorporating appropriate access management standards and controls that allow a roadway to maintain its classified purpose.

Geometric Design Standards - The acceptable physical measurements that allow a facility to maintain functional integrity.

Grade Separated - Two or more facilities that intersect in separate planes of elevation.

Highway - The entire width between the boundary lines of every way maintained when any part thereof is open to the use of the public for purposes of vehicular travel.

Highway Capacity - The maximum number of vehicles a roadway can handle during a particular amount of time and at a given level of service.

Highway Network – Collectively all roadways, including controlled access highways, interstates, freeways, expressways, arterials, collectors, and local streets that facilitate vehicular movement within the transportation system.

Industrial/Commercial Collector - Roadway that collects traffic to and from commercial or industrial areas and distributes it to arterials.

Industrial/Commercial Local Street – Street that carries traffic between commercial or industrial lots to industrial/commercial collector streets or arterial streets.

Interchange - A grade-separated facility that provides for movement between two or more roadways.

Internal Circulation - Traffic flow that occurs inside a private property.

Internal Site Design - The layout of a private property, including building placement, parking lots, service drives, and driveways.

Intersection - An at-grade facility that provides mobility between two or more roadways.

Interstate - A federally-designated roadway system for relatively uninterrupted, high-volume mobility between states.

Joint (or Shared) Access - A private access facility used by two or more adjacent sites.

Lane - The portion of a roadway used in the movement of a single line of vehicles.

Left-Turn Lane - A lane used for acceleration, deceleration, and/or storage of vehicles conducting left-turning maneuvers.

Level of Service - The factor that rates the performance of a roadway by comparing operating conditions to ideal conditions described in the Highway Capacity Manual; "A" is the best to "F," which is worst.

Major Arterial - Roadway that serves the highest traffic volume corridors and the longest trips. Typically provides travel between business districts and outlying residential areas, between major inner city communities and between major suburban centers, and connects communities to major state and interstate highways. Access is generally limited and partially controlled. Spacing of major arterials is typically from one to five miles.

Median - A barrier that separates opposing flows of traffic. Raised medians (with curbs and a paved or landscaped area in the center) are generally used in urban areas. Raised medians should not be confused with more obtrusive Jersey barriers. Flush median (with no curbs and a grass-covered area in the center) are generally used in rural areas. Medians can be both functional and attractive.

Median Width - The distance between the near edge of the through travel lanes in each direction when separated by a median.

Mid-Block Crossing - A crossing that is provided so that pedestrians can conveniently cross a roadway in the middle of a block or segment of roadway.

Minor Arterial - Roadway that interconnects and augments the major arterials. Accommodates trips of moderate length at a lower level of travel mobility than major arterial streets with typically similar operating speed and less volume. Access is generally limited and mostly controlled. Spacing of minor arterials in combination with major arterials is generally from one-half mile to three miles.

Shared-Use Path - A paved surface typically constructed parallel to a street to serve pedestrian and bicycle traffic.

NCHRP - The National Cooperative Highway Research Program, a program that sponsors research on highway safety, operations, standards, and other topics.

Peak Hour Traffic - The number of vehicles passing over a section of roadway during its most active 60-minute period each day.

Police Power - The general power vested in the legislature to make reasonable laws, statutes and ordinances where not in conflict with the Constitution that secure or promote the health, safety, welfare and prosperity of the public.

Private Street - A highway, street or road, open for use by the general public and which is under private jurisdiction or control. A private street is generally constructed to the same standards as a public street, named and used in reference addressing property.

Public Street - A highway, street or road, open for use by the general public and which is under the jurisdiction or control of a public body. Public Streets are generally classified as various highways, arterials, collectors, local and access based on function.

Queue Storage - That portion of a traffic lane that is used to temporarily hold traffic that is waiting to make a turn or proceed through a traffic control device such as a stop sign or traffic signal.

Raised Median - The elevated section of a divided road that separates opposing traffic flows.

Residential - Property developed for the purpose of single family, low-density multi-unit, agricultural or other housing quarters.

Residential Access Street - Roadway that carries traffic between residential lots and residential local street or residential collector streets. Residential access streets usually carry no through traffic and include short loop streets, cul-de-sacs, and courts that provide direct access to property. Desirable maximum ADT = 200 for cul-de-sacs and 400 for loop streets.

Residential Collector - Roadway that collects traffic to and from residential areas via residential local and residential access streets and distributes it to arterial streets. Limited access is allowed from residential lots when no local street or access street is available. Desirable maximum ADT = 3,000.

Residential Local Street - Street that usually carry through traffic having its origin or destination within the immediate neighborhood and provide direct access to property. Desirable maximum ADT = 1,500.

Reviewing Engineer - An individual or individuals designated by the City Engineer to review development projects and make decisions as outlined in this Policy. The review should include input from the appropriate departments (fire, police, public works, planning & development, etc.).

Right-In, Right-Out (RIRO) - A driveway where left turns and cross-overs at an intersection are prohibited.

Right-of-Way - Land reserved, used, or slated for use for a highway, street, alley, walkway, drainage facility, or other public purpose related to transportation or utilities.

Roadway - The portion of a highway improved, designed or ordinarily used for vehicular travel. That portion of a street which only includes the travel lanes.

Roadway Classification System - See "Functional Classification System"

Service Street - A local street that is used to provide alternative access to a street with higher functional classification; service roads may include internal circulation systems, frontage roads, or backage roads.

Shared Driveway - A single, private driveway serving two or more lots.

Side Friction - Driver delays and conflicts caused by vehicles entering and exiting driveways.

Sidewalk - A paved surface designed specifically to serve permitted non-motorized transportation users. Refer to sidewalk definitions in the Code of Ordinances.

Sight Distance - The distance visible to the driver of a passenger vehicle measured along the normal travel path of a roadway to a specified height above the roadway when the view is unobstructed to oncoming traffic. Sight distance would include intersection sight distance, roadway sight distance, stopping sight distance, passing sight distance, etc.

Spacing - For purposes of this policy, the distance between two roadways and or drives measured from the center of one roadway to the center of the next roadway, unless otherwise defined for a specific application.

Speed Differential - The difference in travel speed between through traffic, and traffic entering or exiting a roadway.

Stopping Sight Distance - The minimum distance required for a vehicle traveling on a roadway to come to a complete stop upon the driver seeing a potential conflict; it includes driver reaction and braking time and is based on a wet pavement.

Storage Length - see Queue Length.

Street - The pavement and sub-grade of an access, local, collector or arterial roadway, inclusive of shoulder, curb, on-street parking, etc.

Strip Development - A linear pattern of roadside commercial development, typically with relatively shallow lots and frequent drives. Also typically lacks a network of side streets permitting efficient traffic circulation between adjacent developments.

Taper - The transitional area of a roadway where lanes are added or dropped.

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

Through Street –A through street shall be defined as any part of any roadway or street functionally classified as a Local, Collector, Arterial, Frontage Road, or Highway that assumes priority or which may be designated priority over another roadway at intersections based on the highest functional classification of intersecting roadways, except when otherwise may be determined by the City Traffic Engineer upon the basis of an engineering and traffic study and such condition is appropriately signed or controlled to give notice thereof.

Traffic Flow - The actual amount of traffic movement.

Transportation Impact Study - A report that compares relative roadway conditions with and without a proposed development; typically including an analysis of mitigation measures.

Trip Generation - The estimated volume of entering and exiting traffic caused by a particular development.

Turning Radius - The radius of an arc that approximates the turning path of a vehicle.

Two-Way Left-Turn Lane (TWLTL) – A lane located between opposing traffic flows which provides a transition area for left-turning vehicles.

Uncontrolled Access - A situation that results in the incremental development of an uncontrolled number, spacing, and/or design of access facilities.

Upstream - Against (behind) the direction of the traffic flow.

Vehicle Trip - A vehicle moving from a point of origin to a point of destination.

Warrant - The standardized condition under which traffic management techniques are justified.

Weaving - Crossing of traffic streams moving in the same general direction through merging and diverging, for instance near an interchange or intersection.

Section 3 - Street Classification System

3.1. Street Classifications

Safe and efficient operation of roadways requires that these facilities be classified and designed for the functions that they will perform. The entire highway network is traditionally classified by relating the proportion of through movement to the proportion of access. Interstates and freeways, which have full control of access and serve only the movement function, are at one end of the scale; access and local streets, which predominately provide for land connections, are at the other end of the scale because they have little or no through movement. Collector and arterial streets normally must provide a balance between movement and access functions; it is along these streets that access management actions become most important.

Interstates, freeways and expressways in Lee's Summit are generally the responsibility of the Missouri Department of Transportation (MoDOT). As such, those facilities should generally reference the state and federal classification systems and applicable requirements. City streets generally range from access streets to arterial streets. Seven roadway classifications are defined in Section 2; also referenced in more detail and context in the Thoroughfare Master Plan. These include:

- Major Arterial
- Minor Arterial
- Industrial/Commercial Collector
- Residential Collector
- Industrial/Commercial Local
- Residential Local
- Residential Access

A number of highway frontage roads exist in Lee's Summit, some owned by MoDOT and some by the City. These frontage roads are unique by their proximity to fully-controlled highways but the function of each may be categorized by one of the seven aforementioned classifications.

3.2. Typical Sections

A typical section for each classification is described in the Lee's Summit Public Works Department Design and Construction Manual. Some of the considerations that go into defining the needed cross section of any given street segment are described below.

3.2.A. Traffic Lanes

The number and types of lanes on any street should be determined by existing and projected traffic volumes and the nature of land use activity adjacent to it. Turn lanes are essential at many intersections. Reference the Thoroughfare Master Plan and Access Management Code for lane requirements and planning.

3.2.B. Bicyclists

Bicycle routes are established on some city streets. Considerations for bicyclists could include a wider traffic lane, marked bike lanes, or shared-use paths. Reference the

Bicycle Transportation Plan and Greenway Master Plan for bicyclist accommodation types and locations.

3.2.C. Pedestrians

Sidewalks or shared-use paths are generally required on one or both sides of a public street. Requirements are outlined in the Design and Construction Manual and the Unified Development Ordinance. Reference the Greenway Master Plan for shared-use path locations.

3.2.D. Right-of-Way

Providing sufficient right-of-way to meet the long term growth potential of a street is one of the most important elements of the transportation system. Once development occurs adjacent to the street, additional expansion of the roadway may become very expensive or impractical if sufficient right-of-way is not available. This may in turn limit additional development if sufficient capacity cannot be provided.

In addition to the basic number of through lanes, street elements that influence the amount of right-of-way required include left-turn lanes (double left-turn lanes at some arterial street intersections), right-turn lanes, bike lanes, medians, sidewalks and shared-use paths.

3.2.E. Corner Right-of-Way Triangles

A minimum 25-foot triangle of additional right-of-way shall be provided at the corners of two intersecting streets as noted in the Unified Development Ordinance. The triangle is determined by measuring along both right-of-way lines 25 feet from their point of intersection and striking a line to connect the two points (see ***Figure 3-1***). A larger triangle may be required at intersecting streets that both have a designated classification of arterial or collector and/or where any street alignments require additional sight distance. A triangle of additional right-of-way may be required at intersections with driveways if the conditions are deemed appropriate by the City Traffic Engineer. The purpose of this triangle is to allow room for utilities, traffic control devices, sight distance, sidewalks and shared-use paths behind the corner radius of the intersection.

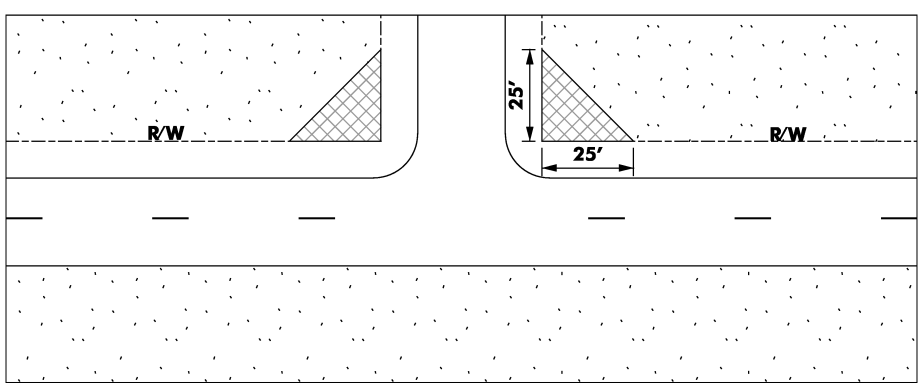

Figure 3-1
Corner Right-of-Way Triangle

Section 4 - Street Planning

The location and spacing of arterial streets should reference the Thoroughfare Master Plan. Arterials have highly controlled alignments associated with long-term community planning considerations and predetermined connectivity to fully-controlled highways. Collectors are also depicted in the Thoroughfare Master Plan, but to a much lesser extent than arterials with more flexibly in location and alignment to better accommodate development activity. Collector streets are the backbone of effective access management. These streets, both those classified as collector streets and those within or adjacent to developments that serve in this capacity, allow many developments to be efficiently served from a limited number of connections to the arterial street network.

4.1. Planning Requirements

The following requirements shall be applied in the development of the collector street network.

4.1.A. Prior to the approval of any new development, the Thoroughfare Master Plan shall be reviewed and the development compared with consideration of the planned conceptual collector street network, or the modification thereto that maintains continuity thereof, for the area bounded by the arterial streets or section lines containing the development and projected future land uses based on zoning and supporting transportation system within the area. Consideration must also be given to existing or planned connections and collector streets in adjacent sections, nearby developments, existing property lines and topographic features.

4.1.B. The proposed development plan may propose an alternative collector street network as long as the principles described above are followed. The alternative collector street network must be approved along with the development plan. Within exclusively residential areas, continuous collector streets are desirable, but not essential. In these areas, a less defined collector network may be utilized, but should provide connectivity between developments and relatively direct access between the designated collector street connections to the arterial street network (note that access at other connections to the arterial street network may be restricted per this policy).

4.1.C. Collector streets shall be public streets.

4.1.D. A collector street may serve both residential and non-residential development, but should be planned to discourage use by commercial traffic into residential areas.

4.1.E. Collector streets should connect to arterial streets at full median opening locations in accordance with the standards in this policy. Where feasible, the connection should also be made at a location suitable for a traffic signal.

4.2. Example

An example of a collector street network is shown on ***Figure 4-1***. Note that in order to maintain good connection spacing on the arterial roadways, commercial development areas should be at least 1/4 mile by 1/4 mile in size, larger where adjacent to major arterial streets.

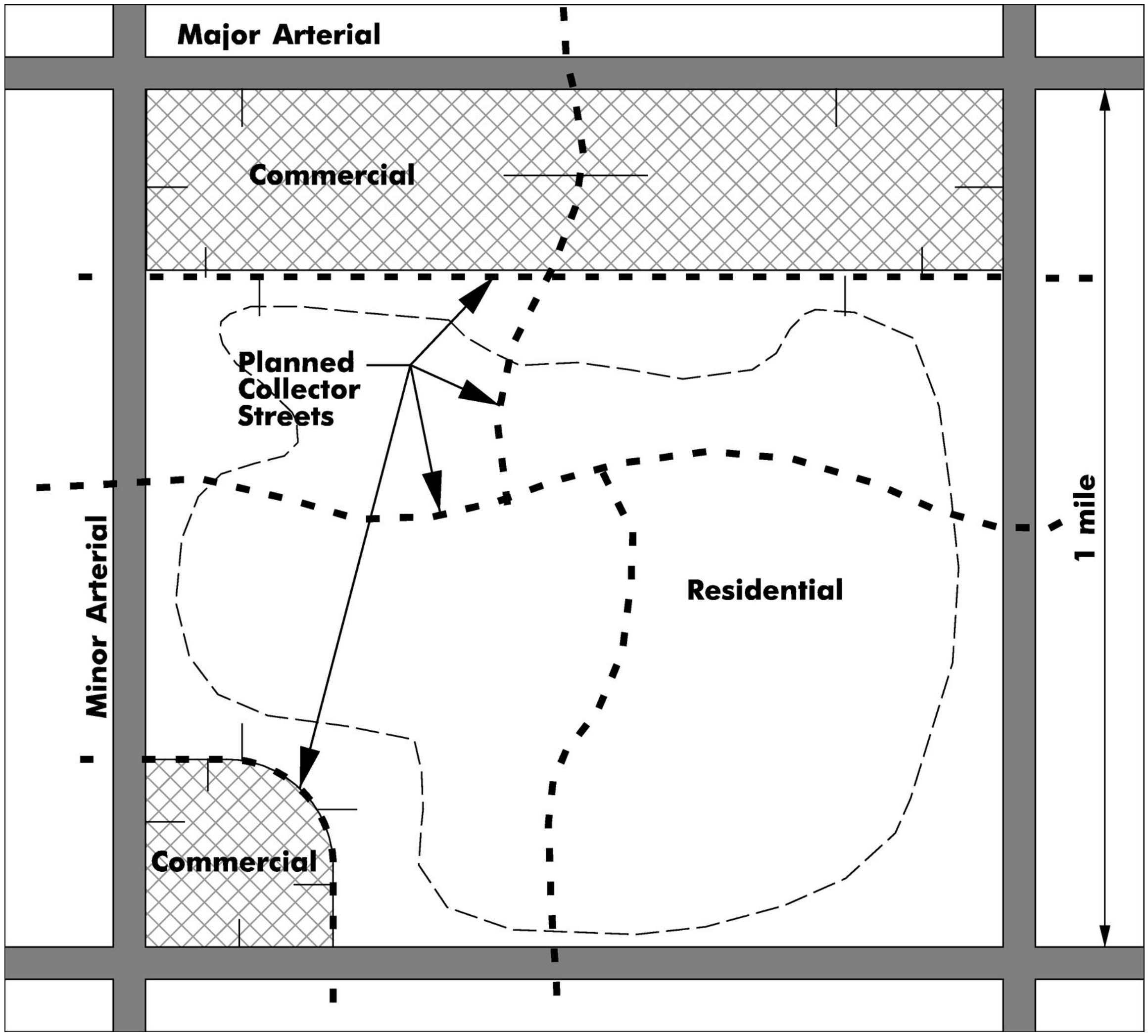

Figure 4-1
Collector Street Planning Example

Section 5 - 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 standards in this policy.

5.1. Approval Required

5.1.A. No person shall construct or modify any access connection to a Lee's Summit street without approval from the City. Approval is typically granted through the preliminary and final development plan processes, plats and/or engineering approval of construction plans for streets. All requests for connections to a roadway, including those requests by Right-of-Way permit, within the City shall be reviewed for conformance with this Access Management Code.

5.1.B. Access connections that do not conform to this policy and were constructed before the effective date of this policy, as may be applicable to the original policy of 2004, shall be considered legal nonconforming connections and may continue until a change occurs as provided in Section 8. Temporary access connections are legal nonconforming connections until such time as the temporary condition expires. Access connections and legal nonconforming conditions do not limit the City's ability to restrict access or relocate access as the extent, number and location of access, whether full or partial, for existing legal conforming or legal nonconforming conditions is not guaranteed at any time.

5.1.C. 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.

5.2. Requests for Modification

5.2.A. Access connections deemed in conformance with this policy may be authorized by the City Traffic Engineer. Any requests for modification shall require approval by the City Traffic Engineer. Any appeal of the decision of the City Traffic Engineer shall be to the city council which has final authority. Note: some access restrictions are also described on the recorded plat and the subject plat should be referenced in review of any request for modification.

5.2.B. Modifications of greater than 10 percent of the allowable spacing standard or 100 feet, whichever is less, 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.

5.3. Waiver for Nonconforming Situations

Where the existing configuration of properties and driveways in the vicinity of the subject site precludes spacing of an access point in accordance with the spacing standards of this policy, the City

Traffic Engineer, in consultation with appropriate City departments, shall be authorized to waive the spacing requirement if all of the following conditions have been met:

5.3.A. No other reasonable access to the property is available.

5.3.B. The connection does not create a potential safety or operational problem as reasonably determined by the City Traffic Engineer based on a review of a transportation impact study prepared by the applicant's professional engineer.

5.3.C. 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.

5.3.D. 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.

Where the spacing requirement is waived, the requirements for turn lanes may also be amended accordingly at the discretion of the City Traffic Engineer due to physical constraints and limitations of access separation.

5.4. Temporary 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 network may be allowed a temporary connection. When adjoining parcels develop which can provide joint or cross access, permission for the temporary connection shall be rescinded and the property owner must remove the temporary access and apply for another connection.

Conditions shall be included in the approval of a temporary 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 or temporary access when adequate alternative access becomes available.
- The transportation impact study should consider both the temporary 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 6 - Access Management and Subdivision Practices

The design of property access is established when land is subdivided for commercial or residential development. Therefore, all new lot splits and commercial and residential plats will be reviewed to assure that property access is designed in accordance with the access management code. The following standards shall also apply.

6.1. Creation of New Lots

New lots shall not be created on any arterial or collector street unless they comply with the access spacing standards of this plan through existing, shared, or alternative access.

6.2. Subdivision Access

6.2.A. When a subdivision is proposed that would abut or contain an arterial or collector street, it shall be designed to provide lots abutting the classified roadway with access from an interior local or access street. On arterial streets, appropriate measures may be required to buffer residential properties from the noise and traffic of the through street.

6.2.B. Direct residential driveway access to individual one-family and two-family dwellings shall be avoided from any arterial or collector street.

6.2.C. Residential corner lots shall obtain access from the street with the lowest functional classification, and access shall be placed as far from the intersection as possible to achieve the maximum available corner clearance. Residential corner lots located at the intersection of two local or access streets may have one access from each street so long as minimum corner clearances are met, the access does not impact the intersection functional area, or encroach the sight distance triangle. Access shall also reference the connection spacing standards in Section 15 and consider any restrictions that may be noted on the recorded plat.

6.2.D. Access locations to subdivisions shall provide appropriate sight distance, driveway spacing, and include a review of related considerations.

6.3. Connectivity of Supporting Streets

As the City of Lee's Summit continues to grow and land is subdivided for development, it will be essential to provide for a balanced network of local and collector streets to avoid traffic congestion on arterial roadways. Without a supporting well connected minor street network, all local trips are forced onto a few major streets resulting in significant traffic delays and driver frustration. Reasonable connectivity of the local street network is important. Fragmented street networks impede emergency access, focus congestion, diminish operational and maintenance efficiencies (e.g. snow removal, service deliveries, etc.) and increase the number and length of individual trips. A network of residential local and access streets should be designed in a manner that fosters appropriate operating speeds, diversity of routes, access to collectors, shorter block lengths, and fewer through trips, without eliminating connectivity.

To accomplish these objectives, the following standards shall apply:

6.3.A. New residential subdivisions shall be designed to coordinate with existing, proposed and anticipated streets.

6.3.B. All new developments shall be designed to discourage the use of access and local roadways by non-local traffic while maintaining the overall connectivity with the surrounding system of roadways. This may be accomplished through the use of well-connected local streets to centrally located collectors, shorter block lengths between streets that increase route choice, modified grid systems, T-intersections, roadway jogs, or other appropriate traffic calming or street design measures within the development.

6.3.C. Proposed streets should be extended to the boundary lines of the proposed development where such an extension would connect with streets in another existing, platted, approved, planned or potential development. The extension or connection should be based upon traffic circulation and/or public safety enhancement opportunities and compatibility of adjacent land uses, development requirements for access and to reasonably support the highest and best anticipated use of the property in conformance with the Comprehensive Plan.

6.3.D. When a proposed development abuts unplatted land or a future development phase of the same development, stub streets should be provided to provide access to abutting properties or to logically extend the street network into the surrounding areas. All street stubs serving more than two residential units (or exceeds the allowable maximum length of dead-end street considering provisions of the Fire Code or Unified Development Ordinance) should be provided with a temporary cul-de-sac, and the restoration and extension of the street would be the responsibility of any future developer of the abutting land.

Section 7 - Unified Access and Circulation

Internal connections between neighboring properties and shared driveways allow vehicles to circulate from one business or development to the next without having to reenter a collector or arterial street. Unified access and circulation improves the overall ease of access to development and reduces the need for individual driveways. The purpose of this section is to accomplish unified access and circulation systems for commercial development.

7.1. Outparcels and Shopping Center Access

Outparcels are 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. Outparcel access policies foster unified access and circulation systems that serve outparcels as well as interior development, thereby reducing the need for driveways on an arterial street.

In the interest of promoting unified access and circulation systems, development sites under the same ownership or consolidated for the purposes of development and comprised of more than one building site shall prepare a unified access and circulation plan. In addition, the following shall apply:

7.1.A. The number of connections shall be the minimum number necessary to provide reasonable access to the overall development site and not the maximum available for that frontage under the connection spacing requirements in this policy.

7.1.B. Access to outparcels shall be internalized using the shared circulation system of the principal development.

7.1.C. All necessary easements and agreements shall be recorded in an instrument that runs with the deed to the property.

7.1.D. 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.

7.1.E. Where properties are under the same ownership or consolidated for the purposes of development, the shared access, driveway or street(s) shall be constructed by the developer.

7.2. Joint and Cross Access

7.2.A. Joint and cross access policies promote connections between developments, interactions of land use varieties, as well as continuity of properties along a corridor without thoroughfare conflicts. 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, i.e., adjacent shopping centers or office parks that abut shopping centers, apartments and restaurants. Adjacent commercial or office properties and major traffic generators, e.g. shopping plazas, shall provide a cross-access drive and pedestrian access way to allow circulation between adjacent properties. This requirement shall also apply to a building site that abuts an existing developed property unless the City Traffic Engineer finds that this would be impractical.

7.2.B. To promote efficient circulation between smaller development sites, the City Traffic 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 shared access. The shared access 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 shared access 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.

7.2.C. 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 shared access (or private road), and a joint maintenance agreement defining maintenance responsibilities of property owners that share the joint-use driveway and cross-access system (or private road).

7.2.D. Joint and cross access requirements may be waived by the City Traffic Engineer for special circumstances such as incompatible uses, e.g. a gas station next to a child care center, or major physical constraints, e.g. change in grade between properties makes connection impractical.

Section 8 - Redevelopment

Access management policies are not retroactive, but existing legal non-conforming access is not immune to the problems associated with inept access management; and the absence of access management policies in the past does not diminish the benefits of proactive improvement. Existing nonconforming properties may continue in the same manner as they existed before this policy was adopted and until such time redevelopment of the property, significant change of property use or street improvement occurs. This allowance, commonly known as "grandfathering", protects the substantial investment of property owners and recognizes the expense a property owner may incur bringing nonconforming properties into conformance.

Yet nonconforming access situations may pose safety dilemmas, contribute to traffic congestion, deter economic development, or undermine community character. To address the public interest in these matters, without posing an undue burden on property owners, access to existing nonconforming properties is addressed when a change in use, expanded use or redevelopment occurs so applicants can finance access improvements as part of the overall property improvement. In some instances, opportunities to improve the location or design of property access can also occur during the public roadway improvement process. The extent of access to a property is not guaranteed and such access may be limited directly by improvements to the street where access exists or indirectly through access restrictions to the subject street at intersecting streets. This plan includes the following conditions or circumstances where property owners or permittees may be required to relocate or reconstruct nonconforming access features and/or pursue alternative access measures.

8.1. Requirements

Properties with nonconforming access connections shall be allowed to continue, but must be brought into compliance with this Access Management Code to the maximum extent possible when modifications to the roadway are made or when a change in use or density results in one or more of the following conditions:

8.1.A. When a new connection is requested or required.

8.1.B. When a preliminary and/or final development plan is required.

8.1.C. When a preliminary and/or final plat is required.

8.1.D. When a site experiences an increase of ten percent (10%) or greater in peak hour trips or 100 vehicles per hour in the peak hour, whichever is less, as determined by any one of the following methods:

8.1.D.1. An estimation based on the ITE Trip Generation manual (latest edition) for typical land uses, or

8.1.D.2. Traffic counts made at similar traffic generators in the metropolitan area, or

8.1.D.3. Actual traffic monitoring conducted during the peak hour of the adjacent roadway traffic for the property.

8.1.E. 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 final development plan or final plat within a period of one year from the date of approval, or the previously approved preliminary development plan or preliminary plat has expired in accordance with the Unified Development Ordinance, then that property must thereafter be brought into conformance with all applicable access management requirements of this policy (unless otherwise exempted by the permitting authority) and any previous waivers granted through prior approvals are nullified. This shall include the need to update any previously approved transportation impact study where new traffic projections are available for the proposed development or redevelopment project. For uses or approved plats in existence upon adoption of this policy, the initial one-year period for the purposes of this section already ended as the effective date of these requirements was established in 2004.

8.1.F. Access to all change-in-use or change-in-density activities shall require approval by the City Traffic Engineer. All relevant requirements of this policy shall apply. When a development has been approved with a waiver or modification to these access management requirements, the final development plan and or final plat carries the approval of such waiver or modification in accordance with the approved preliminary plan and or preliminary plat provided by City Council until such time as the preliminary plan and or preliminary plat has expired in accordance with the Unified Development Ordinance. Conformance to these requirements may otherwise be dictated by the remaining provisions of Section 8.1.

Section 9 - Transportation Impact Study Requirements

9.1. Background and Purpose

Land use and transportation are strongly interdependent. Transportation facilities and services are essential for development to occur, and high levels of mobility and accessibility are needed to attract the economic development to provide and maintain a high quality of life.

The primary purpose for evaluating the impact of development through transportation impact studies is to protect the integrity of the transportation systems and ensure adequate transportation infrastructure exists to support not only the proposed development but existing users. Neither public nor private interests are well served if transportations systems needlessly degrade due to poor planning and design.

In order to accomplish this objective, the review of transportation systems associated with development needs to be extensively scrutinized and needs to take a long-term perspective. What might be acceptable today may not be as an area develops and matures. This is certainly consistent with the City's long-range planning for land use, streets and other infrastructure.

A transportation impact study, and the resulting work products, will allow for more informed decision-making and could lead to necessary mitigation measures for the impacts created by development to maintain or provide safe and adequate performance of the transportation systems.

9.2. Extent of Study Required

The necessity to review all land development applications from a transportation perspective as well as the wide variety of land use types and intensities suggest that multiple thresholds or triggers be established to warrant a transportation impact study. The following thresholds and associated scope of study will be followed.

9.2.A. All Applications

9.2.A.1. Identify the specific development plan under study and any existing development on and/or approved plans for the site (land use types and intensities and the arrangement of buildings, parking and access). Also identify land uses (including types and the arrangement of buildings, parking and access) on property abutting the proposed development site, including property across public streets.

9.2.A.2. Identify the land uses shown in the Lee's Summit Comprehensive Plan for the proposed development site under study, as well as the ultimate arterial and collector street network in the vicinity of the site.

9.2.A.3. Identify the functional classification of the public street(s) within the development, bordering the site and those streets on which access for the development is proposed.

9.2.A.4. Identify allowable access to the development site as defined by the City Design and Construction Manual, Unified Development Ordinance and/or Access Management criteria.

9.2.A.5. Document current public street characteristics adjacent to the site, including the nearest arterial and collector streets (number and types of lanes, speed limits or 85th percentile speeds, and sight distances along the public street(s) from proposed access).

9.2.A.6. Compare proposed access with established standards and criteria (driveway spacing, alignment with other streets and driveways, width of driveway, and minimum sight distances). Identify influences or impacts of proposed access to existing access for other properties. If appropriate, assess the feasibility of access connections to abutting properties, including shared access with the public street system.

9.2.A.7. Estimate the number of trips generated by existing and proposed development on the site for a typical weekday, weekday commuter peak hours (commonly referred to as A.M. and P.M. peak hours), and other peak hour(s). Calculate the net difference in trips between existing and proposed uses. If the development site already has an approved plan, also estimate the number of trips that would be generated by the approved land uses. If the development application is proposing a land use different than indicated in the Comprehensive Plan, also estimate the number of trips that would be generated by the land use indicated in the Comprehensive Plan. The Director of Planning & Development shall approve the potential land use intensity in such cases.

9.2.B. Rezoning, Preliminary Development Plan, Preliminary Plat, and Conceptual Development Plan applications.

9.2.B.1. Development or Site Plan Generates 100 to 499 Trips in a Peak Hour
A transportation impact study will be required. The study area may tend to be confined to the street or streets on which access is proposed but should be extended to at least the first major intersection in each direction.

9.2.B.2. Development or Site Plan Generates 500 or More Trips in a Peak Hour
A transportation impact study will be required. The study area will include the street or streets on which access is proposed to at least the first major intersection in each direction but may also extend beyond the first major intersection and/or include other streets.

9.2.B.3. Proposed Land Use Modifies the Comprehensive Plan
Determine the extent of a transportation impact study based on anticipated trip generation. Conduct comparative analyses using the proposed land use and the land use identified in the comprehensive plan.

Table 9-1 lists several land use types and the approximate amount of development that would generate 100 or 500 trips in a typical weekday peak hour.

Table 9-1
Typical Development Size Thresholds

ITE Code	Land Use	Units	Size to Generate 100 Trips	Size to Generate 500 Trips
110	Light Industry	Sq. Ft.	160,000	800,000
130	Industrial Park	Sq. Ft.	250,000	1,250,000
140	Manufacturing	Sq. Ft.	140,000	750,000
150	Warehouse	Sq. Ft.	500,000	2, 650,000
210	Single Family	Units	100	510
220	Apartments	Units	180	n/a
310	Hotel	Units	170	n/a
565	Daycare	Sq. Ft.	9,000	n/a
712	Small Office	Sq. Ft.	40,000	n/a
720	Medical Office	Sq. Ft.	30,000	n/a
812	Bldg Materials	Sq. Ft.	50,000	n/a
813	Discount Superstore	Sq. Ft.	all	115,000
816	Hardware Store	Sq. Ft.	40,000	n/a
820	Shopping Center	Sq. Ft.	10,000	90,000
932	Sit Down Rest.	Sq. Ft.	10,000	n/a
934	Fast Food w/DT	Sq. Ft.	3,000	n/a
945	Gas Sta. w/Conv. Store	Sq. Ft.	all	n/a
881	Pharmacy w/DT	Sq. Ft.	9,500	n/a
912	Bank w/DT	Lanes	4	n/a
912	Bank w/DT	Sq. Ft.	5,000	n/a

Institute of Transportation Engineers (ITE) *Trip Generation*, 10th Edition

9.3. Qualifications to Conduct and Review a Study

The parties involved in a land development application sometimes have different objectives and perspectives. Further, the recommended elements of a transportation impact study require skills found only in a trained professional engineer with specific experience in the field of traffic engineering and transportation planning.

For these reasons, the person conducting and the person reviewing the study must be registered professional engineers licensed in the State of Missouri with at least five years of demonstrated experience either in the preparation or review of transportation impact studies for land development. A registered Professional Traffic Operations Engineer, certified by the Transportation Professional Certification Board, is preferred.

The City Traffic Engineer shall determine whether an individual professional engineer is qualified to conduct a transportation impact study. Credentials shall be provided upon request. Any appeal shall be made to the City Council.

9.4. Review and Use of a Study

A transportation impact study should be viewed as a technical assessment of existing and projected transportation conditions. The extent to which individual professional judgment has to be applied will be minimized by provision of community policies and practices with respect to street and traffic control design and land development.

Ultimately, a transportation impact study will be used by professional staff to make recommendations to the Planning Commission and City Council. Transportation is one element amongst many that must be considered.

City personnel charged with reviewing transportation impact studies have several functions to consider:

9.4.A. Determine whether the impacts of development have been adequately assessed.

9.4.B. Ensure that proposed access is properly coordinated with existing and planned facilities, fits into the ultimate configuration of the street network, and is appropriately designed at its connection to the public street network.

9.4.C. Determine whether proposed improvements for the public street network are necessary and sufficient to mitigate the impacts created, that the improvements meet local requirements, and that adequate transportation infrastructure is available to support the existing transportation users as well as the proposed development in the interest of protecting public health, safety and welfare. The expectations for adequate infrastructure relate to safety and operations in reference to not only the Access Management Code, but also the other standards, policies and ordinances of the City; including but not limited to the Level of Service Policy and Unimproved Road Policy.

9.4.D. Ensure that the development plan considers the needs of pedestrians, bicyclists, and transit users.

9.4.E. Determine whether the development layout can accommodate all anticipated vehicle types and that such vehicles can be accommodated on-site without adverse impact to the public street network.

9.4.F. Invite other responsible and applicable transportation agencies or entities, e.g., Missouri Department of Transportation, to participate in the study and review processes.

9.4.G. Provide consistent, fair, and legally defensible reviews.

9.5. Standard Transportation Impact Study Procedures

9.5.A. Study Methodology Determination

Prior to conducting any transportation impact study it is necessary to determine the minimum technical responsibilities and analyses that will be performed. It is the applicant's responsibility to ensure that the study utilize the techniques and practices accepted by the City and other participating agencies.

The following items shall be considered, discussed and agreed to by the City Traffic Engineer and the applicant for transportation impact studies. The City Traffic Engineer can provide a general scope of services for a traffic impact study upon request from the applicant or applicant's traffic engineer.

- Definition of the proposed development, including type and intensity of the proposed land uses and proposed access.
- Study area limits based on the magnitude of the development.
- Impact or influence on access for adjacent and nearby properties.
- Time periods to be analyzed, e.g., weekday A.M. and P.M. peak hours.
- Scenarios or conditions to be analyzed, e.g. existing conditions, existing plus approved/unbuilt, existing plus approved/unbuilt plus development conditions, and future conditions (consistent with horizon year in City traffic model).
- Future analysis year(s), including special study procedures for multi-phase development plans.
- General assumptions for trip generation, trip distribution, mode split, and traffic assignment.
- Traffic analysis tools and acceptable parameters.
- Availability and applicability of known data.
- Traffic data collection requirements and responsibilities, including time periods in which traffic counts will be collected.
- Transportation system data, e.g. traffic signals, transit stops, etc.
- Planned transportation system improvements, including the anticipated schedule, for all modes of transportation, e.g. street widening, bicycle trails, transit stops, etc.
- Planned/Approved development in the vicinity and any associated improvement conditions/mitigations.
- Methodology for projecting future traffic volumes.
- Current level of service, road condition and access management requirements.
- Acceptable mitigation strategies.

9.5.B. Study Area

The study area and the intersections and street segments to be included will vary for a number of reasons - the type and intensity of the development, the maturity of other development in the vicinity, the condition of the street network, etc. The study area should be large enough to assess the impact or influence of proposed access along street segments and to evaluate the ability of streets and intersections to absorb the additional traffic.

The study area should at least include those street segments onto which access is proposed and should typically extend to the next major intersection (arterial/arterial, arterial/collector, or collector/collector) in each direction.

9.5.C. Analysis Periods

Transportation impact studies should be based on peak-hour analyses. The analysis period(s) should be based on the peaking characteristics of both the public transportation systems and development traffic. The typical analysis periods for most development are the weekday A.M. and P.M. peak hours, often coincidental with peak commuter activity. Retail development that is typically not open early in the morning may not warrant study for the A.M. peak hour. On the other hand, intense retail activity in an area may warrant study during the Saturday peak hour. Some development generates its highest traffic volumes outside these time periods, such as Church and Recreation/Entertainment Facilities, and may require unique study to ascertain the impact of its peak traffic activity.

9.5.D. Analysis Years

In general, the analysis years should be the current period, development build-year, and the horizon year in the City's traffic model. Not all development will require a horizon year analysis; depending on the scale and land use proposed, consistency with the Comprehensive Plan and

Thoroughfare Master Plan, rights-of-way impact for ultimate buildout of adjacent and inclusive roadways and other factors that may be considered by the City Traffic Engineer for its waiver.

9.5.E. Method of Determining Future Traffic Volumes

Future traffic volumes on arterial and collector streets may be identified from the City's traffic model used to develop the long-range transportation plan for each arterial and collector street segment in the study area. The City Traffic Engineer shall provide future traffic projections based on the long-range transportation model or provide a method of derivation to be used in the analysis based on the scope of services. Some large-scale projects that significantly change the land use or transportation network may require long-range transportation modeling, in which case the City may share its transportation demand model for reference. Future traffic volumes are not applicable if the analysis of future year is not included in the scope of study.

9.6. Transportation Impact Assessment

Once the parameters for the transportation impact study have been established, the steps in the study process require the applicant to collect relevant data, assess existing conditions, assess the impact of development, and project future conditions. Actually, two baseline conditions will be studied for existing conditions unless there are no approved developments in the vicinity - one called "Existing Conditions" that is based on conditions in the study area at the time of the study and another called "Existing Plus Approved/Unbuilt Conditions" that is comprised of existing conditions plus traffic forecasts linked to development projects in the vicinity that have been approved but not yet built.

9.6.A. Data Collection

The applicant is responsible for collecting, assembling, analysis and presentation of all data. Typically, the following types of data are required for the study area.

9.6.A.1. Proposed Site Development Characteristics

Identify the specific development plan under study and any existing development on and/or approved plans for the site. This includes land use types and intensities and the arrangement of buildings, parking and access. Also identify land uses (including types and the arrangement of buildings, parking and access) on property abutting the proposed development site, including property across public streets.

Information for the proposed development shall be displayed on a scaled drawing. If detailed information regarding abutting property is not shown on the development plan, it may be exhibited on a current aerial photograph, or other drawing, along with the proposed development.

This information is needed to assess the proposed access in relation to existing driveways and side streets at the site and along the street corridors on which access is proposed. This process should also take into account potential access for undeveloped land in the vicinity.

9.6.A.2. Transportation System Data

This includes the physical and functional characteristics of the transportation systems in the study area. Data to be collected includes:

- The functional classification and jurisdiction responsible for each street.
- The number and types of lanes for all intersections and street segments.

- Traffic control devices such as traffic signals (including left-turn control type(s) and phasing), other intersection control, and speed limits.
- Transit, bicycle, and pedestrian routes and facilities.
- Available sight distances to/from each proposed point of access.
- Planned streets not yet built.
- Planned transit, bicycle and pedestrian routes and facilities not yet built.
- Planned improvements for each street and/or intersection (either programmed for construction or included in the long-range transportation plan).

9.6.A.3. Transportation Demand Data

This includes current traffic volumes (intersection turning movement counts), percent trucks, peak hour factors, transit patronage, bicycle usage, and pedestrian usage. For some studies, additional data such as right-turn-on-red usage, traffic distribution by lane, or other similar data may be required.

Intersection turning movement counts shall be taken on a typical Tuesday, Wednesday, and/or Thursday for weekday conditions. It is preferred that morning and afternoon counts be taken on the same day. For a study requiring traffic counts at several intersections that cannot be accomplished all in one day, the counting program should be organized so that adjacent intersections are counted as close in time as possible and volumes adjusted to balance the highest movements measured. As a minimum, traffic volumes should be measured at any existing site driveway and on the adjacent streets, including the nearest arterial/arterial or arterial/collector intersection in each direction along streets bordering the development site. If a proposed driveway or street will line up with an existing driveway or street opposite it, traffic volumes shall be collected at the existing intersection. The time periods in which existing traffic is counted should generally coincide with the highest combination of existing traffic plus traffic expected to be generated by the proposed development. A minimum of one hour is required but the count periods should extend at least 15 minutes before and at least 15 minutes beyond the anticipated peak hour to ensure that the highest one hour of traffic is identified. Traffic volume counts at intersections shall document left-turn, through and right-turn movements on all approaches and shall be tabulated in no greater than 15-minute increments. The City Traffic Engineer shall determine, based on the nature of the development, additional time periods and locations in which current traffic volumes shall be documented.

9.6.A.4. Traffic Forecasts for Approved/Unbuilt Development

The City Traffic Engineer will determine which approved but unbuilt development influences the study area and will provide the traffic forecasts from those developments for each intersection and street segment in the study area.

9.6.A.5. Land Use Data

Identify the land use(s) shown in the Lee's Summit Comprehensive Plan for the proposed development site under study.

9.6.B. Operational Analysis

Capacity analyses shall be performed for each intersection in the study area. All capacity analyses shall be performed using a method or software approved by the City Traffic Engineer. In general, capacity analyses must be based on methodologies outlined in the latest edition of the Highway Capacity Manual (HCM). Planning level methods of analysis will not be accepted.

While other types of capacity analyses such as roundabout operations may be required for some transportation impact studies, most will include only signalized and unsignalized intersections.

9.6.B.1. Signalized Intersections

9.6.B.1.a. Analysis programs require input of intersection-specific information such as traffic volumes, number and types of lanes, signal phasing, etc., but also include a number of parameters reflecting traffic characteristics and signal operations that typically have preset default values. Care must be exercised to ensure that these parameters provide a true reflection of actual traffic operations and are based on normal practices of the City.

9.6.B.1.b. Cycle lengths used in these analyses must be reasonable based on the signal phasing and traffic demand at the intersection. For example, an arterial/arterial intersection with 8-phase control and protected-only left-turn phasing would likely use a cycle length of at least 100 seconds but possibly as high as 120 to 140 seconds. The cycle length to be used for the analyses shall be based on either existing operations or a cycle length optimization available with most capacity analysis software. Likewise, the green time (or cycle split) allocated to each phase must provide an accurate reflection of existing conditions. For isolated intersections, it is preferred that green times be determined through an optimization program in order to show how well the intersection could operate. For signalized intersections in coordination, actual timings should be used. Other means of developing green times shall be reviewed in advance with the City Traffic Engineer.

9.6.B.1.c. Other considerations in most analyses include the peak hour factor (PHF), percent trucks, clearance intervals, and the queuing model. The PHF should reflect the actual counts taken at the intersection. Some percentage of trucks should be input - either the amount measured or an estimate agreed to with the City Traffic Engineer. Clearance intervals shall be calculated based on practices recommended by the Institute of Transportation Engineers (ITE). These practices will typically yield clearance intervals (yellow plus all red) in the range of 5 to 6 seconds. Other clearance intervals related to pedestrian crossings shall also be accurately represented and comply with MUTCD, ADA and other requirements of the City. The type of queue model used should be applicable to the conditions and queue estimate should provide at least a 90 percent confidence level of the maximum anticipated queue.

9.6.B.1.d. On occasion, the lane utilization factor may need to be adjusted. Under some circumstances, near an interchange for example, the lane utilization may be imbalanced to such an extent that default values would not provide a likely representation of actual conditions.

9.6.B.1.e. The most important outputs of these analyses are the overall intersection level of service and the anticipated vehicle queuing in each lane.

9.6.B.1.f. Under some circumstances, traffic simulation modeling may be necessary or more appropriate to assess a street corridor. Closely-spaced traffic signals or corridors that employ traffic signal coordination are good candidates for simulation modeling. Any such model, however, must produce outputs comparable to HCM methodologies in order to estimate levels of service.

9.6.B.2. Unsignalized Intersections

9.6.B.2.a. The analysis on an unsignalized intersection is actually an analysis of only those movements that must yield to another movement. For example, at a two-way stop controlled intersection, the through and right-turn movements on the uncontrolled street are allowed free flow and are not subject to any delay.

9.6.B.2.b. Analysis results shall never be expressed as an overall intersection level of service; the term is meaningless.

9.6.B.2.c. The most important outputs of these analyses are the levels of service by lane or lane group and the anticipated vehicle queuing in each lane.

9.6.B.3. Acceptable Levels of Service

Refer to the City's Level of Service Policy adopted by City Council Resolution.

9.6.B.4. Vehicle Queuing Considerations

At signalized intersections, vehicle queues should be contained within turn lanes and should not extend into adjacent intersections. Vehicle queues in through lanes may influence the ability to access turn lanes and should be considered in assessing traffic operations.

At unsignalized intersections, vehicle queues should be contained within turn lanes. In the case of a side street or driveway serving a development site, vehicle queues should not impede site circulation, particularly inbound movements from public streets.

9.6.C. Background Traffic Growth

Background traffic is the expected increase in traffic volumes over time except for the specific development under study. Background traffic can be estimated out to the applicable horizon year in order to assess future traffic conditions. When the horizon year analysis is required, the Lee's Summit traffic model should be used to estimate background traffic growth in the following manner.

The model will need to be run four times to identify turning movement data for:

- Base Year Traffic Volumes;
- Base Year Select Zone Traffic Volumes;
- Future Year Traffic Volumes; and
- Future Year Select Zone Traffic Volumes.

Both the base year and future year models will need to be run two times. The first run will save the traffic volumes at the study intersections, as well as the select zone matrix for the TAZ's in which the development is being evaluated (the TAZ's under consideration will be identified by the City Traffic Engineer prior to the study). The model will need to be re-run using an all-or-nothing assignment of the select zone matrix based on the adjusted travel times for the previous runs. Details of this procedure are included in the model guideline documentation.

The City Traffic Engineer will establish the acceptable procedure for determining background traffic growth and future traffic volumes. Said procedure may be updated or revised from time to time at the discretion of the City Traffic Engineer.

The City Traffic Engineer may provide the applicant or applicant's traffic engineer background traffic growth for the horizon year.

9.6.D. Trip Generation

Trip generation is the process used to estimate the amount of travel associated with a specific land use or development. Trip generation is estimated through the use of "trip rates" that are based on some measure of the intensity of development, such as gross floor area (GFA).

Trip Generation, published by the Institute of Transportation Engineers (ITE), is the most comprehensive collection of trip generation available. The rates provided are based on nationwide data and numerous case studies. This manual is generally accepted as the industry standard and the latest edition shall be used for studies in the City of Lee's Summit. Caution needs to be applied when limited data points exist for a land use category. Local trip generation characteristics may be used if deemed to be properly collected, provide a broad and statistically valid collection of measures that represent the proposed land use, and are consistent with, but not exclusively unique to, the subject development application. The City Traffic Engineer shall make this determination.

In making the estimate of trips, the instructions and recommendations included in Trip Generation shall be followed. Typically, the trip generation equations, where available, provide the best estimates. Where data is provided for multiple independent variables, the one yielding the highest number of trips and is based on at least 10 samples (studies) shall be used.

Trip generation shall be estimated for the proposed development for daily, A.M. peak hour, and P.M. peak hour conditions. Other time periods may be necessary based on the land use and/or the inclusion of additional analysis periods in a particular study.

If the development site already has an approved plan, also estimate the number of trips that would be generated by the approved land uses. If the development application is proposing a land use that requires an amendment to the comprehensive plan, also estimate the number of trips that would be generated by the land use indicated in the Comprehensive Plan. The Director of Planning & Development shall approve the potential land use intensity in such cases for the purpose of estimating vehicle trips.

If internal capture rates and/or pass-by and diverted trips are used by the applicant, the applicable rates must be justified by the applicant and subject to approval by the City Traffic Engineer prior to use. In general, where pass-by trips are applicable, the number of pass-by trips should not exceed 10 percent of the adjacent street traffic during a peak hour or 25 percent of the development's external trip generating potential, whichever is less, and trips internally captured is highly dependent on proximity between compatible trip sharing land uses within a mixed-use development.

9.6.E. Trip Distribution

Trip distribution is the general direction of approach and departure to/from a development site. Trip distribution will typically be estimated using existing travel patterns exhibited in the area, the position of the development in the community, capacity and classification of surrounding streets and the likely market area of the development. Data from similar development in the immediate vicinity could be useful as well. Good judgment is necessary to develop reasonable estimates of trip distribution.

9.6.F. Mode Split

Mode split is the estimate of number of travelers anticipated to use transportation modes other than automobiles. Data associated with most transportation impact studies is taken from suburban locations where there is little to no commuting alternative to automobile transportation. Further, the trip generation rates are based on the actual number of vehicles, not persons, entering and departing a particular land use. Therefore, mode split will not be applicable to most transportation impact studies.

Mode split, or modified trip generation rates, can be applied where the influence of alternative transportation modes is clearly demonstrated and documented. Prior approval must be received from the City Traffic Engineer.

9.6.G. Trip Assignment

Trip assignment involves the determination of traffic that will use each access point and route on the street network. While it certainly uses the trip distribution estimates, it is a different process. This is also the step where trip-reduction factors such as pass-by and diverted traffic are applied.

The assignments should reflect the conditions anticipated to occur in the analysis year. Assignments are estimates of how drivers will travel and need to account for physical and operational characteristics of the roadway and the habits of typical drivers. Some of these factors might include:

- The type of traffic control device at an intersection. For example, drivers might avoid a protected left-turn movement if they can reach their destination via the through movement and the left-turn phase has expired on approach.
- The design of internal circulation systems on the development site.
- The number of opportunities to enter from the same street. Typically, most drivers will use the first opportunity to enter but exiting trips tend to be more balanced.
- The difficulty turning left onto a major street at an unsignalized intersection.
- Drivers tend to travel in the most direct path towards their destination. In other words, drivers tend to avoid backtracking unless conditions either require it or an overall gain in safety and efficiency is expected.

Since some of these factors conflict, good judgment is necessary. Further, an iterative process might be necessary based on internal circulation alternatives and/or traffic mitigation alternatives considered. For example, the initial access plan may show a full-access driveway but the mitigation may call for it to be limited to right turns in and out.

9.6.H. Existing, Existing Plus Approved/Unbuilt, Existing Plus Development, and Existing Plus Approved/Unbuilt Plus Development Conditions Analysis

The analysis of existing plus approved/unbuilt, existing plus development, and existing plus approved/unbuilt plus development conditions are based on the combination of existing traffic,

traffic estimated for approved development yet to be built, and development traffic anticipated on opening. The development may be phased and have corresponding analysis scenarios to assess independent and compounding degrees of its completion. The methods of analysis shall be consistent and as described above.

Two sets of conditions should be analyzed for the Existing Plus Development and/or Existing Plus Approved/Unbuilt Plus Development scenarios:

- Existing Plus Development Traffic with No Improvements
- Existing Plus Development Conditions with Improvements
- Existing Plus Approved/Unbuilt Plus Development Traffic with No Improvements
- Existing Plus Approved/Unbuilt Plus Development Conditions with Improvements

In the first scenario for each condition, existing plus development and/or existing plus approved/unbuilt plus development traffic is analyzed with the current street geometry and traffic control except for the proposed access. The purpose is to demonstrate likely traffic conditions before mitigation and improvement measures are considered.

The second scenario is typically an iterative process where mitigation and improvement measures are necessary to achieve compliance with the Access Management Code, acceptable levels of service and/or to manage vehicle queuing. The final results of that process are to be documented along with the mitigation and improvement measures associated with those results. Improvements that become warranted by City design criteria or access management codes shall be identified and included in this process.

Mitigation measures might include:

- Additional turn lanes on the public streets and/or the site access.
- Additional through lanes on public streets.
- Revised traffic control, including new traffic signals.
- Access management strategies, e.g. build a raised median on the public street.
- Site plan or land use changes.

Mitigation and improvement measures should be logical for the conditions at a specific location, consistent with the corridor design and operations, and should contribute towards or at least be consistent with the ultimate configuration of the public street. The ramifications of mitigation and improvement measures must be clearly identified. For example, adding a second left-turn lane on one approach to an intersection will typically necessitate widening of the opposite approach.

In addition to achieving acceptable levels of service, anticipated vehicle queuing needs to be assessed to ensure that turn lanes are properly designed and that queues from one intersection do not impact operations at other intersections. This applies to the development site where access driveways connect to the public street system. In general, the site circulation layout should not create conditions where entering traffic might queue back onto the public street and/or the efficiency of exiting traffic is diminished. Further, the site plan and design should allow for all vehicle circulation to take place on-site and not on the public streets.

9.6.I. Future Conditions Analysis

The analysis of future conditions is important to further assess proposed access in relation to the configuration of the public streets at a more mature stage of development. What might be deemed acceptable today might not fit with the long-range configuration of a street corridor. It may also prove useful in determining when significant improvements to major streets need to be planned.

The analyses should reflect street improvements planned to occur prior to the horizon year. Traffic associated with approved/unbuilt development is included in the background traffic growth of a future horizon.

9.6.J. Pedestrian, Bicyclist, Transit and Truck Considerations

While transportation impact studies primarily address automobile traffic, recognition of other vehicle types and travel modes is appropriate, particularly in a community that strives for multi-modal choice and complete streets (livable streets). The following text by no means represents a comprehensive list of site planning elements but each must be addressed.

9.6.J.1. Pedestrians

Sidewalks along public streets or off-street paths provide mobility for pedestrians. Pedestrians should be provided the opportunity to readily travel between these public infrastructure and adjacent land uses. Pedestrians should also have efficient and safe mobility within the development and minimize conflicts with vehicular traffic. All development plans should provide this accessibility, connectivity and mobility.

9.6.J.2. Bicyclists

Similar to pedestrians, development sites should provide reasonable opportunities to travel between adjacent public streets, shared-use paths or bicycle trails and the land use. This does not imply that separate facilities are always needed; rather, the conditions within a development site should be comparable to conditions adjacent to and near the site. Adequate and properly placed parking facilities for bicycles are a key component to encouraging bicycle travel. At a minimum, bicycle accommodations identified in the Bicycle Transportation Plan and/or Greenway Master Plan shall be incorporated in the development.

9.6.J.3. Public Transportation

Bus transportation is currently provided by several private and publicly funded agencies. More widespread public transit, whether demand service models, fixed routes and/or mass commute systems, could be implemented or expanded in the future. Site development should account for both current and potential transit services. Some of these considerations are similar to trucks due to the relatively large size of vehicle; however, the primary difference is that transit vehicles need to circulate with customer traffic flow. Turnouts may be planned for specific corridors or intersections, or adjacent to major trip generators.

9.6.J.4. Trucks

Site driveways and internal circulation must be designed to accommodate the largest truck anticipated to serve the development or potential land use. Vehicle turning paths need to be provided such that trucks do not encroach over curbs and medians. Encroachment into opposing turning lanes should be minimized, but can be consistent with the scale of the development, the frequency and timing of truck movements and roadway functional classification. Truck circulation through a development site should minimize conflicts with customer traffic and loading docks should be configured such that parked trucks do not impede normal traffic flow.

9.6.K. Documentation

The transportation impact study shall be documented in a typewritten, bound report outlining the findings and conclusions of the study, including exhibits illustrating the site plan, traffic volumes for each analysis scenario, and existing and proposed street conditions (lane configurations and intersection traffic controls). Exhibits shall also include level of service, delay and vehicle queuing results for each analysis scenario. The report, or an appendix, shall include all analysis worksheets and traffic volume count spreadsheets listing data by the minimum time increment in which the data was collected (not less than 15-minute increments). Two (2) bound copies, one unbound copy and one electronic disk/media containing all of the analysis files and a PDF of the final report shall be submitted with the development application. The bound copies and electronic disk/media will be routed internally by City staff to the Public Works Department - Traffic Engineering Division.

The report shall be well organized and generally follow the study process chronology. The report should be divided into sections to clearly distinguish between the site plan details, assessment of existing conditions, assessment of existing plus development conditions, and the assessment of future conditions. The concluding section of the report shall summarize the significant findings and outline the mitigations and improvements needed to meet accepted standards. Trip generation information, trip distribution assumptions, and analysis results should be organized in tables or exhibits and page numbering should be used.

Documentation of the mitigation and improvement measures shall include a detailed description of the proposed improvements. For example, turn lanes shall include a recommended length. It is expected that sufficient due diligence has been conducted to reasonably conclude that the mitigation and improvement measures can be implemented without disruption to existing roadside facilities, other public street facilities, e.g., another turn lane, and/or existing access. If proposed access or a mitigation or improvement measure will cause such a disruption, the impact shall be clearly described.

It is not appropriate to define or suggest funding responsibilities in the study report.

Any deviation from established guidelines/policies shall be clearly identified and justification provided as to the basis for such a condition and its potential ramifications on the public street system.

All assumptions and analysis methodologies should also be identified. The final report should be complete to the extent that the reviewer could find all information necessary to understand how analyses were conducted and could even recreate those analyses and achieve the same results.

The professional engineer responsible for completing the study shall sign and seal the final report.

Section 10 - Interchange Areas

The purpose of this section is to preserve the safe and efficient operation of traffic on interchange crossroads and interchanges, while preserving the accessibility of interchange areas for economic development. Specific purposes are to ensure adequate storage and maneuver distances for drivers between the first signalized intersection and the highway ramp and to avoid access connections to interchange crossroads that would interfere with traffic operations at interchange ramps. In addition, this section seeks to promote the development of local streets and service roads for access in the functional area of interchanges as an alternative to individual driveway access.

The standards in this section apply to areas where grade-separated facilities, e.g. Interstates and other freeways, interchange with surface streets, highways, and roads. In such cases, adequate areas need to be provided for traffic to make the transition from a high-speed highway to the surface street system.

10.1. Interchange Functional Area Standards

These requirements shall be applied in the vicinity of interchanges. These requirements should be applied within interchange areas and generally reflect the access management criteria provided by the Missouri Department of Transportation (MoDOT) for MoDOT rights-of-ways. Consequently, these requirements should be considered in consultation with the MoDOT which may recommend more stringent requirements in the interest of safety and operation of their facilities. The City does not exercise control over MoDOT right-of-way; but will coordinate the recommendations of MoDOT and support such recommendations applicable to the state highway system in the review of development applications that impact MoDOT interchanges and where such interchange operations influence the vicinity of interchanges that may or may not be MoDOT managed. In developed areas, these standards may be difficult to achieve, however they should be considered the desirable standard and achieved to the extent reasonably possible. In undeveloped areas, these connection spacing standards should be the minimum standards.

10.1.A. Requirements:

10.1.A.1. In order to provide a safe distance for transitional activity to occur, the spacings identified in ***Figure 10-1*** shall be provided from the end of the off ramp to the first private driveway, median opening, or intersection with a public road.

10.1.A.2. The measurement basis for this standard is from the near edge of the ramp to the center of the intersection. At "diamond" type interchanges where traffic (including right turns) is controlled by a stop sign or traffic signal, the distance is measured from center to center of the intersections. At "diverging diamond", roundabout or other continuous flow type interchanges, the distance is measured from the stop line or yield line.

10.1.A.3. Local roads or service roads shall be used for direct access to property within interchange areas.

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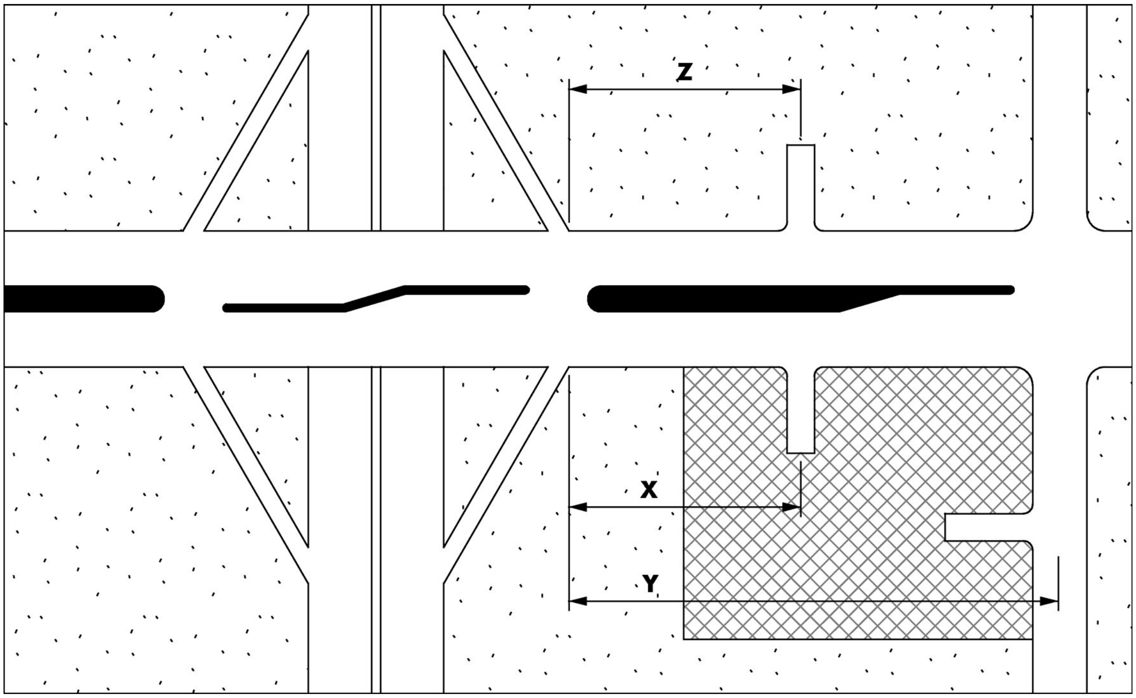

X = 750 feet
Y = 1,320 feet
Z = 750 feet

Figure 10-1
Connection Spacing Near Interchanges

Section 11 - Intersection Functional Area

The functional area of an intersection consists of more than the area bounded by the stop lines, yield lines or crosswalks. The functional area of the intersection also includes the area upstream of the intersection where vehicles have to react to slowing traffic in front of them, decelerate and wait in queues. The downstream functional area includes the area where through traffic merges with traffic turning from the cross street. It also includes the distance required to accelerate back to driving speeds. The intersection functional area is shown schematically in ***Figure 11-1***.

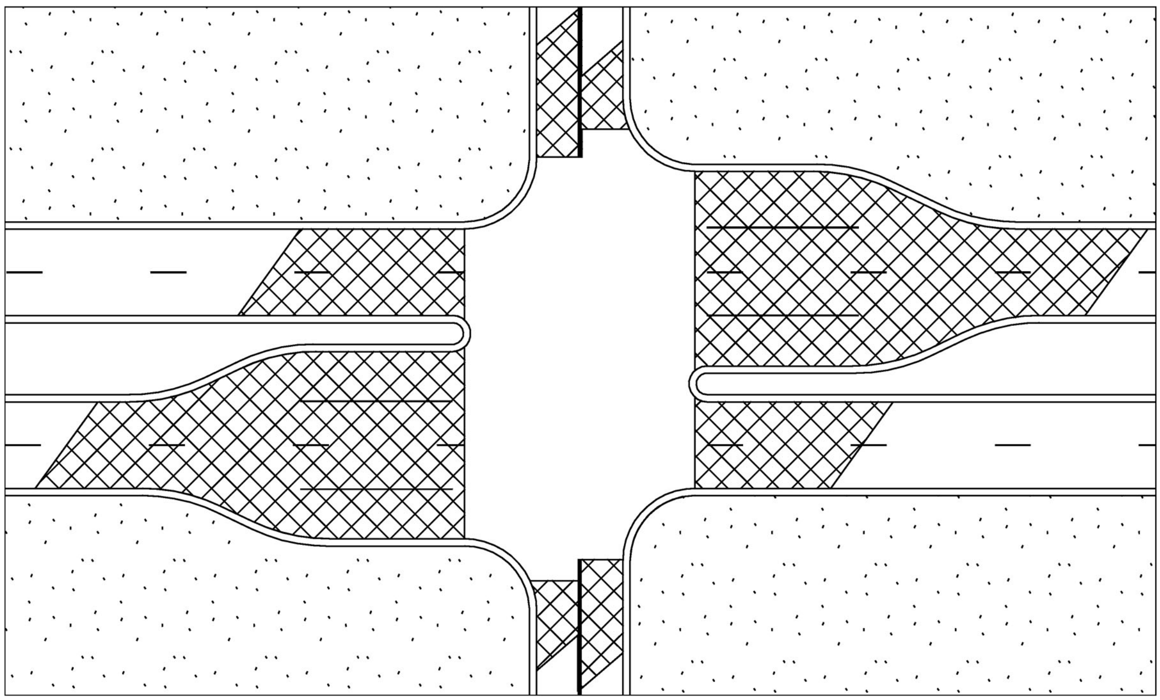

Figure 11-1
Intersection Functional Area

11.1. Upstream Intersection Functional Area

The upstream intersection functional area can be determined by summing two primary components, the Reaction/Deceleration Time and the Storage Length:

11.1.A. Reaction/Deceleration Time

This is the distance traveled while the driver recognizes that action is required, i.e. sees vehicles stopping ahead, reacts, i.e. presses break pedal, and decelerates i.e., slows to a stop. These values can be calculated from ***Table 11-1***. The City Traffic Engineer shall determine where limiting conditions can be applied.

Table 11-1 Upstream Intersection Area Excluding Storage, in Feet				
Speed (MPH)	Desirable Conditions[2]		Limiting Conditions[3]	
	Deceleration[4]	PIEV Plus Deceleration[5]	Deceleration[4]	PIEV Plus Deceleration
30	225	315	170	215
35	295	370	220	270
40	375	490	275	335
45	465	595	340	405
50	565	710	410	485
55	675	835	485	565
60	785	960	565	605

[1]all distances rounded to 5ft
[2]2.0 second perception-reaction time; 3.5 fps^2 average deceleration while moving laterally into turn lane, 6.0 fps^2 average deceleration thereafter; speed differential < 10 mph
[3]1.0 second perception-reaction time; 4.5 fps^2 average deceleration while moving laterally into turn lane, 9.0 fps^2average deceleration thereafter; speed differential <10 mph
[4]distance to decelerate from through traffic speed to a stop while moving laterally into a left-turn or right-turn lane
[5]distance traveled during perception-reaction time plus deceleration distance

11.1.B. Storage Length

Queue lengths should be calculated based on existing (or existing plus development for new development projects) and future (horizon-year) traffic conditions. For development projects, turn lane storage improvements may be based on existing plus development conditions, however, site access and right-of-way should be planned to accommodate ultimate (horizon-year) conditions.

Queue lengths should be calculated for left-turn, through and right-turn lanes. Queue lengths should consider 90th percentile queues and should be calculated using established procedures or software that reports 90th percentile or maximum back of queue. As traffic signals on most arterial corridors have the potential to be coordinated, it is recommended that a cycle length of at least 120 seconds be used. Analysis should conform to Highway Capacity Manual methods. In areas with closely spaced or coordinated signals, software that analyzes coordinated signal timings, e.g. SIMTRAFFIC, TRANSYT, CORSIM, VISSIM, etc., may be needed to supplement the analysis. In these cases, queue lengths should be evaluated for both coordinated arrival and random vehicle arrival and the larger of the two values used, as future changes in coordination timings can significantly change queue patterns. In no case should the queue storage length used for calculating the upstream functional area be less than the maximum total length of any turn lane including taper at the intersection approach.

The City Traffic Engineer may elect to define the upstream functional area at a value less than that calculated by the aforementioned method based on existing or anticipated conditions at an intersection.

11.2. Downstream Functional Area

The functional area of an intersection extends some distance downstream from the crosswalk location because of the need to establish guidance and tracking after having passed through the area in which there are no lane lines. This is especially true following a left turn. It can be argued that a vehicle should clear a major intersection before the driver is required to respond to vehicles entering, leaving or crossing the roadway. The logic of this criterion is to simplify the driving task and thus minimize the chances of driver mistakes and collisions. Stopping sight distance is one criterion which would allow the driver to clear the intersection before having to rapidly decelerate in response to a maneuver at a downstream intersection. Downstream functional areas based on AASHTO stopping sight distances are given in ***Table 11-2***. The downstream intersection area should also extend beyond any U-turn design element.

Table 11-2
Downstream Intersection Area, in Feet

Speed	AASHTO Stopping Distance[1]
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570

[1]Level Roadways

Section 12 - Medians and Continuous Center Turn Lanes

Restrictive ("raised" or "non-traversable") medians and well designed median openings are known to be some of the most important features in a safe and efficient street system. The design and placement of these medians and openings is an integral part of the access management practice. Raised medians are important for several reasons.

- Vehicular Safety - to prevent crashes caused by crossover traffic, headlight glare distraction and traffic turning left from through lanes.
- Pedestrian Safety - to provide a refuge for pedestrians crossing the street.
- Vehicular Efficiency - to remove turning traffic from through lanes thereby maintaining desired operating speed. This reduces fuel consumption and emissions which is an environmental benefit.
- Improved Aesthetics - Landscaped and grass medians offer aesthetic benefits over paved turn lanes or undivided roadways.

Properly implemented median management will result in improvements to traffic operations, minimize adverse environmental impacts, and increase transportation safety. As traffic flow is improved, delay is reduced as are vehicle emissions. In addition, roadway capacity and fuel economy are increased, and most importantly, crashes are less numerous and/or less severe due to fewer conflict points, moderated interruptions in traffic flow and simplified driver decisions.

Continuous two-way center turn lanes ("two-way left-turn lanes" or "TWLTL" or "traversable" medians) do not provide all of the safety benefits of restrictive medians, but do offer some safety improvements over roadways where no left-turn lanes are provided, particularly in areas with frequent and low volume driveways. These facilities provide more flexibility than restrictive medians and operate safely and efficiently under appropriate circumstances. However, once the driveway density, left-turning traffic volumes, and through traffic volumes reach certain levels, the safety benefits diminish rapidly. Under such conditions, restrictive medians are the more effective alternative with regard to safety and operations.

12.1. Median Standards

Restrictive medians shall prohibit vehicles from crossing the median except at designated median openings through the use of a barrier curb or wide landscaped median treatment. Restrictive medians shall be required under any of the following conditions:

- On all major arterial streets.
- On minor arterial and collector streets where existing daily traffic volumes are in excess of 18,000 (where traffic volumes are projected to exceed 18,000 in the future, the roadway and access should be designed to accommodate the future installation of a raised median, e.g. identify potential median opening locations, use 16-foot wide center turn lane).
- Speeds are posted at 45 MPH or above.
- Adjacent to left-turn lanes at signalized intersections (existing or planned signal locations) where driveways are present or would otherwise be located within the intersection functional area.
- Adjacent to all dual left-turn lanes.

- On multi-lane roadways (two or more through lanes in each direction) within the functional area of an interchange.
- On roadways with three or more through lanes in each direction.
- At roundabout controlled intersections.

12.2. Continuous Two-Way Center Turn Lanes

Continuous two-way center turn lanes may be considered under the following conditions (except where restrictive medians are required as described above):

12.2.A. On minor arterial and collector streets adjacent to property that is already developed or planned for low density commercial use or in areas where there is a need for frequent left-turn lanes and low left-turn volume.

Section 13 - Median Openings

Openings in restrictive medians should only be provided to accommodate turning traffic in locations where this can be safely done. Where openings are provided, adequate spacing between them is necessary to allow for required vehicle storage, adequate entry taper and weaving of traffic so as to preserve traffic flow and provide for safe lane changes and turns.

A full opening allows turns to be made in both directions; a directional opening allows turns to be made in only one direction. An example of a directional median would be one that allows left turns into a driveway, but does not allow left turns to be made out.

Examples of these median opening types are shown on ***Figure 13-1*** and ***Figure 13-2***.

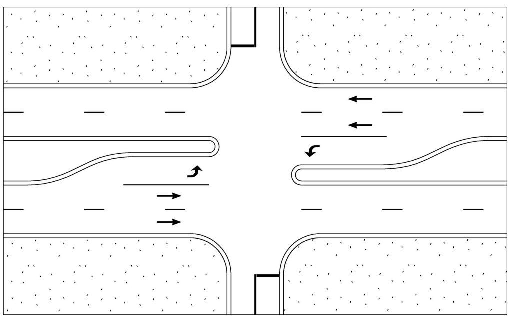

Figure 13-1
Full Median Opening

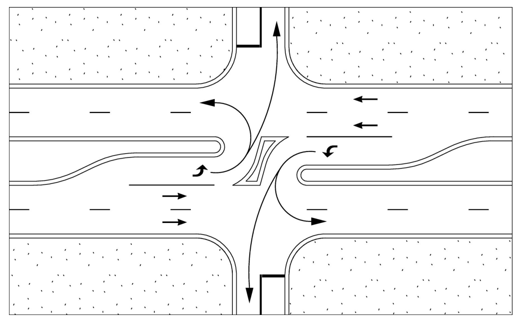

Figure 13-2
Directional Median Opening

13.1. Median Opening Standards

The minimum spacing standards for full median openings shall be subject to the limitations listed below.

13.1.A. No median openings shall be permitted within the functional area of an interchange or intersection.

13.1.B. Median openings shall not be permitted where an opening would be unsafe due to inadequate sight distance.

13.1.C. Full median openings along major arterials must meet the minimum requirement of one-quarter mile spacing and full median openings along any roadway must meet the minimum connection spacing requirements noted in Section 15.

13.1.D. Directional median openings may be provided at any connection that meets the connection spacing requirements, and is found to be an acceptable location based on a transportation impact study.

13.1.E. Left-turn lanes shall be required at all median openings. Median openings shall not be permitted where minimum required queue storage and taper cannot be provided for the left-turn lanes.

13.2. U-Turns

As access management principles and standards are applied, the U-turn becomes an increasingly important movement for accessing local streets and driveways along arterials. A standard passenger vehicle cannot easily make a U-turn from a left-turn lane with minimal median width, e.g. 4 feet, and only two lanes in the opposing direction. In order to accommodate U-turn movements at median openings on a four-lane roadway, there are two options - provide a wide median near the intersection (30 feet or more) or provide some sort of widening of the downstream approach near the U-turn location. Downstream widening can be accommodated by allowing vehicles to turn on the shoulder or by flaring the pavement width at the U-turn locations. Ultimately, the width between the left edge of the left-turn lane and the right edge of the downstream travel lane needs to be at least 44 feet for a typical automobile to make a U-turn. An assessment of the design vehicle wheel path for U-turns should be done where U-turn accommodations are desired to ensure the appropriate area is available without encroachment and is not excessively overbuilding the pavement which can mislead lane identification. Special care should also be given to U-turns at traffic signal controlled intersections for the left-turn/U-turn phase interaction with protected or permitted or overlap right-turn operations. Examples of these techniques are illustrated on ***Figure 13-3*** and ***Figure 13-4***.

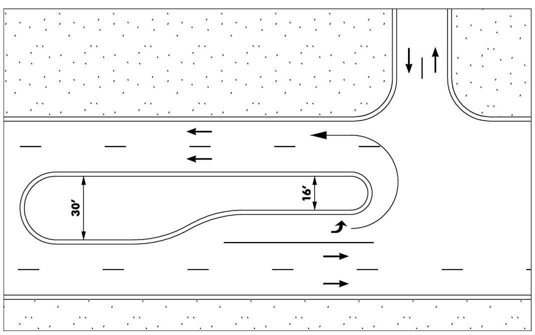

Figure 13-3
U-Turns at Wide Median

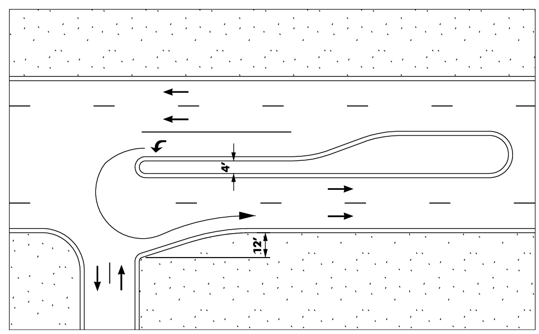

Figure 13-4
U-Turns onto Flared Approach

Section 14 - Traffic Signals

This section addresses the distance between signalized at-grade intersections on public streets. Minimum spacing is mainly intended to preserve efficient traffic flow and progression on urban arterial streets; for instance, a quarter or half-mile spacing allows traffic signals to be effectively interconnected and synchronized. Effective signal coordination will also tend to reduce rear-end collisions and stop-and-go driving that increases congestion, delay, and air pollution.

14.1. Traffic Signal Standards

An intersection should meet the following requirements to be considered for installation of a traffic signal.

14.1.A. The intersection shall meet a warrant or warrants in the Manual on Uniform Traffic Control Devices (MUTCD). Installation of a traffic signal based solely on the peak hour warrant will only be considered at the intersection of an arterial street with another arterial street, collector street, or at the intersection of an expressway, highway or freeway and ramp terminal. Other locations must meet additional signal warrant criteria and be supported by engineering study.

14.1.B. For intersections where one or more of the roadways is a collector street, existing traffic volumes shall be utilized in evaluating the signal warrants (installation of a traffic signal based on existing plus proposed development traffic volumes may be approved if the projected traffic volume will likely realize within 12 months of occupancy). Signals warranted based on future phases of development would have conditions of approval for signal installation coincidental to the phase of development that merits the signal warrant. Approved development trip generation that has not yet realized may be considered in the traffic signal warrant evaluation.

14.1.C. The location of the traffic signal should be at least one-quarter mile (1/4) from another traffic signal, either existing or anticipated and shall not be less than one-eighth mile (1/8) from another traffic signal where extraordinary conditions exist and by approval of the City Traffic Engineer

14.1.D. Traffic signal interconnect conduit and fiber optic lines shall be installed between traffic signals within 3,000 feet of the proposed location, potentially within one mile for wireless communications

14.1.E. Roundabouts should be considered, where applicable and practical based on engineering study, in lieu of traffic signals except where the intersection is within the influence of an adjacent traffic signal and coordinated corridor.

Section 15 - Connection Spacing

This standard governs the minimum allowable spacing between connections (e.g. streets and private driveways) on various classifications of streets. Access points introduce conflicts and friction into the traffic stream. Each conflict point increases the crash opportunity and exposure along a corridor. Each friction point reduces the corridor capacity to efficiently move traffic. Vehicles entering and leaving the main roadway often slow the through traffic, and the difference in speeds between through and turning traffic increases crash potential. The many proven benefits of managed access can be read in more detail from various Transportation Research Board references, papers, reports and studies as well as multiple documents published by AASHTO, including A Policy on Geometric Design of Highways and Streets.

The professional consensus is that increasing the spacing between access points improves arterial flow and safety by reducing the number of conflicts per mile, by providing greater distance to anticipate and recover from turning maneuvers, and by providing opportunities for use of turn lanes. Many studies have shown that driveway spacing is one of the key factors that influence crash frequency.

15.1. Connection Spacing Standards

Connections (a street or driveway, public or private) to public roadways shall conform to the following requirements. All applicable criteria must be met to be deemed conforming.

15.1.A. Connections along any arterial or collector shall be outside any interchange or intersection functional area.

15.1.B. Connections shall be sufficiently separated to accommodate warranted and/or required right-turn lanes and left-turn lanes.

15.1.C. Connections along any arterial or collector shall be aligned with existing or planned connectors on the opposite side of the street, except where a restrictive median is in place and the spacing criteria in 15.1.E are satisfied. The alignment and angle of intersection of connections at the intersecting connector shall meet the criteria described in the City's Design and Construction Manual.

15.1.D. Connections where no restrictive median is in place, minimum separations (measured from centerline to centerline) include:

15.1.D.1. Major Arterial - 660 feet
15.1.D.2. Minor Arterial - 400 feet
15.1.D.3. Industrial/Commercial Collector - 300 feet
15.1.D.4. Residential Collector - 200 feet
15.1.D.5. Local or Access – Minimum separation as required by the Unified Development Ordinance (UDO), except such connector shall also be spaced from any collector or arterial intersection in accordance with minimum throat length criteria described in Table 18-2 and not be located within the intersection sight triangle (not to obstruct sight distance).

15.1.E. Connections where a restrictive median is in place shall meet the following requirements and the minimum requirements of Section 13. Any access having restricted movement shall be controlled through the use of a restrictive median conforming to Section 12.

15.1.E.1. Connections with restricted left-turns out and cross-street traffic (LIRIRO) shall meet all of the requirements in sections 15.1.A, 15.1.B, and should meet the requirements of 15.1.D where adjacent to LIRIRO or full access.

15.1.E.2. Connections limited to right-turns in and right-turns out (RIRO) shall meet all of the requirements in sections 15.1.A and 15.1.B.

15.1.F. Multiple (2) residential driveways for a single residential property may be approved on local and access streets at the discretion of the City Traffic Engineer, so long as sight distance is not obstructed, access to mail box or fire hydrant is not impeded, or a negative impact caused to on-street parking availability for adjacent owners (next to or across from such driveway). Multiple driveways for a single residential property are not permitted on collectors and arterials and access to collectors and arterials for residential properties shall conform to other provisions of this code which preclude such access if an alternative exists from a local street, access street or shared access condition.

Section 16 - Turn Lanes

Vehicles slowing to turn right or left onto cross streets or into driveways cause disruptions to through street traffic flow and increase crashes along a corridor. Thus, the treatment of turning vehicles has an important bearing on the safety and movement along roadways. Turn lanes are one of the most influential and important components of access management.

Left turns may pose problems at driveway and street intersections. They may increase conflicts, delays, and crashes and often complicate traffic signal timing. These issues are especially acute at major suburban arterial intersections where heavy left-turn movements take place, but occur also where left turns enter or leave driveways serving adjacent land development. The following illustrate these problems:

- More than two-thirds of all driveway-related crashes involve left-turning vehicles.
- Where there are more than six left turns per traffic signal cycle, virtually all through vehicles in the shared lane may be blocked by the left-turning vehicles.

16.1. Left-Turn Lane Standards

16.1.A. Left-turn lanes shall be provided on all approaches to intersections controlled by, or planned to be controlled by, traffic signals.

16.1.B. Left-turn lanes shall be provided on all arterial streets at the intersection with other arterial and collector streets. Left-turn lanes shall be provided on minor arterial streets at the intersection with any local street or driveway where the left-turn volume is at least 20 vehicles in any hour. On major arterial streets, left-turn lanes shall be at the intersection with all connectors (an exception may be granted for a singular, existing, residential lot).

16.1.C. Left-turn lanes shall be provided on collector streets at the intersection with a connector serving non-residential development where the left-turn volume is at least 30 vehicles in any hour and should be provided where the left-turn volume is less than 30 vehicles in any hour.

16.1.D. Left-turn lanes shall be provided on non-residential connectors intersecting with major arterial streets (where left-turn egress is permitted). Left-turn lanes shall be provided on non-residential connectors intersecting minor arterial streets (where left-turn egress is permitted) where the left-turn volume is at least 20 vehicles in any hour. Left-turn lanes should be provided on any connector at any location as recommended by a traffic study or where the left-turn lane provides design efficiencies desired by the owner/developer with exception of access associated with residential property.

16.1.E. Left-turn lanes shall be provided at all median openings on roadways with medians.

16.1.F. Continuous two-way left turn lanes may be used in lieu of individual left-turn lanes where permitted by the City Traffic Engineer and in consideration of conditions listed in Section 12. Continuous left-turn lanes in the presence of a median will not be allowed.

16.1.G. Dual-left-turn lanes should be planned for all approaches of an arterial/arterial intersection. The outside receiving lane for a dual-left-turn lane condition should be designed with a tapered entrance to accommodate a wider turning radius.

16.1.H. The minimum length of left-turn lane should be 250 feet plus taper on an arterial street intersecting another arterial street and 200 feet plus taper on an arterial street at other locations. The minimum length of left-turn lane on collectors should be 150 feet plus taper. The minimum length of left-turn lane on connectors should meet the driveway throat length requirements.

16.1.I. The length of the left-turn lane shall be increased as necessary to accommodate estimated queue length. The length of the left-turn lane at intersections controlled by traffic signals should be increased, if necessary, based on the longer of the queues in the turn lane or the adjacent through lane.

16.1.J. Left-turn lane lengths cover the full-width segment between the taper and the end of the lane at an intersection. The end of the lane at the intersection should be determined as the stop line, or if none, as the point of curvature for the corner radius.

16.1.K. The introductory taper should be a reverse curve using a 150-foot radius for a single left-turn lane and 300-foot radii for a dual left-turn lane. The reverse curve does not define the redirection taper where a left-turn lane is introduced.

16.1.L. The beginning of a taper should not encroach the interchange or intersection functional area of an adjacent traffic signal or roundabout, whether existing or planned.

16.2. Right-Turn Lane Standards

16.2.A. Required on arterial streets at each intersecting street or driveway where the right-turn volume on the major arterial street is or is projected to be at least 30 vehicles in any hour, or the right-turn volume on the minor arterial street is or is projected to be at least 60 vehicles in any hour. Minimum length should be 250 feet plus the taper on a major arterial at the intersection of another arterial street or 200 feet plus the taper on a minor arterial at the intersection with another arterial street or on a major arterial at the intersection of a collector and 150 feet plus the taper at other locations along arterial streets.

16.2.B. Required on collector streets in non-residential areas at the intersection with any street or driveway where the right-turn volume on the collector street is or is projected to be at least 100 vehicles in any hour. The minimum length should be 100 feet plus the taper.

16.2.C. The length of the right-turn lane shall be increased as necessary to accommodate estimated queue length. The length of the right-turn lane at intersections controlled by traffic signals or roundabouts should be increased, if necessary, based on the longer of the queues in the turn lane or the adjacent through lane.

16.2.D. Right-turn lane lengths cover the full-width segment between the taper and the end of the lane at an intersection. The end of the lane at the intersection should be determined as the stop line or yield line, or if none, as the point of curvature for the corner radius.

16.2.E. The introductory taper should be a straight line and its length should be determined by using a rate of 12.5 to 1 based on the width of the right-turn lane.

16.2.F. The beginning of a taper should be no closer than 100 feet from the nearest point of curvature on the intersection corner radius of the nearest connector preceding the turn lane along arterials and 50 feet from the same of the nearest connector preceding the turn lane along collectors and other locations. The beginning of a taper should not encroach the interchange or intersection functional area of an adjacent traffic signal or roundabout, whether existing or planned.

16.2.G. Continuous right-turn lanes will not be allowed.

16.3. Variances

The standards outlined in the section may be altered or waived by the City Traffic Engineer for a specific situation in which extraordinary conditions are encountered.

Section 17 - Sight Distance

Sight distance for driveway and street construction should be considered essential in the design and issuance of permits for all connectors. If there is a request to construct a driveway or street at a questionable location, the transportation impact study must include a field inspection to evaluate the sight distance. Sight distance is the most important consideration in allowing, not allowing, or placing driveway and roadway intersections. Both vertical and horizontal alignment can limit sight distance. Special consideration is required for skewed intersections.

The sight distance standards include stopping sight distance, intersection sight distance, passing sight distance and other sight distances referenced in the 2011 AASHTO "Green Book" A Policy on Geometric Design of Highways and Streets, as may be amended in the publication of future editions.

17.1. Sight Distance Standards

17.1.A. Stop-Controlled Intersections

The intersection sight distance is based on a gap-acceptance concept. It is assumed that drivers on the major road should not need to reduce speed to less than 70 percent of the initial speed. The intersection sight distance is determined from the size of acceptable gap that a driver requires to enter the roadway.

The acceptable gaps that drivers require to enter a major roadway for left turns and right turns from the stop are given in ***Table 17-1***. Adjustments for roadway width and approach grades are given in footnotes to the table. Sight distances for left-turns for passenger cars on various width roadways at a stop controlled approach are summarized on ***Table 17-2***. Sight distances for right-turns and cross-over maneuvers for passenger cars are generally less than the distances required for left-turns. The speed used to calculate the minimum sight distance shall be the posted speed, design speed or the 85th percentile speed, whichever is known and greatest.

Table 17-1
Gap Time for Stop Controlled Intersections

Design Vehicle[1]	Time Gap [2,3]
Passenger Car	7.5 sec.
Single Unit Truck	9.5 sec.
Combination Truck	11.5 sec.

[1]Passenger car design vehicle is typically sufficient for streets and drives serving residential, commercial and office development. For industrial developments, or on major streets with more than 3% trucks, consider using truck categories.
[2]Adjustment for multilane highways:
For left turns onto two-way highways with more than two lanes, add 0.5 sec for passenger cars or 0.7 sec for trucks for each additional lane, in excess of one, to be crossed by the turning vehicle. For right turns, no adjustment is necessary.
[3]Adjustment for approach grades:
If the approach grade on the minor road is an upgrade that exceeds 3 percent: Add 0.1 sec per percent grade for right turns, add 0.2 sec per percent grade for left turns.

Table 17-2
Sight Distance for Stop Controlled Intersections, in Feet
Passenger Cars, Grades Less Than 4%

Speed[2] (MPH)	Lanes to Cross[1]			
	One	Two	Three	Four
20	225	240	250	265
25	280	295	315	335
30	335	355	375	400
35	390	415	440	465
40	445	475	500	530
45	500	530	565	600
50	555	590	625	665
55	610	650	690	730
60	665	710	750	795
65	720	765	815	860
70	775	825	875	930

[1]Lanes to cross for left-turning vehicles (lanes with vehicles approaching from left including left and right-turn lanes, add one lane for each 15 feet of median width not including left turn lane) ; except where a left-turn movement can be staged by design within a median of sufficient width, the left-turn may be evaluated as a right-turn.
[2]Greater of posted speed, design speed or 85th percentile speed.

17.1.B. Traffic Signal Controlled Intersections

The intersection sight distance at signal-controlled intersections requires that the first vehicle on each approach should be visible to the drivers of the first vehicle on all other approaches. If the signal is to be placed on two-way flashing operation, the requirements for left and right turns from a stop controlled intersection must be met. If right turns on red are permitted, an expected operation in Lee's Summit by default, the departure sight triangle for right turns for stop controlled intersections should be provided.

17.1.C. All-Way Stop Controlled Intersections

The first vehicle stopped on each approach should be visible to the drivers of the first vehicles stopped on all other approaches.

17.1.D. Left Turns from a Major Road

The required intersection sight distance for left-turns from the major road when the left-turn is not controlled is the distance traveled by an approaching vehicle at the design speed of the major roadway for the distances shown in ***Table 17-3***.

Table 17-3 Gap Time for Left Turns from Uncontrolled Street	
Design Vehicle	**Travel Time [1]**
Passenger Car	5.5 sec.
Single Unit Truck	6.5 sec.
Combination Truck	7.5 sec.
[1]Adjustment for multilane highways: For left turns that must cross more than one opposing lane, add 0.5 sec for passenger cars and 0.7 sec for trucks for each additional lane to be crossed	

Generally, no separate check for this condition is necessary where sight distance for stop intersections is available. Checks are required at three-legged intersections and at mid-block approaches or driveways. Locations on horizontal curves and with sight obstructions present in the median need to be checked as well.

17.2. Exceptions to Sight Distance Requirements

Sight distance should be considered a key element in the location of all driveways and roadway intersections with particular emphasis placed upon public street approaches, high volume commercial and industrial driveways, and all driveways on arterial streets. All driveway and roadway intersection locations shall meet or exceed the requirements listed above.

If no location on the applicant's frontage meets or exceeds the sight distance requirements, but a location does meet or exceed the distances shown in the ***Minimum Stopping Sight Distance*** column on ***Table 17-4***, a driveway or roadway may be located with the City Traffic Engineer's approval, in accordance with the all the following criteria:

- The proposed driveway location has the maximum sight distance available on the entire property frontage.
- The classification for the street is not expressway or major arterial.
- The proposed location is not for a public street approach or a high-volume commercial driveway (more than 50 trips (in plus out) existing or projected during the peak hour).
- There is no other available access, having equal or greater sight distance.
- The Applicant will submit a letter to the City Traffic Engineer stating the following: "Applicant is aware that the sight distance of this driveway is restricted. The sight distance is the minimum necessary for a vehicle traveling at the posted speed to come to a complete stop prior to the driveway." The permit may also be issued with conditions limiting the number and types of vehicles using the driveway.

If these conditions are not met the permit shall not be issued for the driveway. The applicant should be advised of work that could improve sight distance for the location, such as grading or brush removal.

Table 17-4
Minimum Stopping Sight Distance, in Feet

Speed[1]	25	30	35	40	45	50	55	60	65
Distance[2]	155	200	250	305	360	425	495	570	645

[1]Greater of design speed or 85th percentile speed.
[2]Distances shown for level roadways. Additional stopping sight distance is required for downgrade conditions.

17.3. How to Measure Sight Distance

The sight distance for the proposed driveway is measured for each direction of travel and turning movement considered and the smaller distance is then located in the sight distance chart for the speed (greater of the design speed and 85th percentile speed) of the roadway to determine which sight distance criteria is met, if any.

Acceptable sight distance measurement methods are described in the AASHTO "Green Book". For example: To measure actual sight distance limited by vertical alignment in the field for a proposed driveway, place a sighting target 3.50 feet above the edge of pavement at a point 20 feet from the edge of the nearest travel lane to represent the approximate location of a driver waiting to exit the driveway at the proposed driveway location. On streets classified minor arterial and below, the target may be placed at a point 15 feet from edge of the nearest travel lane. Sighting from a height of 3.5 feet for cars (7.6 feet for trucks), move along the roadway away from the proposed driveway site to a point beyond where the target disappears. Move toward the target until it can first be seen and place a mark on the pavement. The target should remain visible as you continue toward the driveway. The line of sight should stay within the limits of the right-of-way. Measure the distance along the roadway between the mark and the target. This measured distance is the sight distance.

Sight distance should take into account both the horizontal and vertical profile of the roadway. Consideration may also be given to vegetation both on the right-of-way and adjacent to the right-of-way as it may impede vision more or less during certain times of the year. Where providing adequate sight distance requires visibility across private property, provisions must be made to preserve sight lines across the property.

Section 18 - Driveway/Connection Geometry

The design of driveways is important in access management in that it affects the speed of traffic turning into and out of driveways. This in turn affects the speed differential between through traffic and turning traffic where auxiliary lanes are not provided. Large speed differentials are created where driveways are inadequately designed and these higher speed differentials are associated with higher crash rates and diminished traffic operations. The design of driveways also impacts the safety of pedestrians crossing driveways and delay associated with pedestrian driveway crossing activity.

Another critical aspect of the driveway or connection design is the potential for traffic operations off of the public street to become congested and spill or queue back onto the public street. The proper separation of internal conflict points from the public street is necessary to eliminate or diminish this potential.

Driveway designs should always be based on the results of a study of the traffic likely to use them.

18.1. Driveway/Connection Standards

18.1.A. Lining Up Driveways Across Roadways

Driveways shall align with driveways across the roadway on roadways without non-traversable medians or shall be offset as described in the connection spacing standards.

18.1.B. Angle of Intersection to the Public Roadway

18.1.B.1. Driveways that serve two-way traffic should have angles of intersection with the public street of 90 degrees or very near 90 degrees. The minimum acceptable angle for driveways that serve two-way traffic is 80 degrees.

18.1.B.2. Driveways that serve one-way traffic may have an acute angular placement of from 60 to 90 degrees.

18.1.C. Corner Radius

The corner radius at intersections should be large enough to allow entering vehicles to do so at a reasonable rate of speed and avoid encroachments of adjacent lanes by turning vehicles of frequent use (e.g. typically a passenger vehicle and/or single unit truck), but should otherwise be minimized to reduce the negative impacts associated with larger radii. Large corner radii can adversely impact safety and operations by acute view angles, increased pedestrian crossing exposures, indistinct lane definition, greater intersection area, and other considerations. The Design and Construction Manual describes minimum corner radii, measured from the back of curb or edge of roadway when curb is not present. Corner radii for driveways shall not exceed the radii standards for street intersections and should be less than those for streets so as not to confuse the identification of driveway intersections as street intersections along a roadway. Corner radii of greater than 50 feet should not be used.

18.1.D. Driveway Width

Driveway widths shall be measured exclusive of any curb or curb and gutter. If monolithic curb is used, a 2-foot section measured from the back of curb shall be deemed a de facto curb and gutter section. Any medians contained in the driveway are above and beyond the minimum widths in the table. Driveway widths shall be minimized and accommodate the required number of lanes and all traffic movements for the expected design vehicle. Typical minimum and maximum widths for various levels of traffic and directions of access are shown on ***Table 18-1***.

18.1.D.1. All commercial and industrial driveways shall be curbed.

18.1.D.2. All parking lots and driveways leading to or connecting with parking lots shall also be curbed.

18.1.D.3. All commercial and industrial driveways with four or more lanes shall have a raised median separating the inbound and outbound lanes. The median should be at least 4 feet in width with aesthetically enhanced materials of contrasting color and texture to that of the pavement surface. A landscaped median with minimum width of 8 feet is desired. On industrial drives with primarily heavy truck traffic, medians may be omitted unless provided to comply with controlled access conditions.

18.1.D.4. Single inbound or outbound lanes on driveways with a median shall be 16 to 18 feet in width.

18.1.D.5. The width of any residential driveway shall conform to the requirements noted as general conditions herein, the Unified Development Ordinance and/or Design & Construction Manual whichever applies and is most restrictive. Generally, residential driveway width at the right-of-way shall be minimized to the extent practical and not exceed a typical three-car width (a typical two-car drive width preferred).

18.1.D.6. Low volume driveways may be permitted to have a width of 24 feet (back of curb to back of curb) on local and access roadways or in the Downtown Core provided trucks are prohibited or the site, throat depth and driveway are designed to accommodates truck traffic.

Table 18-1
Commercial/Industrial Driveway Widths
(Back of Curb to Back of Curb)

Driveway Traffic Category	Average Daily Traffic Using Driveway	Peak Hour Traffic Using Driveway	Two-Way Access		One-Way Access	
			Min. Width	Max. Width	Min. Width	Max. Width
Low Volume	< 1500	< 150	28 feet[2]	42 feet[3]	16 feet[1]	18 feet[1]
Medium Volume	1500-4000	150-400	42 feet[3]	56 feet[4]	18 feet[1]	30 feet[2]
High Volume	>4000	>400	42 feet[3]	To Be Determined Through a Traffic Study	Generally Not Applicable	Generally Not Applicable

[1]One-lane driveways.
[2]Driveway accommodates two-lanes.
[3]Driveway is striped for three lanes.
[4]Driveway is striped for four lanes. Driveway may require a width greater than 56 feet where additional lane(s) are needed based on a traffic impact study or other Access Management Code provision.

18.1.E. Driveways and Accommodation of Pedestrians

In current and future urban places, all driveways must adequately accommodate pedestrians using sidewalks or paths. The crosswalk location should be placed to balance the pedestrian crossing distance and the width of the intersection for vehicular traffic (typically this is at about the center point of the corner radius). Crosswalks should not be placed where pedestrians would likely have to cross behind or between stopped vehicles. Where four or more driveway lanes are created, the driveway should be designed so that the pedestrian has a refuge from entering and exiting traffic unless such driveway is traffic signal controlled. Driveway widths and corner radii should be minimized, not maximized, to reduce the pedestrian crossing distance. This will also reduce the pedestrian crossing time making traffic operations more efficient.

18.1.F. Driveways and Accommodation of Bicycles

Where a new driveway crosses a bicycle facility (such as a dedicated bike path or an on-street bike lane), the driveway should be designed so as to accommodate the safe crossing of bicyclists. Likewise, when a new bicycle facility is built that crosses existing driveways, the bicycle facility should be designed with safe crossings in mind. Developments that accommodate cyclists should have driveways that also accommodate cyclists or separated bicycle facilities.

18.1.G. Driveway Throat Length

The driveway throat length should minimize or eliminate the condition where inbound traffic queues onto a public street (see ***Figure 18-1***). The throat length also provides a place for vehicles to queue without adversely affecting site circulation, gives better definition of the driving lanes, and separates the parking area from the adjacent street or drive. Driveway throat lengths shall meet or exceed the requirements of Table 18-2 and should be based on the ultimate public street section and land development anticipated. Residential driveway throat depth shall meet the requirements of the UDO, typically dictated by building setback.

Table 18-2
Driveway Throat Depths

Project Peak Hour Vehicles Per Hour (vph) (two-way traffic)	Adjacent Roadway Classification		
	Local	Collector	Arterial
< 10 vph	30 feet[1] 50 feet	30 feet[1] 50 feet	30 feet[1] 50 feet
10 vph to 50 vph	50 feet	50 feet	75 feet
50 vph to 100 vph	50 feet	75 feet	100 feet
100 vph to < 400 vph	Greater of 75 feet or as calculated by Transportation Impact Study	Greater of 100 feet or as calculated by Transportation Impact Study	Greater of 125 feet or as calculated by Transportation Impact Study
400 vph or more	Greater of 100 feet or as calculated by Transportation Impact Study	Greater of 125 feet or as calculated by Transportation Impact Study	Greater of 150 feet or as calculated by Transportation Impact Study

[1] For driveways serving extremely low volumes (10 vehicles or less in the peak hours) on low volume (less than 100 vehicles existing or projected in any hour), low speed (25 miles per hour speed limit) streets, a throat depth of 30 feet may be permitted at the City Traffic Engineer's discretion.

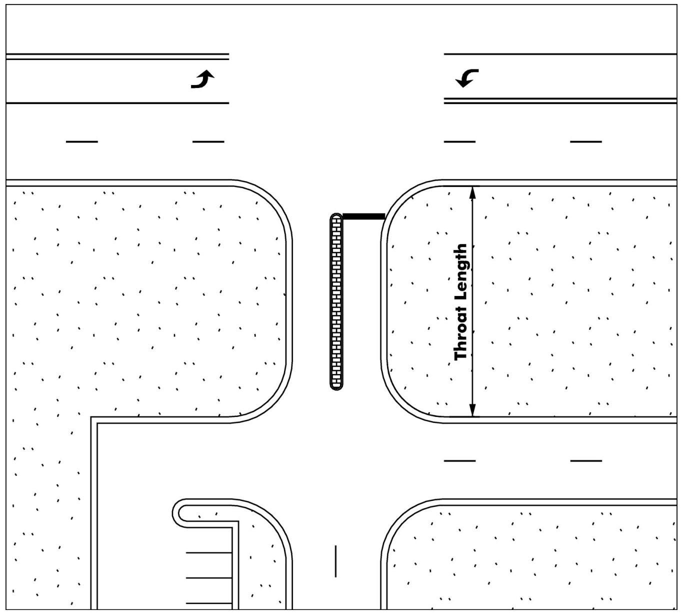

Figure 18-1
Driveway Throat Length

18.1.H. Turning Radius

The path that a vehicle follows when turning left to or from a cross street or drive is defined as the turning radius. This path should be a continuous, smooth curve from the stopping point e.g. the stop line, the end of the median nose, or the location the vehicle typically waits to make a left turn, to beyond the farthest conflicting travel lane. Left-turning drivers should not have to pull out straight into the intersection and then begin the turn maneuver. The minimum turning radii are as follows:

- For low volume drives or streets (less than 100 vehicles in the peak hour) serving primarily passenger cars, 40 feet minimum.
- For dual left-turn movements, 75 feet minimum (for the inner left-turn movement).
- For all other situations, 60 feet minimum.

Opposing left-turn movements, e.g. eastbound left turns and westbound left turns, at the same intersection shall provide at least 10 feet of separation between the outside edges of the two turning paths.