CITY OF SURPRISE
Planning and Zoning Commission Work Session Agenda
16000 N. Civic Center Plaza
Surprise, AZ 85374

Thursday, August 7, 2014 @ 5:00 PM
Council Chambers

Back Print

CALL TO ORDER.

A. Roll Call

B. Pledge of Allegiance

C. Current Events and Reports – Pursuant to A.R.S. §38-431.02(k) the chief administrator, presiding officer or a member of a public body may present a brief summary of current events without listing in the agenda the specific matters to be summarized, provided that 1) The summary is listed on the agenda; and 2) The public body does not propose, discuss, deliberate or take legal action at that meeting on any matter in the summary unless the specific matter is properly noticed for legal action.

D. Staff Reports

Planning and Zoning Commission Work Session Agenda:

CALL TO THE PUBLIC:

INSTRUCTIONS: In order to address the Board\Commission, you will need to fill out a Call to the Public Form available at the front counter, and then turn it in to the Secretary before the meeting begins.

Note: A.R.S. 38-431.01(H) - During this time members of the public may address the Board\Commission on any item not on the agenda. At the conclusion of the open call, the Board\Commission may respond to criticism, may ask staff to review the matter or may ask that the matter be put on a future agenda. No discussion or action shall take place on any item raised.

E. Approval of items on the Consent Agenda – all items with an asterisk (*) are considered to be routine matters and will be enacted by one motion and one roll call vote to the Board\Commission. There will be no separate discussion on these items unless a board member or commissioner requests, in which event the item will be removed from the consent agenda and considered in its normal sequence on the agenda.

CONSENT AGENDA:

REGULAR AGENDA ITEM - NON-PUBLIC HEARING:

ITEM #	DISTRICT #	ITEM DESCRIPTION	STAFF RECOMMENDATION/ PRESENTED BY

#1	District Citywide	**Presentation and discussion on the City of Surprise Draft Access Management Plan.**	No Action Martin Lucero, Community Development

OTHER BUSINESS:

ADJOURNMENT:

SHERRY ANN AGUILAR, CITY CLERK, CMC

POSTED: Posted July 31, 2014 @ 12:25 p.m.

SPECIAL NOTE: PERSONS WITH SPECIAL ACCESSIBILITY NEEDS, INCLUDING LARGE PRINT MATERIALS OR INTERPRETER, SHOULD CONTACT THE CITY CLERK'S OFFICE @ 623.222.1200 OR TTY 623.222.1002, BY NO LATER THAN 24 HOURS IN ADVANCE OF THE REGULAR SCHEDULED MEETING TIME.

CITY OF SURPRISE
Planning and Zoning Commission Work Session

August 7, 2014 @ 5:00:00 PM

Back Print

Board Meeting Date:	August 7, 2014	Contact Person:	Martin Lucero, Community Development
Submitting Department:	CD Boards and Commissions	District:	Citywide
Staff Recommendations:	No Action		

Consent	Regular x	Public Hearing	Report/Discussion

Agenda Wording:

Presentation and discussion on the City of Surprise Draft Access Management Plan.

Motion:

Discussion Only

Background:

Staff has developed a City of Surprise Draft Access Management Plan. The information presented in the Draft Access Management Plan is a general City wide plan that was developed to be consistent with the City, MAG and ADOT's access management goals and policies.

Financial Impact Statement:

ATTACHMENTS:

Click to download

- ☐ Staff Report
- ☐ Draft AMP

External Attachment Links:

Meeting Requirements:

Powerpoint	x	Video		White Board		Other	x

Presentation Speaker Names (spelling and titles for TV captions):

Martin Lucero, Tranportation Planning Manager

SURPRISE
ARIZONA

COMMUNITY DEVELOPMENT

Date: August 7, 2014

To: Planning and Zoning Commission

From: Chris Boyd, Interim Director
Martin Lucero, Transportation Planning Manager

Re: City of Surprise Access Management Plan

Project Summary

An introduction to Access Management was given to the Commission on July 10th. The goal of the plan is to balance local planning and economic goals with the safe and efficient operation of the City's Transportation Network.

As noted above, the Access Management Plan contains ways in which access, safety, and congestion along the City's transportation network can be improved over time. This document outlines access management tools that the City can use and techniques; however, with adoption of this plan the agencies will work more efficiently with regional and community stakeholders to ensure the safe and efficient travel now and in the future.

Once the work session is complete Staff plans on bring the plan forward at the August 7, 2014 Planning and Zoning Commission meeting for recommended approval to City Council and then present the plan to City Council on September 16th for adoptions.

Recommendation

Presentation and discussion only.

Attachments
Draft Access Management Plan

CITY OF SURPRISE

Access Management Plan

Draft

16000 N. Civic Center Plaza
Surprise, AZ 85374
http://www.surpriseaz.gov/

7/3/2014

Access Management Plan

Table of Contents

I. INTRODUCTION TO ACCESS MANAGEMENT

A. Purpose of Access Management

Within the City of Surprise there are critical corridors that have access challenges. The purpose of the access standards outlined in this document is to maintain the capacity of roadways while promoting safety by reducing the number of conflict points along a roadway facility.

Access standards should preserve the function of the roadway. As a result, the need for new or expanded roadways may be reduced or delayed because existing infrastructure maintains its capacity to handle trip volumes. In addition to safety and operational benefits of access management, when consistently and appropriately applied, they help maintain or improve property values, facilitate bicycle and pedestrian travel, and provide efficient connections to the surrounding transportation infrastructure. This access management plan enhances roadway purpose and compatibility with the surrounding land use, community goals, and objectives that were established in the City's General Plan 2035.

For parkways and arterials, the number of driveways to businesses and intersections with cross streets should be kept to a minimum to maintain a high degree of mobility. Mobility refers to the ability of a roadway to provide consistent traffic flow with minimal conflict. With the understanding that businesses and public venues require driveways for access and to meet certain code requirements, it will be important to regulate the number and the spacing of access points to maintain mobility. Too many driveways increase conflict points unnecessarily along a corridor. As a result, delays are experienced, which encourages development of new roadway facilities to solve the perceived capacity problem. Whenever possible, collector or local streets and frontage roads should be utilized for access. This helps achieve a separation between access and mobility.

Another critical element of any successful access management solution involves utilizing the principles of "Complete Streets". Complete streets emphasize the importance of the roadway network being safe and convenient for all modes of travel and of enhancing the relationship between transportation and the surrounding land uses. These access management guidelines will support all modes of transportation by recommending the reduction or consolidation of conflict points along parkways, arterial and collector roadways. Reducing conflict points protects all users, especially the more vulnerable cyclists and pedestrians.

B. Principles of Access Management

Access Management is the systematic control of spacing and location of driveways and cross streets, placement of median openings, and the interconnectivity of road classifications to

maintain the access and mobility function of collectors, arterials, parkways and highways. A facility's capacity and function can be preserved and the number of conflict points reduced by managing access to adjacent land uses.

The Transportation Research Board (TRB), a national organization that researches and publishes documents on transportation, recommends ten principles that should be followed when implementing access management:

1. Provide a specialized road system:
   A viable community requires a variety of roadways organized as an integrated system. Recognize that different roads serve different purposes. Parkways and arterials are needed for higher speed, longer trips. Collectors and local streets provide access to homes and businesses.
2. Limit direct access to major roadways:
   Avoid site plan designs with driveways that enter onto parkways and major arterials. Orient business and residential driveways to collectors and local streets that feed onto arterials at a few carefully designed and spaced intersections.
3. Promote intersection hierarchy:
   Build an efficient transportation network that provides appropriate transitions from one classification of roadway to another. Factors should include location and spacing of intersections depending on the major and minor roadways' capacity and function.
4. Locate signals to favor through movement:
   When traffic signals are uniformly spaced on a roadway at distances of greater than one-quarter mile, the signals can be coordinated such that through traffic travels in both directions with a minimal amount of stopping and delay at signalized intersections.
5. Preserve the functional area of intersections and interchanges:
   The functional area is where motorists are responding to the various maneuvers at an intersection or interchange, such as deceleration, turning in or out of driveways, stopping, or lane changes. Avoid placing access points that are too close together to give motorists enough time to respond to all the potential conflicts.
6. Limit the number of conflict points:
   A conflict point is any access point along a roadway where vehicle paths will cross, merge into or diverge from one another. Conflict points are good indicators of the potential for accidents. Reducing the number of conflict points increases the safety of an access point.
7. Separate conflict areas:
   Adequate spacing between access points allows drivers to react to one intersection at a time and provides greater opportunities to avoid potential conflicts at each successive downstream intersection.
8. Remove turning vehicles from through traffic lanes:
   Traffic needs to slow down for vehicles exiting, entering, or turning across the roadway. Restricting turning movements and providing turning lanes allows

turning vehicles to get out of the way of through vehicles.

9. Use non-traversable medians to manage left turn movements:
   The majority of access-related crashes involve left turns. Non-traversable medians eliminate left turns or reduce driver workload and can be especially effective in improving roadway safety.
10. Provide a supporting street and circulation system:
    The design of an interconnected local streets system and internal vehicle circulation in parking areas reduces the number of driveways that businesses need for access to the major roadway and appropriately accommodate future development.

The Federal Highway Administration (FHWA) has an Access Management Program Plan which states that an access management plan should address the following issues,

1. Facility Hierarchy
2. Intersection and Interchange Spacing
3. Driveway Spacing
4. Traffic Signal Spacing
5. Median Treatments and Median Openings
6. Turning Lanes and Auxiliary Lanes
7. Street Connections

To effectively apply these concepts, it is important to also understand to what degree each will enhance the facility's performance. In many cases, systematic data collection is essential to quantifying how well access management has worked at a location. The access management hierarchy can be reduced to system-wide strategies, corridor implementation strategies, and local or individual access point strategies.

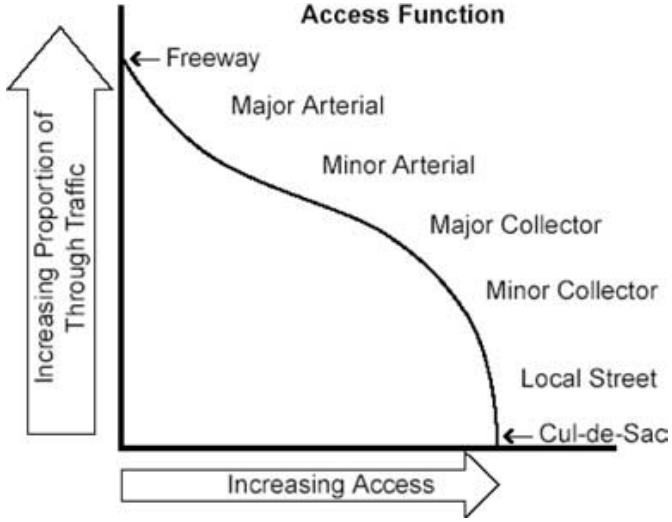
The City of Surprise has followed these guidelines, where applicable, throughout development of the access management plan. The guidelines influenced the policies and standards that are described in the following sections.

This manual is provided as a resource to help developers and transportation professionals quantify the expected benefits of various access management applications. As a result, this manual includes recommendations for how to evaluate potential access management applications including expected performance metrics and recommended data collection information.

II. ROADWAYS

A. Functional Classification

All publicly-owned streets in the City of Surprise can be categorized into a hierarchy of roadways by their intended function to balance mobility and the need to provide access to individual parcels of land. Mobility refers to the ability of a roadway to provide consistent traffic flow with minimal conflict. Classifications at the higher end of the hierarchy are designed to move larger volumes of traffic at a higher speed for longer distances, while classifications at the lower end are designed to provide direct access to property. The graph below illustrates the inverse relationship between a roadway's capacity to provide mobility and its function to provide access to parcels.



B. Urban Road Classification

i. Freeways are designed to carry significant traffic volumes at high speeds. Freeways are intended for intercity or regional travel; therefore mobility is its top priority. Access is restricted to interchanges at one-half mile or greater intervals. Within the City of Surprise, SR303 and the proposed White Tanks Freeway fall into this classification.

ii. Parkways are high capacity roadways designed to accommodate travel over significant distances. Parkways have substantial access control and left turns are prohibited at intersections. Several parkways are planned in the City of Surprise, including Dove Valley Parkway, Deer Valley Parkway, and Jomax Road.

iii. Major Arterials are designed to carry high volumes of traffic over long distances, but may also provide a few direct accesses to adjacent properties. Access to/from major arterials should be minimized and judiciously designed to ensure that mobility does not suffer. Bell Road, Reems Road, and Pat Tillman Boulevard are examples of major arterials in the City of Surprise.

iv. Minor Arterials are similar in function to major arterials, but are designed to carry fewer vehicles and slightly shorter trips than major arterials. Minor arterials may provide a higher degree of direct access to parcels, but

should be carefully planned and designed. Bullard Avenue, Sunrise Boulevard, and Happy Valley Road are examples of minor arterials in the City of Surprise.

v. Collectors are designed to carry moderates volumes of traffic over shorter distances than arterials. A collector's function is to receive traffic from arterials and distribute to neighborhoods, and vice versa; therefore, a collector must provide adequate mobility while maintaining sufficient access to property. Collector roads in Surprise include Parkview Place, Mountain View Boulevard, and Acoma Road.

vi. Local streets are designed to carry low volumes of traffic directly to individual parcels of land; therefore, access is its top priority. Mobility is hindered because access points along a local street are many and closely spaced. Maui Lane, Summer Breeze Way, and Desert Mesa Drive are examples of local streets in the City of Surprise.

C. Rural Road Classifications

i. Rural Major Arterials provide minimal interference to through movements for long distance trips. They handle a high percentage of heavy commercial vehicles and form an integrated network without stub endings except where unusual geographic conditions exist. They are part of the critical transportation infrastructure. Rural Major Arterials provide access to important traffic generators and major cities not served by freeways, and provide access to intermodal facilities.

ii. Rural Minor Arterials provide a high level of mobility and minimize interference to through movements. They are used for long distance travel across entire counties. They are part of an integrated transportation network without stub endings, except where unusual geographic conditions exist.

iii. Rural Collectors connect urban areas with populations over 5,000 and tend to collect traffic from local roads to rural minor arterials. Rural collectors serve traffic generators typically of intracounty importance and serve trips between low density residential and commercial areas.

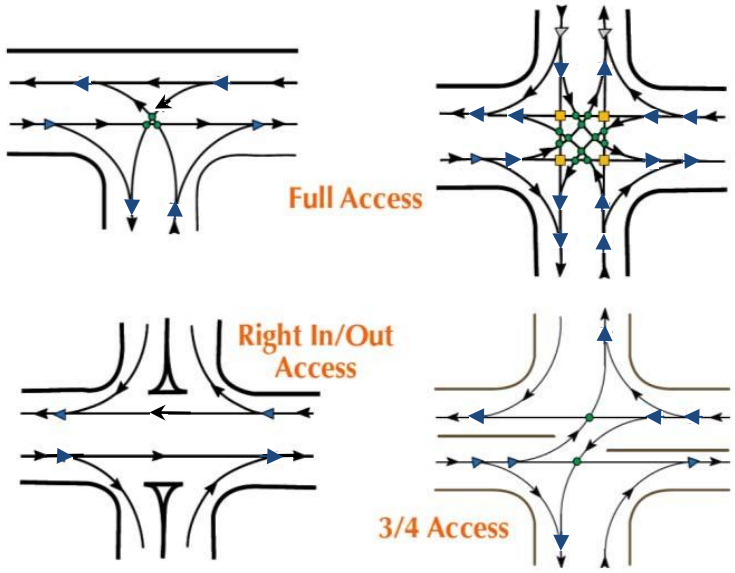
iv. Rural Local street collects traffic from local roads to rural major collectors and has the lowest traffic volumes. They provide the dual function of maintaining mobility and providing access. They serve small population centers and provide access to residences and businesses.

D. Frontage Road

Frontage Roads run parallel to freeways or major arterials and provide access to local properties via strategically located access points. The purpose of frontage roads is to separate through movement on the mainline from accessing property.

III. Access Management Strategies

Access is the interface between land use and the road network. How well the access points function has a direct impact on the operation of the road and helps to determine the best use of the land. Access management includes strategies to reduce the number of traffic conflicts associated with access points and to enhance the safe and efficient movement of traffic. Conflicts occur whenever vehicles are turning on or off a roadway and in and out of a driveway or intersection. The figure below illustrates the number of conflict points at a full intersection, right in/right out access point, and a ¾ access point.



Number and Type of Conflict Points for Each Type of Access Point

	Crossing	Turning	Merge/Diverge	Total
Full Access +	4	12	16	32
Full Access T	0	3	6	9
¾ Access	0	2	8	10
Right In/Out Access	0	0	4	4

Access management techniques should be considered for each classification of roadway. These techniques need to be reviewed for every access point on a corridor-wide basis. The techniques can be implemented during the initial land development process or during redevelopment of the parcel or as a roadway is reconstructed.

Because some existing facilities cannot easily be brought up to current design standards it becomes critical to find ways to improve safety and mitigate congestion. One of the most effective means, without total reconstruction, is through the application of appropriate access management techniques.

A number of access management techniques may be used to improve roadway safety and enhance intersection operational efficiency. When properly and consistently applied, access management strategies would also promote bicycle and pedestrian safety and economic vitality of a commercial corridor. However, not all techniques are appropriate at all locations, and there are different purposes for different techniques. This document is

designed to be a "toolbox" for managing access and therefore some "tools" are better than other in some situations.

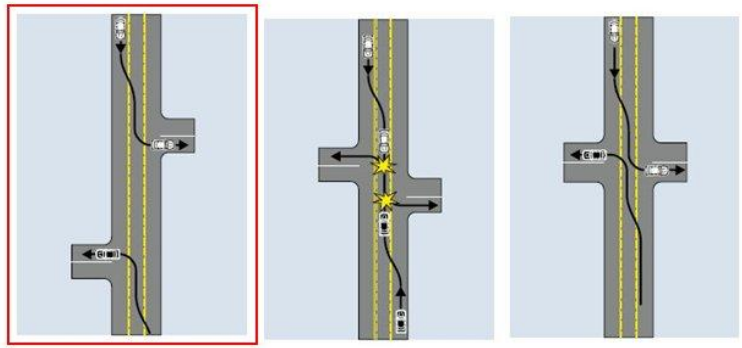
A. Driveways and Intersections

Driveways are the primary access points for ingress and egress from an individual parcel of land. Their design, spacing, and quantity have a significant impact on a roadway's safety.

I. Minimum spacing of access points is established based on the functional classification of the roadway, the posted speed limit, traffic volumes on the roadway, and traffic volumes at the access point. Minimum spacing requirements reduce the number of access points a driver must observe and reduce the chances of a crash. Well spaced driveways spread out turning maneuvers and allow drivers to focus on one conflict area at a time. This reduces the potential for crashes by allowing drivers to make driving decisions sequentially, not simultaneously.

II. Shared access points among adjacent parcels are highly encouraged. The number of access points along a roadway should be kept to a minimum, depending on the functional classification of the roadway. Each parcel should normally be limited to one access point on a parkway or arterial, although shared access should be required, where feasible. A second access points should be taken via collector streets or local streets, where feasible. Consolidation of existing access points at the time of redevelopment should be explored.

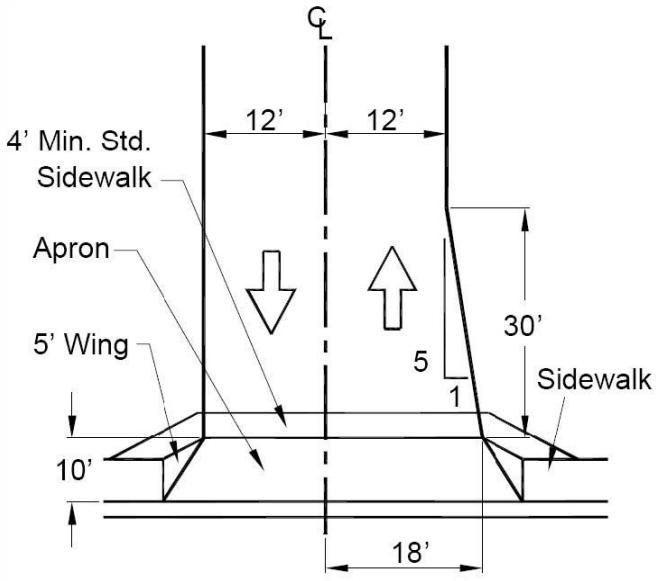
a. Where there are driveways on opposite sides of the road they should be aligned directly opposite each other and intersect at a 90 angle to improve safety and minimize conflicts. If driveways cannot be aligned, certain turning movements should be restricted. The figure below shows the correct and incorrect alignment of driveways on opposite sides of the streets.



Source: FHWA Office of Safety – FHWA-SA-10-002

III. Driveways should be designed with the prevailing speed on the adjacent roadway in mind. The typical curb cut driveway is suitable for lower speed roadways because of its small

radii. A curb return with adequate radii is recommended for all commercial driveways along parkways and arterials to accommodate the higher speed. An alternative to the curb return is a slightly wider opening at the curb cut then tapering as the driveway enters the adjacent land use. The following figure illustrates the alternative driveway design used by the City of Scottsdale. The driveway flares out an additional six feet on the inbound lane to provide a greater turning radius and minimizes encroachment into the outbound lane by entering vehicle.



Source: City of Scottsdale

B. Number of Access Points

The number of access points along a segment of roadway has a direct affect on the mobility, function, and safety of that roadway. While having multiple and frequent access points may be convenient and provides a more direct connection from the arterial roadway, each driveway or intersection adds incrementally to the disruption of the flow of traffic. Therefore, the cumulative impact of an excessive amount of access points is not acceptable on a parkway or arterial. Each driveway proposal must demonstrate its necessity and alternative access points via a lower classification of roadway must be thoroughly considered. Except where not feasible, the minimum number of access points along a parkway or arterial shall be permitted.

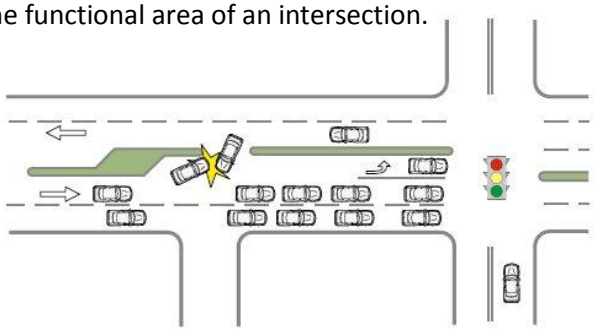
C. Medians

Medians are provided on parkways, arterials, and some high volume collectors to separate the opposing traffic movements, prohibit left turns at undesirable locations, regulate turning movements, provide storage space for left-turn lanes, and provide pedestrian refuge islands at signalized intersections. Non-traversable medians have shown to reduce delays, increase throughput capacity, and improve traffic safety by reducing crash rates. Landscaping or other items of visual interest on medians can add to the aesthetic value of a roadway corridor.

Traversable medians, such as a Two-Way-Left-Turn-Lane (TWLTL) or solid lane lines, may be appropriate on residential collectors in neighborhoods and other locations

where there are minimal access points along a roadway. Traffic volumes on a collector being considered for a traversable median must not exceed the maximum allowable daily volume of 18,000 vehicles per day.

a. The location of median openings must be carefully evaluated to ensure that the operations and free flow of traffic on the roadway is not negatively impacted. Median breaks on parkways and arterials shall maintain a minimum of one-half mile spacing, shorter intervals may be allowed for partial median breaks on arterials. A minimum of one-quarter mile spacing shall be maintained for median breaks on High Volume Collectors and Commercial Collectors. [Current Engineering Development Standards allow full access at one-quarter mile spacing, and partial access at one-eighth mile spacing.] Median openings are prohibited in the functional area of an intersection or another median opening and in the physical length of a left-turn bay. The figure below shows the dangers of providing a median opening in the functional area of an intersection.



Source: FHWA Office of Safety-SA-10-002

b. Median openings are designed to provide left-turn access to and/or from a parcel of land or at an intersection. A full median break may be provided along a roadway where there are driveways opposite each other and allow left turns in and left turns out from both driveways as well as cross traffic. A partial median break is designed to provide only left-turn out or left-turn in, and no cross traffic is allowed. Every median break must be evaluated and designed based on the following factors:
    i. distance from adjacent intersections, driveways, or other median openings;
    ii. posted speed limit and volume of the roadway;
    iii. actual or forecasted volumes in and out of the driveway;
    iv. stopping and intersection sight distance; and
    v. the size of the largest vehicle allowed to use the median break.

c. Median U-Turn Openings, also called Directional Crossovers, are provided along parkways to facilitate turning movements from parkways. The first directional crossover downstream from an intersection should be at a minimum 660 feet. Each subsequent directional crossover should be placed between 660 and 1320 feet apart. Directional

crossovers for opposite directions should be at least 100-150 feet apart.

A U-turn crossover can be provided immediately upstream of an intersection so U-turn vehicles avoid having to cross the intersection twice. It can also be installed on arterials and collectors when it is not feasible to allow the U-turn movement at the intersection.

D. Auxiliary Lanes

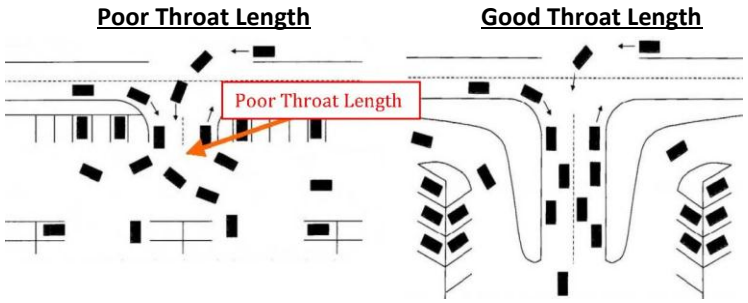
Auxiliary lanes allow turning vehicles to move out of the through lane so roadway capacity and traffic flow would not be negatively affected at driveways or intersections. They also reduce the risk of rear-end crashes by providing a safe distance to decelerate. Adequate storage length and taper distance are necessary to ensure proper operations and safety of the intersection or driveway.

d. Several factors need to be considered during the planning and design phases of an auxiliary lane and its taper. Current operations at the intersection or driveway, such as traffic control method and level of service, should be analyzed and considered. Traffic volumes for the through movement and turning movement will help determine the need for the turn lane and will also guide its design. The posted speed limit will help determine the length of taper. All design elements shall conform to City of Surprise Engineering Development Standards.

E. Internal Site Circulation

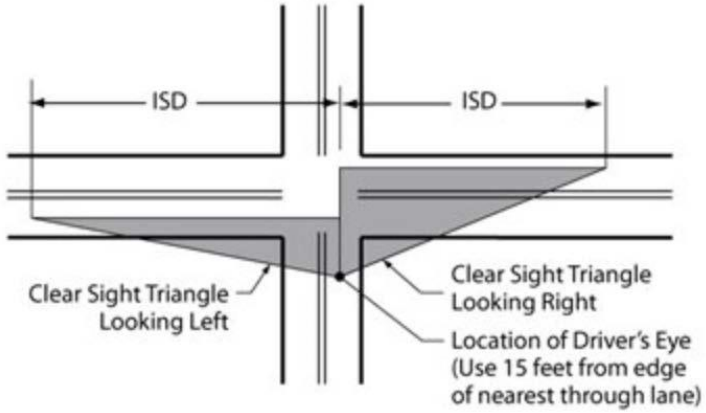
Site circulation and driveway design could negatively impact traffic flow and safety on the arterial roadway if improperly designed. A properly designed internal circulation system should prevent queuing into the arterial, clearly assign right-of-way, separate conflicting turning movements, provide enough gap distance for safe turning movements, and minimize certain types of vehicle crashes such as rear ends and angle crashes. Various design features may be employed to achieve the goal of safety and efficiency. The property developer should consult City staff regarding any specific requirements for a particular parcel of land.

I. A properly designed driveway with adequate throat distance minimizes conflict between vehicles entering a site and internal traffic flow. Throat length is the distance of the drive aisle measured from the driveway to the closest on-site intersecting drive aisle. The throat distance of a driveway must be long enough to accommodate vehicles entering a site to ensure any on-site congestion would not cause vehicles to queue into the adjacent roadway. Traffic volumes, type of vehicles, and vehicle queues are primary considerations for determining driveway throat length. The suggested minimum throat length for a commercial development is 100 feet. [The minimum throat distance requirement will be evaluated against Engineering Development Standards.] The following figure illustrates the affect on traffic operations on the adjacent roadway as well as on parking lots of providing adequate throat length.



Source: Washington City (UT) Access Management Plan, 2010

II. Adequate intersection sight distance must be provided for vehicles to safely enter and exit from a driveway. Sufficient sight distance ensures drivers can see oncoming traffic and safely merge into the traffic flow or drive across traffic lanes to enter a driveway. According to AASHTO design criteria, sight distance is measured 3.5 feet above the roadway and 10 feet back from the edge of the travel lane to simulate the height and location of a driver's eyes as the driver waits at a driveway. Sight distance is an unobstructed and continuous line of sight from the driver to a certain distance along the roadway. A roadway's design speed and grade are primary considerations for determining adequate sight distance. The following figure illustrates the intersection sight distance and the sight distance triangle.



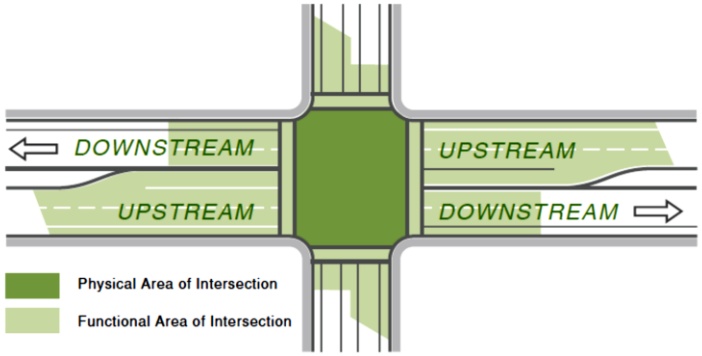
Source: Sight Distance Triangle Concept, from FHWA Office of Safety

III. Where possible, shared access driveways between adjacent parcels along a parkway, arterial, or collector roadway should be used. Shared access driveways minimize the number of access points along a roadway; therefore, they minimize the potential for conflict and enhance the operational efficiency of the roadway. Implementation of shared access driveways may be used to achieve driveway spacing standards. Shared driveways are strongly encouraged for parcels that have limited frontage on a parkway, arterial, or collector, within 300 feet of a signalized intersection, and/or are part of a larger commercial development. An efficient network of internal roads or parking aisles is necessary to provide interconnected access to each parcel and ensure the success of the shared driveway. Consideration should be given to providing pedestrian access between parcels so patrons to a commercial center can conveniently walk to each destination.

IV. INTERSECTIONS

A. Functional Area

The Functional Area of an intersection is where the driver is responding to other vehicles in the intersection that may be decelerating, changing lanes, stopping, or making a turn. The functional area of an intersection includes areas upstream and downstream of the intersection. In "A Policy on Geometric Design of Highways and Streets", the American Association of State Highway and Transportation Officials (AASHTO) defines the functional area of an intersection as the variable distance both upstream and downstream of an intersection, as pictured below.

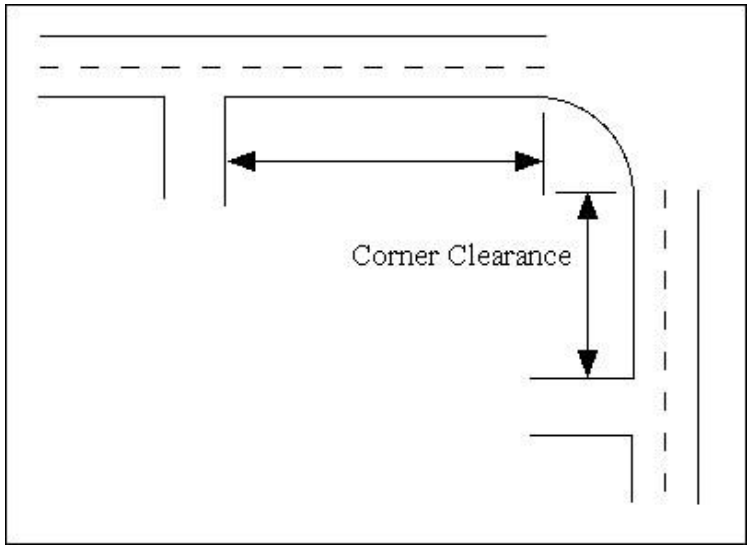


Source: FHWA Office of Safety-SA-10-002

The upstream functional area of an intersection can be influenced by the distance a vehicle traveled during perception-reaction time, deceleration distance while the driver maneuvers to a stop, and the amount of queuing at the intersection.

a. No access points shall be permitted in the functional areas of an intersection, as established in the minimum driveway spacing requirements.

B. Corner Clearance is the distance from an intersection to the closest driveway, measured from the intersection radius to the inside edge of the driveway (see diagram below). It is needed to preserve the functionality of the intersection. Some factors that influence corner clearance spacing include functional intersection area, stopping sight distance, posted speed, and the presence of right turn lanes. Inadequate corner clearances can create problems for traffic operation, safety, and capacity.



Source:

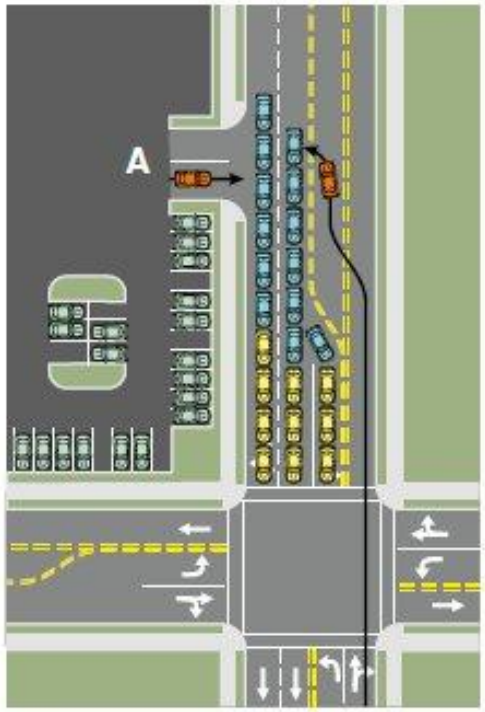
Minimum Corner Clearance distances for the various road classifications described earlier will be based on the table

below and determined by posted speed limits. For driveways that cannot meet the corner clearance standards, it is recommended that they be consolidated with nearby driveways or that cross access be permitted to provide shared property access.

Speed (mph)	Minimum Corner Clearance Distance
20	115’
25	155’
30	200’
35	250’
40	305’ (1/16 mi = 330)
45	360’
50	425’
55	495’
60	570’
65	645’ (1/8 mi = 660)
70	730’

[Current Engineering Development Standards requires a minimum distance of 300 feet between a driveway and the intersection, and a minimum of 200 feet between driveways, regardless of the posted speed limit on the adjacent roadway]

C. Where there is a left-turn lane, the storage length should be sufficient to accommodate the longest queue expected most of the time. When development occurs, plan and locate driveways for future estimated traffic volumes, to limit potential access issues at driveway(s) with future traffic queuing conditions. Every effort should be made to locate driveways outside of the functional area of an intersection and outside the influence area of an adjacent driveway. The following figure illustrates the access problems created by a driveway that is located within the functional area of an intersection.



Source: Federal Highway Administration Office of Safety - FHWA-SA-10-002

V. BICYCLE & PEDESTRIAN ACCESS

A. Bicycle and Pedestrian Access and Mobility

Proper access management can have a beneficial impact to pedestrian and bicycle mobility and accessibility to individual parcels, as well as increased safety on the public right-of-way. Site design strategies that seek to incorporate pedestrian and bicycle facilities, and shorten walking and biking distances between adjacent land uses and the roadway will provide the most benefit.

Source: Calm Streets Boston

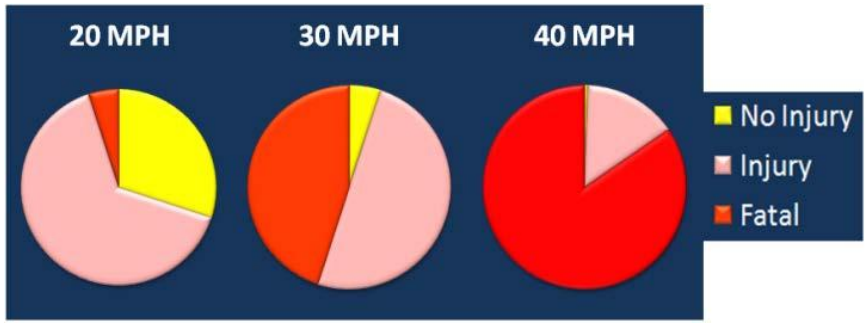
The following standards should be applied to new construction as well as upgrades and reconstruction of existing facilities:

i. Require applicable pedestrian facilities on all arterial and collector roadways. Crosswalks should be clearly striped and located in appropriate areas.
ii. Require striped bike lanes on all arterials and collector roadways
iii. Require development of median refuge islands on all four and six lane arterials
iv. Require bicycle and pedestrian access (e.g. by way of an easement) at the end of cul-de-sacs to adjacent arterials and collector roadways
v. Provide buffer zone (detached sidewalks) on all arterials. All sidewalk widths should meet or exceed City of Surprise standards.
vi. All sidewalk widths should meet or exceed City of Surprise standards.
vii. Require facilities to meet Americans with Disability Act (ADA) requirements, especially where pedestrian use may be expected across an access point
    a. The vertical and horizontal design characteristics of the access shall be designed in accordance with the ADA Standards for Accessible Design.
viii. Bicycle and pedestrian amenities such as bike racks, benches, shade structures, and water fountains should be provided at commercial developments as outlined within the City Code Section 122-133(e).
ix. Site plan design should address pedestrian and bicycle access from the adjacent street as well as circulation within a commercial development. A safe and appealing pedestrian circulation network promotes walking between businesses.

x. Where two or more parcels share driveway access, a system of paths should also provide convenient and safe access for pedestrians and bicyclists between the parcels.

Proper access management aims to increase safety for pedestrians as well as motorists. Where pedestrian and vehicle paths cross, i.e.: driveways, intersections, and crosswalks, speed is one of the main factors in serious injuries or deaths. As vehicle speed increases above 20 mph, the likelihood of injuries increase dramatically. The kinetic energy of a vehicle traveling at 40 mph is 4 times greater than that of a vehicle traveling at 20 mph, even though it is only traveling at twice the speed. This is because kinetic energy increases with the square of the speed.

The figure below shows the probability of injury and fatality in a pedestrian/vehicle crash for different vehicle speeds. A pedestrian struck by a vehicle traveling at 30 mph is 9 times more likely to be killed than if he/she were struck by vehicle traveling at 20 mph. As the figure shows, pedestrian fatality is almost certain if he/she is struck by a vehicle traveling at 40 mph.



Adopted from "Literature Review on Vehicle Travel Speeds and Pedestrian Injuries". US DOT, NHTSA, DOT HS 809 021 October 1999. Graphic produced by P. Demosthenes.

B. Shared Use Paths

Shared use paths (or sidepaths) are pedestrian and bicycle facilities that are physically separated from motor vehicle traffic with an open space or barrier. Shared use paths are off-road facilities that are often found along waterways, utility rights-of-ways, and within parks and open space areas. Shared use paths may be safer and more desirable than traditional sidewalks and bike lanes along high-volume high-speed limited access roadways because they are physically separated from vehicle travel lanes. However, shared use paths are not substitutes for properly designed and constructed in-street sidewalks and bike lanes. Shared use paths may be used by a variety of user groups (bicyclists, pedestrians, joggers, or in-line skaters) for a variety of purposes, including commuting, recreation, or fitness.

Consolidated canal trail in Mesa, AZ

Caution should be exercised when installing a shared use path in an urban setting. This type of multimodal facility works best where there are fewer access points along the route to provide bicyclists and pedestrians with long stretches of uninterrupted travel. Rest areas with benches should be provided periodically, depending upon the anticipated amount of users. It is recommended that the design criteria of shared use paths meet the requirements as outlined in the AASHTO Guide for the Development of Bicycle Facilities, FHWA Designing Sidewalks and Trails for Access, Part II: Best Practices Design Guide, and ADA Standards for Accessible Design.