

REGIONALLY SIGNIFICANT ROUTES FOR SAFETY AND MOBILITY



ACCESS MANAGEMENT MANUAL

OCTOBER 2008

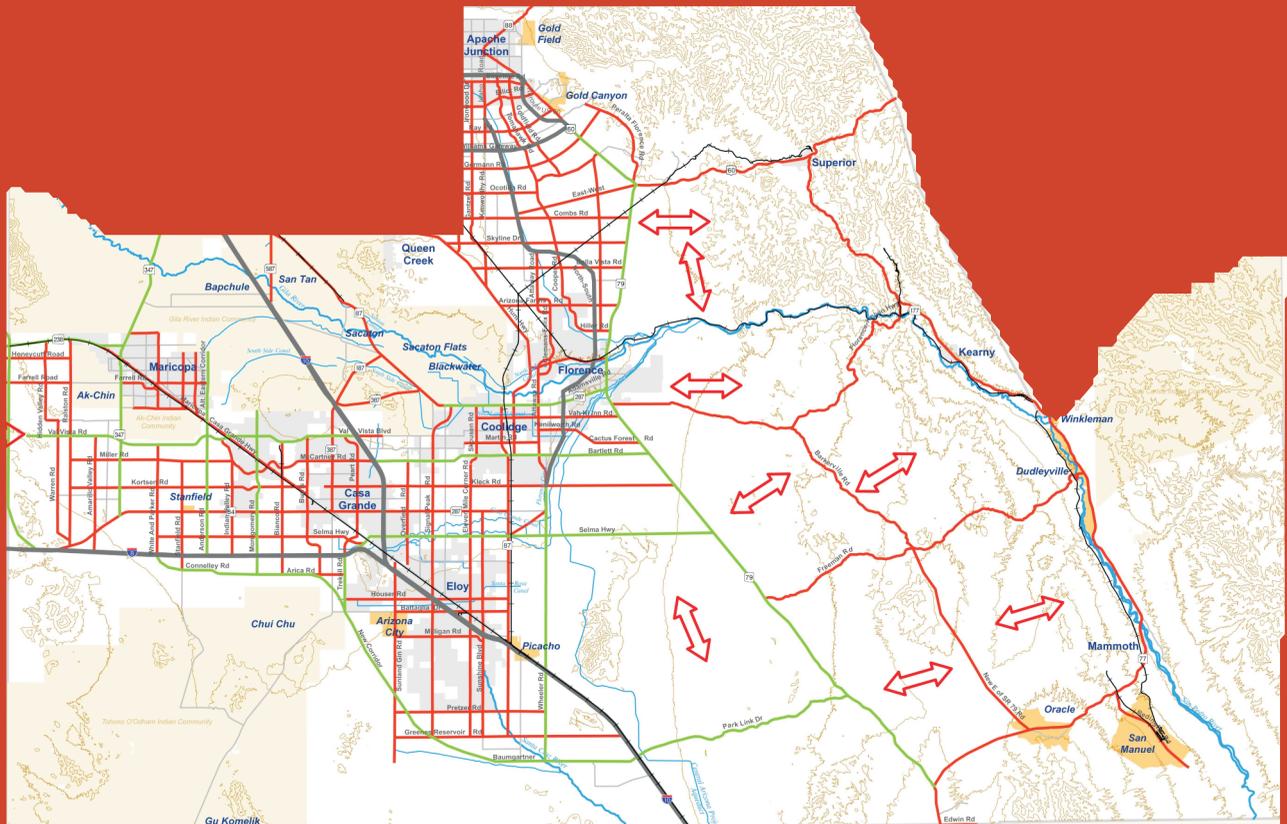


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1. INTRODUCTION

PURPOSE

The Access Management Manual provides guidance on the implementation of access management for Regionally Significant Routes for Safety and Mobility (RSRSM) to Pinal County, local jurisdictions, Native American Communities, and private developers. The intent of the manual is to ensure consistent application of access criteria on RSRs across all entities in the County.

The manual has been prepared through an extensive open process of coordination, cooperation, and communication among the County, local municipalities, Native American Communities, private developers, and the Arizona Department of Transportation.

ORGANIZATION OF MANUAL

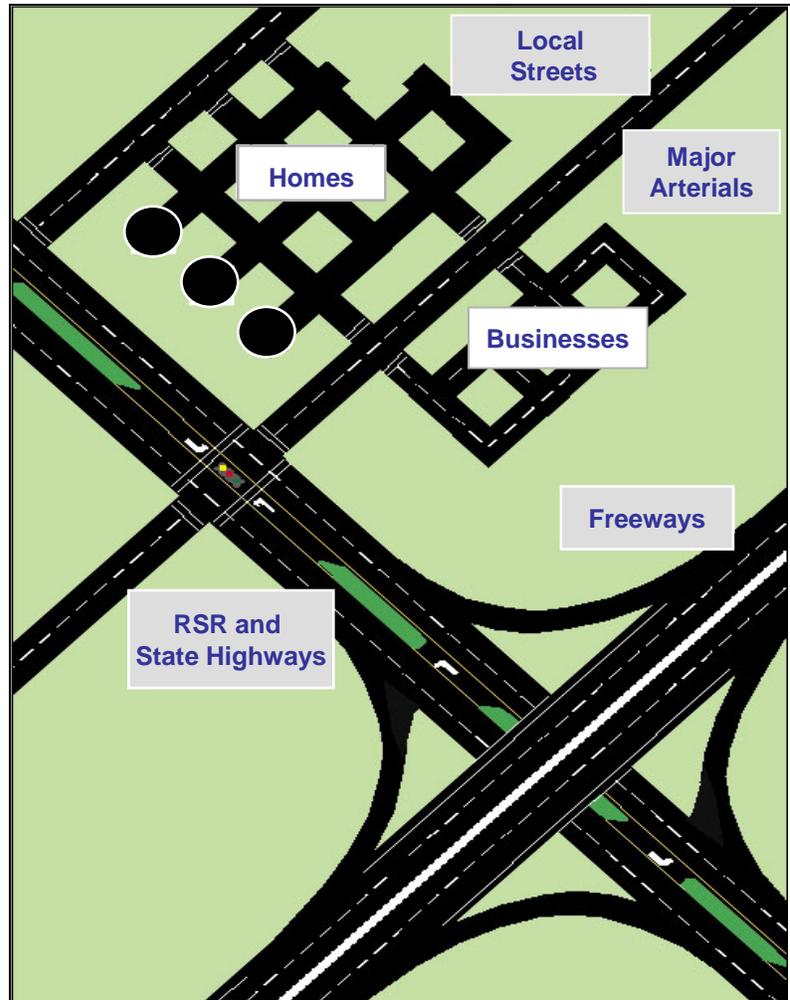
Chapter 2 discusses the need for access management, and definition and benefits of access management. The authority of the County, jurisdictions, and state to implement access management on RSRs is presented in Chapter 3. The next chapter outlines the classification and access guidelines for RSRs. Chapter 5 presents an overview of the access decision-making process and Chapter 6 gives a toolkit for land use and technical access management strategies.

2. THE NEED FOR ACCESS MANAGEMENT

A highly functional roadway system provides mobility for persons and goods to land use activities. Figure 1 shows how the roadways in the various functional classifications might serve land uses directly (major arterials, collectors, and local streets) or indirectly (freeways, and regionally significant routes). Figure 2 shows how roadways of various functional classes provide varying degrees of mobility and/or access. Freeways that restrict access only at specific interchange locations provide the highest level of mobility.

Regionally significant routes and arterials with limited access to adjacent property provide a high level of mobility. Collector streets provide both mobility between neighborhoods and commercial areas and access to these areas from arterials. Local streets provide access to individual homes and businesses within neighborhoods and commercial areas.

FIGURE 1. ACCESS AND MOVEMENT FUNCTIONS RELATED TO THE TYPE OF ROADWAY



Major transportation corridors such as the Pinal County Regionally Significant Routes are designed for the safe and efficient movement of people and goods at a high level of service. If access to these corridors is limited, then safety and mobility will be maintained along the corridors. However, if access to adjacent property is not limited and adjacent property develops, the addition of traffic signals and curb cuts often has an adverse effect on mobility and safety. As land is developed along transportation corridors, vehicle access to property adjacent to the corridor is often achieved directly to and from the transportation corridor. As a result, more trips are forced onto the corridor due to insufficient internal access systems serving these land use activities. As traffic congestion increases, the level of service provided by the major transportation corridor decreases. In addition, crashes along such a corridor generally increase due to the large number of turning and other conflicts along the corridor.

FIGURE 2. VARIOUS FUNCTIONAL CLASSES OF ROADWAYS

Regionally Significant Routes and State Routes Provide High Mobility



Freeways Maximize Mobility



Arterials Provide Mobility



Local Streets Maximize Access

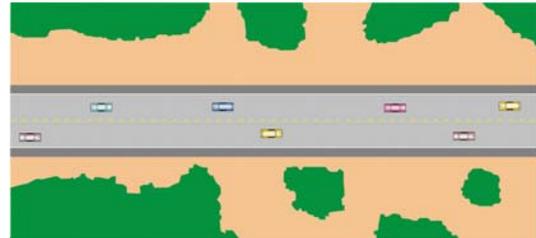


Figure 3 depicts how development and population growth along roadway segments may occur with and without applying access management practices.

FIGURE 3. EFFECT OF DEVELOPMENT ON ROADWAY CHARACTER

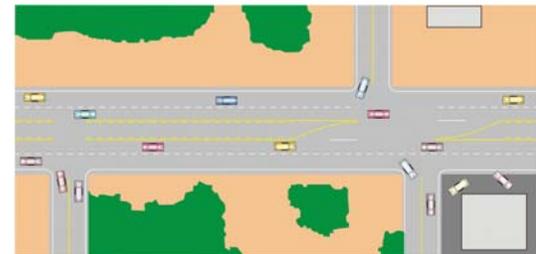
In view A, prior to significant development, the roadway is rural in character, with few delays caused by vehicles entering or exiting the roadway. Driving through the area is a relatively stress-free experience.

VIEW A



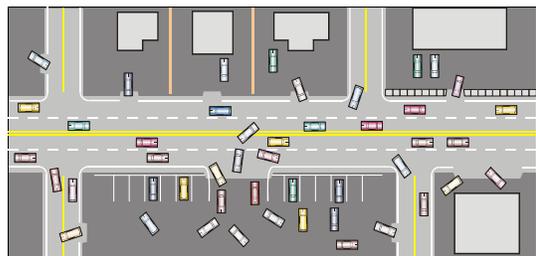
More commercial development has taken place in View B, and the resulting side streets add more opportunities for vehicles to enter or leave the roadway, causing poorer traffic flow. Vehicle spacing is denser, as traffic volumes have increased, and the average speed has dropped.

VIEW B



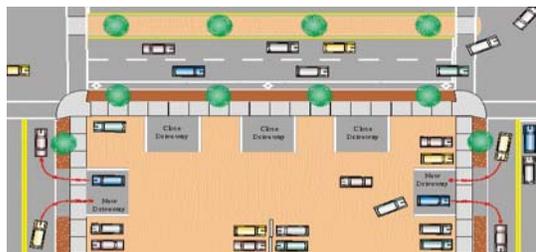
In view C, the addition of too many driveways and intersections causes traffic to be restricted by vehicles entering or exiting the roadway. This condition causes vehicles to collide; resulting in more crashes, and slow through traffic. Driving through the area has become highly stressful, and the average speed has dropped further.

VIEW C



In View D, the application of the reduction of driveways accessing the major transportation corridor improves traffic flow on the corridor.

VIEW D



The goal of an access management program is to successfully balance the roadway operation needs with the land development needs. The main benefits of an access management plan are the preservation of safety and service.

The number of access points also has a significant impact on pedestrian, bicycle, and transit activities. Most crashes involving motor vehicles and pedestrians on busy streets occur at points where vehicles enter the roadway such as intersections, driveways, and alleys. Nearly all transit use involves some pedestrian or bicycle travel between transit stops and the traveler's origin or destination. Hence, access management practices that reduce the number of driveways along a roadway segment not only increase the segment's level of service from a motorist's point of view, but also encourage travel by alternative modes.

DEFINITION OF ACCESS MANAGEMENT

The Federal Highway Administration's official definition of access management is "the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding system in terms of safety, capacity, and speed." In practical terms this process requires the regulation of vehicular access to public highways from adjoining property in order to limit the number of access points to a roadway, and, therefore; to reduce the number of potential conflict points among the users of the roadway.

- Access management deals with the traffic problems caused by unmanaged development before they occur.
- Access management addresses how land is accessed along arterials.
- Access management focuses on mitigating traffic problems arising from development and increased traffic volume traveling to the new activity centers.
- Access management calls upon local planning and zoning to address overall patterns of growth and the aesthetic issues arising from development.

Access management can be provided through legal, regulatory, and technical strategies available to political jurisdictions under state statutes that give them certain authority. The types of possible access management strategies are as follows:

- Legal strategies including implementing legislation to manage access and require access permits.
- Regulatory strategies including zoning and subdivision regulations and access permit regulations. Regulatory strategies were discussed in the previous chapter on Corridor Management.
- Technical strategies including constructing medians, providing right- and left-turn lanes, and providing grade separation.
- Other strategies, such as purchasing access rights from adjacent property owners and limiting access points to a roadway.

THE BENEFITS OF ACCESS MANAGEMENT

The primary benefits of access management are improved safety, more efficient operations and improved aesthetics. This section discusses the major benefits of access management. The Transportation Research Board (TRB) Access Management Manual and the National Cooperative Highway Research Program Report (NCHRP) 420 document the various impacts of many access management techniques that are in use in other states. The Transportation Research Board (TRB) is a division of the National Research Council, which serves as an independent adviser to the federal government and others on scientific and technical questions of national importance. The National Cooperative Highway Research Program (NCHRP) is administered by the TRB.

One of the most important access management techniques relates to the frequency and uniformity of traffic signal spacing. The spacing of signalized intersections can govern the performance of the roadway segment, specifically in terms of the travel time of vehicles. Table 1 shows that travel time increases as the density of signalized intersections along a roadway segment increases. For example, a roadway segment that has four signalized intersections per mile will have a travel time 16 percent higher than that for a roadway segment with only two signals per mile.

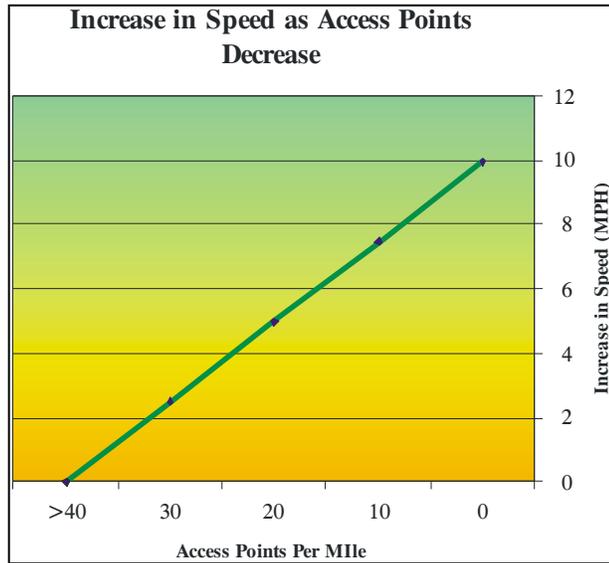
**TABLE 1. PERCENTAGE INCREASES IN TRAVEL TIMES
AS SIGNAL DENSITY INCREASES**

Signals per Mile	Percent Increase in Travel Times (Compared with 2 Signals per Mile)
2.0	0
3.0	9
4.0	16
5.0	23
6.0	29
7.0	34
8.0	39

Source: NCHRP Report 420, Impacts of Access Management Techniques.

Signalized intersections are not the only type of access point to consider. Other access points, such as driveways and unsignalized intersections, also introduce conflicts and friction into the traffic stream. Figure 4 illustrates that speed increases as the number of access points decrease.

FIGURE 4. SPEED INCREASES AS ACCESS POINTS DECREASE



Source: Adapted from Transportation Research Board Access Management Manual

Effective Access Management Improves Safety by Reducing Crashes

Many studies have shown that crash rates increase with greater frequency of driveways and intersections. The crash rate indexes shown in Table 2 were derived using ten access points per mile as a base. The crash rate index represents crash rates for various roadway segments, which for comparability is set to a value of 1.

TABLE 2. CRASH RATE INDEXES

Total Access Points per Mile (Both Directions)	Crash Rate Index
10	1.0
20	1.3
30	1.7
40	2.1
50	2.8
60	4.1

Source: NCHRP Report 420, Impacts of Access Management Techniques

Access density is measured as the total number of access points in both travel directions. The table shows that crash rates (as expressed through the access rate index) increase as the number of access points per mile increase. For example, a roadway with 60 access points per mile would be expected to have a crash rate 4 times higher than a segment with 10 access points per mile. Figure 5 further illustrates that crash rates increase as access points per mile increase.

FIGURE 5. RELATIONSHIP OF CRASH RATE TO ACCESS POINTS PER MILE

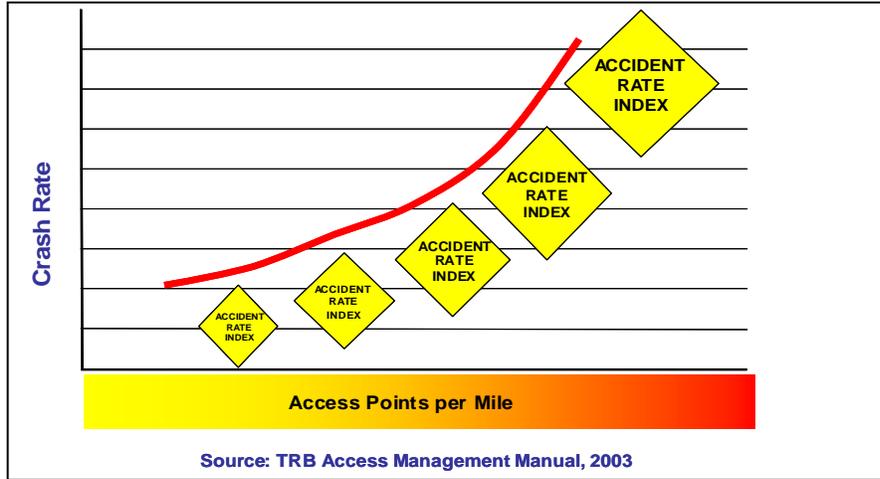


Table 3 correlates the number of signalized intersections with the number of driveways and the resulting crash rate. The higher the number of signalized and unsignalized access points along a roadway the higher will be the crash rate. As shown, crash rates increase as the number of access points increase. Access management minimizes vehicle and pedestrian conflicts. The results on reducing crashes can be dramatic.

TABLE 3. REPRESENTATIVE CRASH RATES¹ BY ACCESS DENSITY—URBAN AND SUBURBAN AREAS

Signalized Access Points per Mile	Unsignalized Access Points per Mile			
	≤20	20.01—40	40.01—60	≥60
< =2	2.63	4.33	3.01	3.80
2.01 —4	3.94	5.58	8.30	8.22
4.01—6	4.83	6.91	8.37	8.54
>6	8.61	8.06	11.30	9.53
Total	3.76	6.26	7.47	8.42

Source: NCHRP Report 420, Impacts of Access Management Techniques.

¹ CRASHES per million VMT

Crash rates also decrease as the median treatment becomes more restrictive (Table 4). For example, a roadway section with a non-traversable median will have a lower crash rate than an undivided roadway segment.

TABLE 4. REPRESENTATIVE CRASH RATES¹ BY TYPE OF MEDIAN—URBAN AND SUBURBAN AREAS

Total Access Points per Mile ²	Median Type		
	Undivided	Two-way Left-Turn Lane	Non-Traversable Median
≤20	3.82	N/A	2.94
20.01—40	8.27	5.87	5.13
40.01 —60	9.35	7.43	6.47
≥60	9.55	9.17	5.40.2
All	8.59	6.88	5.19

Source: NCHRP Report 420, Impacts of Access Management Techniques.

¹ CRASHES per million VMT

² Includes both signalized and unsignalized access points.

Other research such as Minnesota’s Department of Transportation: *Statistical relationship between vehicular Crashes and Highway Access, 1998* comes to the following conclusions:

- Observed positive relationship exist between access density and crash rates in ten of the eleven analyzed highway categories. Higher levels of access density resulted in higher crash rates.
- The data suggests that there is an inverse relationship between speed and crash rates.
- Roadway segments with the highest crash rates have high levels of access density and segments with the lowest crash rates have low levels of access density.
- An observed positive relationship exist between the density of commercial driveways and crash rates on urban roadways.
- A review of case studies of eleven access management related projects documented an average crash reduction of approximately 40 percent

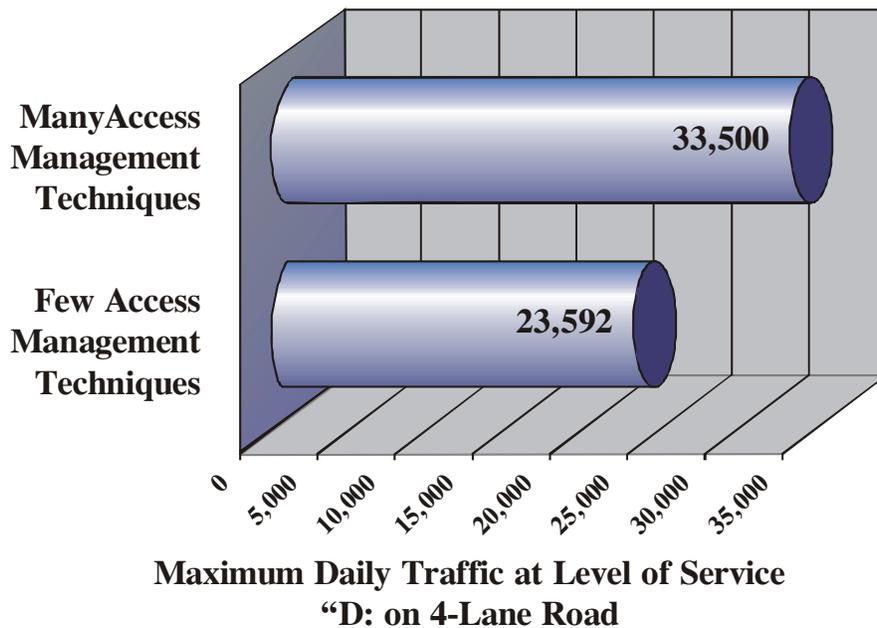
Access Management Improves Traffic Operations – Speeds Are Increased and Travel Time Is Reduced

With reduced access points, traffic is uninterrupted and relatively higher speeds can be maintained. Figure 4 illustrates the impact of access management on speed. Figure 6 illustrates how level of service is improved through increased access management.

Access Management Can Improve Aesthetics

The application of access management will in general improve the visual appearance of transportation corridors. Highways are more visually pleasing with fewer driveways, more controlled roadway and driveway design, and better design of adjacent sites.

FIGURE 6. INCREASED CAPACITY THROUGH ACCESS MANAGEMENT



Source: Lima & Associates, based on Florida Department of Transportation, *Access Management, An Important Traffic Management Strategy*, Undated Presentation.

Economic Impacts of Access Management

Access management measures often times include the installation of medians and the restriction of driveway access for the purpose of safety and traffic operations. Those measures are often controversial since owners of abutting businesses feel that their business will be adversely affected by such measures. The prevailing view point being is that property acquires value from location, the keys being accessibility and exposure. Accessibility in this context means the ease with which people and vehicles can arrive at and depart from a specific site. Several studies were conducted in the 1990 researching the economic impacts of access management. Recent research in regard to the economic impacts of access management summarized the economic impact of access management. (*Economic Impacts of Access Management, Center for Transportation Research, University of South Florida, 2000*). The reviewed research indicated:

- Perceptions of business owners before a median was installed were more pessimistic than what usually happened.
- Business owners reported no change in pass-by traffic after median installations.
- Most Business types reported increases in the number of customers per day and gross sales, except gasoline stations and automotive repair shops, which reported decreases in the numbers of customers per day and gross sales.

- Median projects have little overall adverse impact on business activity. Destination type businesses such as certain restaurants and specialty stores appear less sensitive to access changes than businesses that primarily rely on pass-by traffic, such as gas stations or convenience stores.
- In addition, because the likelihood of left-turns entering or exiting business declines as opposing traffic volumes increase, medians or other access changes will have less effect on the frequency of left turns entering or exiting businesses on high volume roadways or during peak travel periods.

Another study, *Economic effects of restricting left turns* (Transportation Research Board, *Research Results Digest 231 1998*) supports most of the above stated findings and concludes:

- While gas stations, non-durable goods retailers, and service businesses appear to be most likely to be adversely affected, grocery stores and restaurants appear to benefit from the restrictions.
- Interview results about the affects of restrictions presented a mixed picture. Some business owners believed that the left–turn restrictions negatively impacted their businesses; others reported that the turn restrictions decreased congestion and improved traffic flow to the point where their market areas actually expanded.
- Business at mid-block locations perceived the left-turn restrictions as more detrimental.
- Nevertheless travel patterns changed to reach individual businesses; however, many patrons surveyed felt that most customers continued to patronize the businesses with the same frequency than before the restriction.

Findings from NCHRP Report 420 indicate that limiting the access points along a roadway segment can produce a roadway with shorter travel times and fewer crashes. Additionally, the separation of the travel directions can also benefit the users of the roadway by reducing the potential for crashes. Customers are more willing to travel to a business when they are not in fear of a crash and are more willing to travel a longer distance to a business when travel times are reduced.

Access management projects often invoke anxiety among affected business owners. Therefore, it is important to develop a program that would mitigate any potential negative effects. Such a program should be comprised of:

- Information dissemination: the provision of information is critical to reducing potential loss in customers or sales.
- Community Participation: Involving the business community early in the planning process is important in order to mitigate any potential negative effects.

3. AUTHORITY FOR ACCESS MANAGEMENT

This chapter discusses the legal and regulatory authority of state, county, local governments, and Native American Communities to plan, design, and construct transportation facilities as well as control and manage access to the corridors. The Arizona Department of Transportation and local governments within Pinal County have some degree of legal authority to manage access on the highways within Pinal County. The chapter first reviews the legal authority of the County, local governments, Native American Communities, and ADOT to control access of state, county, and local roads. Second, the rules, policies, and ordinances of the various local governments and ADOT that pertain to access management are presented.

LEGAL AUTHORITY TO MANAGE ACCESS

Access rights are property rights protected by the United States Constitution as well as the Arizona Constitution. An owner of a property abutting a public highway has a private right or easement for the purpose of ingress and egress to and from the property. Such an easement may not be taken or substantially impaired without compensation. Property right of access is not an absolute right and is subject to the public's right of passage. The right of access is a right of reasonable access and is not a private right of direct access. An owner is deemed to have a right to access a public street system, but not any specific street to any specific point of access. Local governments and the State have the power to regulate traffic on highways including the following:

- Curbing highways and restricting driveway location, spacing, size, and design
- Regulating traffic flow
- Determining the types of vehicles that may use a highway
- Restricting traffic movement to one direction of travel
- Striping a highway or constructing a median divider which permanently limits property ingress and egress to one direction of travel

In general, property owners have a right of reasonable access to an adjacent roadway. However, governments may restrict the use of private property to protect or advance the public safety and general welfare to prevent public injury or where demanded by public interest. Private rights of abutting landowners to access their property are generally subservient to the rights of the public to free and safe use of the public street system.

Pinal County

A County Board of Supervisors has several types of authority over County roadways, including certain operational and funding authority. ARS 11-251-4 empowers the Board of Supervisors to "Lay out, maintain, control and manage public roads, ferries and bridges within the county and levy such tax for that purpose as may be authorized by law."

According to ARS 11-251-29, the Board of Supervisors may “enter into agreements for acquiring rights-of-way, construction, reconstruction or maintenance of highways in their respective counties, including highways that pass through Indian reservations, with the government of the United States, acting through its duly authorized officers or agents pursuant to any act of Congress, except that the governing body of any Indian tribe whose lands are affected must consent to the use of its land, and any such agreements entered into before June 26, 1952 are validated and confirmed.”

Counties have powers similar to those of the state for roads under their jurisdiction. ARS 28-6701-A, *Establishing, altering or abandoning local highway*, states in Paragraph A that "The board of supervisors may establish, alter or abandon a highway in the county and other legal subdivisions and acquire real property for these purposes by purchase, donation, dedication, condemnation or other lawful means." Thus empowered, the Board of Supervisors, in turn, can then authorize the County department responsible for transportation to implement specific policies and procedures with respect to the design, right-of-way acquisition, construction, and maintenance of County roadways.

Land development powers of local governments include planning, zoning, and land division (subdivision and minor subdivision). A county comprehensive plan provides general guidance concerning the array of potential land uses and the transportation system to serve those land uses. A county zoning ordinance is to be in accordance with a Comprehensive Plan, is to set out areas known as zoning districts, and is to specify the land uses and minimum lot sizes that are to be permitted in each zoning district. A county subdivision regulation is to govern the division of land and is to “provide for the proper arrangement of streets or other highways in relation to existing or planned streets, highways or bicycle facilities...(ARS 11-806.01-E).”

Within the past decade, various issues related to Arizona’s rapid growth and suggested responses to those issues led to comprehensive land use planning and zoning reforms. The legislature passed the Growing Smarter Act in 1998 and the Growing Smarter Plus Act of 2000. Taken together, the two acts modified Arizona county and municipal planning authority, including a 2003 deadline for the adoption of plans under the new laws, facilitation of the acquisition of open space, and restrictions on how general and comprehensive plans can be amended. The Growing Smarter acts require Comprehensive Plans to contain a particular group of elements, based upon the size of each county’s population. The details below indicate some of the ways that the planning, zoning, and land division instruments support access management.

In the case of counties, the authority and requirements for planning, zoning, and land division appear in ARS 11-801 to 11-833. The required elements in a comprehensive plan are found in ARS 11-821-C for a county in the population size category of Pinal County (a population of more than 125,000 persons in the year 2000). Those elements comprise land use, circulation (transportation), and water resources.

The description of the circulation element in ARS 11-821-C-2 is as follows:

Planning for circulation consisting of the general location and extent of existing and proposed freeways, arterial and collector streets, bicycle routes and any other modes of transportation as may be appropriate, all correlated with the land use plan.

Pinal County grew to a population of over 200,000 by 2003. For a county of over 200,000 population as of a given decennial census, the required elements in a comprehensive plan are found in ARS 11-821-D. The County's next comprehensive plan update after the 2010 decennial census; therefore, would be required to include the following additional elements as listed in ARS 11-821-D: open space, growth areas, environmental planning, and cost of development. While plans for counties with populations smaller than 200,000 are not required to include those four elements, ARS 11-821-D states that the smaller counties may include them.

Pinal County has chosen to include the additional elements listed above in a comprehensive plan update begun in 2007. Of the four elements, the growth areas element could have a great effect on transportation, as it would be required to identify . . . those areas, if any, that are particularly suitable for planned multimodal transportation and infrastructure expansion and improvements designed to support a planned concentration of a variety of uses . . . The County's mixed use planning is to include policies and implementation strategies designed to make for more efficient circulation via various transportation modes, "make infrastructure expansion more economical and provide for a rational pattern of land development" (ARS 11-821-D). The policies and strategies set out in a cost of development element could be applied to impel development to pay its fair share toward infrastructure needs including transportation.

The connection between county zoning authority and the designation of an RSR is clear. An RSR is designed to carry a high traffic volume. Retail businesses and certain other commercial uses benefit from frontage on an RSR given appropriate and sufficient points of access. Wise choices concerning the amount and location of commercial zoning and RSR access points can simultaneously accomplish mobility and access. In addition, according to ARS 11-821-F, a county may adopt overlay zoning districts that "modify regulations in another zoning district with which the overlay zoning district is combined." Another connection between county zoning authority and access management works in combination with subdivision regulatory authority: through the subdivision regulation, a county determines precisely how lots achieve access to the roadway system. The lots' minimum size for a given use is determined by the zoning ordinance.

Counties derive the authority for land division through ARS 11-806.01 (subdivision regulation) and through ARS 11-809 (lot splits, or minor divisions of land into five or fewer lots). Subdivision ordinances enacted by a county can accomplish the following access management techniques:

- Control of the number of access points in relation to road deceleration and acceleration lanes to avoid conflict points.
- Provision of adequate design of driveway throat length to avoid a conflict with the flow of off-site traffic.
- Provision of adequate driveway spacing requirements, corner clearance, and joint and cross access configurations.
- Orientation of lots and access points to local streets and not to the high traffic volume arterials.
- Reverse frontage requirements to ensure that lots abutting a collector or arterial roadway obtain access from a local road.

Arizona counties are limited in their authority to regulate minor land divisions. A county can determine only the compliance with minimum applicable county zoning requirements and legal access. A county may not require a public hearing on a request of any minor division and requests are deemed approved if reviews are not completed within 30 days from receipt of the request. A typical resulting land development pattern includes access points for each lot along a busy highway, and is often referred to as a "wildcat subdivision" (URS, 2005).

Counties may assess development fees (also known as impact fees) within specified planning areas, according to ARS 11-1102, if the county has adopted a capital improvements plan for the area, "in order to offset the capital costs for water, sewer, streets, parks and public safety facilities determined by the plan to be necessary for public services provided by the county to a development in the planning area." ARS 11-1102 mandates:

- The fees must result in beneficial use to the development.
- Monies collected must be placed in separate accounts and used only for authorized purposes.
- There must be a schedule of the fees and credits be given to development that provides public sites and improvements.
- The amount of any development fees must bear a reasonable relationship to the burden of capital costs imposed on the county to provide additional necessary public services to the development.
- The fees must be prescribed in a non-discriminatory manner (impact fees must be applied to all new growth).

Cities and Towns

Arizona municipalities' authority for access management is similar to the counties' authority. Some of the enabling legislation is specific to communities of a particular population size range.

The state laws setting out the authority and requirements for planning, zoning, and land division for cities or towns, under Growing Smarter appear in ARS 9-461 to 9-463. A general plan for a city or town is nearly equivalent to a comprehensive plan for a county. The planning law at ARS 9 states that residents of larger Arizona cities, towns, and counties are to vote to ratify general plans. All cities or towns, regardless of population, must include a land use element and a circulation element in their general plans. The required contents of the circulation element in a General Plan are identical to those in a county Comprehensive Plan.

Land use and circulation were the only two required plan elements for Coolidge, Kearny, Mammoth, Superior, and Winkelman, based on criteria such as the 2000 Census population and the growth rate in the 1990s. Kearny, Mammoth, and Winkelman (under 2,500 in population) and the City of Maricopa (incorporated in 2003) were not subject to the 2003 deadline imposed on the other cities and towns in Pinal County. Apache Junction, Casa Grande, Eloy, Florence, and Queen Creek were required to have the following additional plan elements: open space, growth areas, environmental planning, cost of development, and water resources. The growth areas elements and the cost of development elements have the potential in cities and towns, just as they do in counties, to work in combination with the land use and circulation elements to plan for an optimal transportation system in each community.

The authority for zoning by Arizona cities and towns appears in ARS 9-462.01. The authority for cities and towns to regulate the use of properties and the minimum size of lots is similar to the zoning authority granted to counties.

Cities and towns derive the authority for land division through ARS 9-463.01, subdivision regulation. It is permissible for a city or town to institute a simpler subdivision plat review cycle for divisions of land into ten or fewer lots, whereby a city or town may require a final plat, only, (ARS 9-463.01-M) “and may waive or reduce infrastructure standards or requirements except for improved dust-controlled access and minimum drainage improvements.” The city or town may elect, on the other hand, to apply the subdivision ordinance to all land subdivisions into two or more lots.

By the authority of ARS 9-463.05, any municipality may assess development fees to offset costs to the municipality associated with providing necessary public services to a development. The fees may be allocated to various uses, less restricted than is the case in the county enabling legislation, as long as there is a rational connection between the types of costs attributable to the development and the fees.

Arizona Department of Transportation Authority

The Arizona Department of Transportation is given authority to manage access through its powers authorized by Title 28 of the Arizona Revised Statutes (ARS). Currently, Arizona statutes do not codify specific access management authority and guidelines. Rather, the director of ADOT is given the authority through the ARS to exercise powers and duties as are necessary to carry out fully the policies, activities, and duties of ADOT. The director

exercises complete and exclusive operational control and jurisdiction over the use of State highways and State routes (ARS 28-7045, 7046) and prescribes rules as are necessary for public safety and convenience (ARS 28-363). An ongoing study sponsored by ADOT is developing a statewide access management program for the Arizona State Highway System.

The program's vision statement is as follows:

- Develop a Statewide Access Management Program that provides consistency of program decisions and process while maintaining flexibility to assure reasonable access.
- Create a partnership with local governments, Native American Communities, and federal and state agencies to balance local planning and economic goals with the safe and efficient operation of the State Highway System.

The Arizona State Highway System is constructed and maintained by ADOT's Intermodal Transportation Division, which carries out most of its functions in several engineering districts throughout the state. Any rules prescribed by the director of ADOT are set out in the Arizona Administrative Code (AAC).

According to ARS 28-601.2, a "Controlled access highway" means a highway, street or roadway to or from which owners or occupants of abutting lands and other persons have no legal right of access except at such points only and in the manner determined by the public authority that has jurisdiction over the highway, street, or roadway.

The director of ADOT has the authority to coordinate the design, right-of-way purchase, and construction of controlled-access highways and related grade separations of controlled-access highways, and the extension and widening of arterial streets and highways (ARS 28-363). On a controlled-access highway (ARS 28-732), the State can regulate entrances and exits as well as the use of the facility by pedestrians, bicycles, or other non-motorized traffic, or by any person operating a motor-driven cycle.

The State may use their eminent domain authority to purchase access rights from property owners for transportation purposes (ARS 28-7093)

The current authority for control of encroachments (AAC R17-3, Article 5, Highway Encroachments and Permits) derives from ARS 28-7053/7054 and regulates the limited circumstances under which abutting property owners may be permitted to gain direct access to state highways.

State Statutes Enabling Local Access Management

The State of Arizona's statutes enable, and in some cases require, counties and municipalities to engage in a variety of processes that have direct or indirect effects on access management. The county enabling statutes are the primary topic of this section, while the municipal (city

and town) enabling statutes are summarized at the end of the section. The authority for land use planning, land development, and transportation held by local governments affords them more tools to control access to highways under their jurisdiction than is the case for ADOT with respect to the State Highway System. Still, State statutes do not contain language explicitly granting local governments the authority to designate controlled access highways.

JURISDICTIONAL RULES, POLICIES, AND ORDINANCES

The various local governments, Native American Communities, and state and federal agencies participating in the Regionally Significant Roads for Safety and Mobility study have, to varying degrees, guidelines, rules, or policies outlining access management procedures. The following section reports on the documents addressing access management.

Arizona State Transportation Board Policy on Access Management

The Arizona State Transportation Board approved a revised set of Arizona State Transportation Board Policies in November of 2002. Policy 12 provides the following guidance with respect to access management:

It is the policy of the Board to preserve the functional integrity of the State Highway System through the development and implementation of a comprehensive access management program by:

- Directing ADOT to develop an access management classification system for the State Highways with appropriate access management standards for each access management classification.
- Directing ADOT to develop a comprehensive access management manual to guide the uniform application of access management throughout the state.
- The Board and ADOT shall work closely with regional planning agencies and local governments to encourage early notification to ADOT of zoning and other land use decisions such as large developments and major traffic generators that will impact the State Highway System in order to coordinate system planning.
- Purchasing access rights to highways, where appropriate and feasible.
- Maintaining that the approximate minimum spacing between interchanges on the limited access State and Interstate Highway Systems be three (3) miles in rural areas, two (2) miles in suburban or transitional areas, and one (1) mile in urban areas.
- Considering ramifications to the corridor, and its future use, when access is granted to the State and Interstate Highway Systems.
- Reassessing road segments as demand changes over time.

Arizona Department of Transportation

The various ADOT district offices operate according to a common set of rules for granting access to developments along the state highway system, while they have the discretion to employ somewhat differing administrative procedures. The area comprising the southern two-thirds of Pinal County is in the Tucson District. In the northern portion of the county, the area east of Florence/State Route 79 is in the Globe District, and the area west of Florence/State Route 79 is in the Phoenix District. The Phoenix District has separate organizations, a maintenance district and a construction district. The portion of the county that is in the Globe District is the most rural of the three areas.

According to AAC R17-3, Article 5, Highway Encroachments and Permits, access improvement encroachments on state highway rights-of-way from undeveloped properties may occur only if there is to be immediate development of the property evidenced by construction plans or building permits, or continuing maintenance of the undeveloped property (AAC R17-3-502). According to AAC R17-3-503, only an abutting property owner is eligible to apply for an encroachment permit.

The *ADOT Traffic Engineering Policies, Guidelines, And Procedures, January 2000* (ADOT, 2000, as amended), provide typical access characteristics and spacing standards based on the functional classification of roadways. The use of medians is discussed and standards are provided. Guidance is also given in regard to when grade separations are needed and when to provide pedestrian and crossing devices. Another section of the document provides detailed design standards for street cross sections, sight distance, deceleration and turning lanes, driveways, truck loading areas, median openings, pedestrian, bicycle, and transit facilities. The document also provides methods of application including traffic impact analysis, variances, and site design. The methods of application culminate in a series of tables outlining techniques for the implementation of access management under various conditions.

The implementing statement for the ADOT traffic impact analyses guideline is as follows (ADOT Traffic Engineering Policies--Traffic Studies; 240-1):

The management of access to the system in an effective manner is vital to maintain the overall safety and efficiency of this system. Access to the State highway system is managed through the encroachment permit process. This permit process requires those desiring access to the State highway system to apply for an encroachment permit. Since access to a State highway for a development may impact traffic on the highway, a Traffic Impact Analysis shall be prepared for developments which desire a permit and meet the specific requirement stated below.

The purposes of the traffic impact analysis procedures presented herein are to:

- Provide information to the permit applicant and/or his representatives on specific requirements of the analysis, and

- Ensure consistency in the preparation and review of Traffic Impact Analyses.

The ADOT Statewide Access Management Program when completed may establish some updated traffic impact analysis policies, guidelines, and procedures, which could affect conditions associated with the granting of encroachment permits for access purposes.

Pinal County

Comprehensive Plan

The current Pinal County Comprehensive Plan was prepared in 2001 and amended each year from 2002 through 2006. The 2006 amendments became effective on December 29, 2006, and all of the amendments for 2002 through 2006 are incorporated into the plan document. The Comprehensive Plan's Transportation Plan element comprises several statements related to road classification and access management. The Transportation Plan Street Element Map indicates the classification of county highways into principal arterials, minor arterials, and major collectors. The text of the element includes:

- Safety issue: "Access management regulates the level of access control on roadways and is needed to help retain the capacity of public highways, access to private land, and maintain public safety."
- Policy T2.7: Encourage the limiting of direct access on State highways and principal arterials to enhance and protect the capacity and safety of the circulation system and reduce potential traffic conflicts. Direct property access from secondary carrier roads may be allowed as design features permit.
- Policy T2.8: Encourage the submittal of traffic impact studies for commercial, industrial, and residential development projects as outlined in the 2000 Pinal County Transportation Plan.
- Policy T2.9: Encourage the establishment of a scenic corridor designation and development of an overlay district for the Pinal Pioneer Parkway, State Routes 77 and 79, to ensure the protection of scenic views and adjoining vegetation.

In addition, the Comprehensive Plan included 19 special policies for the Oracle Area (Planning Area 4b). Of those policies, the following two policies were related to access management:

- Encourage limiting access to State Routes 77 and 79 to ensure its continuance as a high speed transportation corridor.
- Discourage linear or strip commercial developments along State Routes 77 and 79 frontages to minimize negative visual impacts and vehicular circulation.

Pinal County is conducting a major update of its Comprehensive Plan. The County will update the existing plan elements and develop at least five additional elements: growth areas, environmental planning, cost of development, economic development, and housing. State

statutes related to the Comprehensive Plan appear in the Legal Authority section, above. The Comprehensive Plan update could set goals, objectives, and policies and include future land use maps that would be entirely consistent with this Regionally Significant Routes Plan for Safety and Mobility. In particular, the growth areas element could show RSRs that would be integrated with concentrated areas of mixed land use. The cost of development element could provide a policy basis for requiring developments in particular locations to pay their fair share toward the cost of new RSR segments required by the developments.

Small Area Transportation Study (SATS)

The 2001 Transportation Plan element cited above is based largely on the Pinal County Small Area Transportation Study completed in the year 2000. The Board of Supervisors adopted a new Pinal County SATS in August 2005. The SATS is a key resource for this RSR Plan for Safety and Mobility and for the Transportation Plan element of the 2007 Comprehensive Plan update. The purpose of the SATS was to evaluate the unincorporated county's transportation needs over the next 20 years and to develop a Capital Improvement Plan (CIP). The adoption resolution (No. 083006-SATS) authorized the County administration to use the SATS as a basis for transportation decisions in unincorporated Pinal County. Section 2.2.2 of the SATS addresses Regionally Significant Routes, and Section 4.1 addresses Access Management Guidelines.

Zoning Ordinance

The Pinal County zoning ordinance generally places the business and industrial districts on major roadways. The ordinance's Article 33, the Planned Area Development (PAD) overlay district, contains direct references to roadway classification and access. Section 3302 indicates that:

The purpose of the PAD district is to encourage imaginative and innovative planning of neighborhoods, particularly with respect to diversification in the use of the land and flexibility in site design with respect to various features, including but not limited to... circulation (and) private roadways. . .

Further, Section 3304, Application Requirements, states that a section of the Specific Plan of Development Data (Section 3304.b.4) must show:

A table which compares existing Pinal County subdivision regulation roadway standards with all proposed rights-of-way and pavement widths for each type of private street proposed (arterials, collectors, residential collectors and residential) for the planned area and the perimeter.

Also, the narrative report (Section 3304.c.5) must address:

Location & Accessibility: The advantages of the proposed location should be explained. The means of access, distance from major streets and surrounding road conditions should be described.

Subdivision and Minor Land Division Ordinances and Related Documents

Pinal County Board of Supervisors adopted new *Subdivision Regulations, the Subdivision & Infrastructure Design Manual*, and a *Minor Land Division Ordinance* on December 6, 2006, effective January 5, 2007. Among the purposes of the Subdivision Regulations (Section 104), are:

. . . to secure adequate traffic circulation through coordinated street systems in relation to existing or planned streets, highways or bicycle facilities; to provide for the proper arrangement of hiking and equestrian trails in relation to existing or planned streets; . . . and to provide practical procedures for the achievement of this purpose.

Regulations for street circulation and access are found throughout the County's Subdivision Regulations, since the design of the transportation network is a basic purpose of the Regulations. Most pertinent to RSRSM considerations are:

Section 304.2 Subdivision Planning, Some of the factors to be considered by the subdivider in planning a subdivision are as follows: Subsection h, Access features which may be desirable along major arterial and collector streets.

For some subdivisions a Traffic Impact Analysis is to be completed in the manner set out in Section 402.6 Preliminary Traffic Impact Analysis (TIA) and Section 403.5 Final TIA.

Section 702 General Subdivision Design Standards, Subsection 702.5. The Planning Director, County Engineer, Commission and the Board shall ensure that appropriate provision is made for the harmonious development of the County by requiring:

- A. The coordination of proposed streets and circulation systems with existing or planned streets and circulation systems or with other features of the County Comprehensive Plan;
- B. Coordination of travel demand with roadway and circulation system capacity and the timing of planned improvements which creates conditions favorable to public health, safety, welfare and convenience, and;
- C. Adequate spaces for resident needs such as parks, schools, recreational areas, trails, right-of-way, etc.

Section 702.6. Paved, all-weather, public access shall be provided to and from the subdivision. A minimum of two permanent access points shall be provided for ingress and egress from the subdivision to existing public roads. Approval of adequate access by the County Engineer shall be a condition of approval of the plat by the Board.

The *Pinal County Subdivision & Infrastructure Design Manual* includes Street Design Requirements (Chapter 6). *Section 6.3, Street Classifications*, defines five classes of streets. Arterial streets are the class meant to provide regional continuity and it is specified that “the normal alignment for an arterial roadway is along a section line.” Other sections pertinent to RSRSM are:

Section 6.4.4 Along a railroad right-of-way or limited access highway right-of-way, a parallel street may be required at a distance suitable for appropriate use of the intervening land, such as for park purposes in residential districts or for commercial or industrial purposes in appropriate locations . . .

Section 6.17 Turning Lanes and Medians. Subsection 6.17.4 . . . if a street has a raised median, it is not possible to provide an opening in the median for every street intersection or driveway location. Full median openings should occur at not less than ¼ mile intervals on parkways, expressways, and major arterials. Partial median openings, which allow only left turns off the major street, are acceptable at 1/8 mile spacing. On minor arterials, full median breaks should be no closer than 1/8 mile intervals. Partial median openings and full median openings will be permitted per the approved Traffic Impact Analysis. In built up areas, where reasonable alternate access is not available, median openings may be provided at smaller intervals with the approval of the County Engineer.

Section 6.25.2 General Requirements and Notes. (a.) Developer shall obtain a Pinal County Right-of-Way Use Permit prior to any work being performed within the county right-of-way. Contact Pinal County Public Works Inspection Section at least seven (7) working days prior to work.”

Current Pinal County design standards will be revised to conform to the access management criteria recommend by the RSRSM plan.

Pinal County also adopted the Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction and the Maricopa Association of Governments Uniform Standard Details for Public Works Construction (1998 with revisions through 2005). Among the many public works specifications and details are driveway construction details.

The Pinal County Minor Land Division Ordinance applies to the division of land into five or fewer lots, parcels, or fractional interests, any of which is ten acres or smaller. A Land Division Application must be approved by the Planning Director before any such division of land to determine that, for each lot, the division provides for legal access and physical access that corresponds with the legal access.

4. REGIONALLY SIGNIFICANT ROUTE CLASSIFICATION AND ACCESS MANAGEMENT GUIDELINES

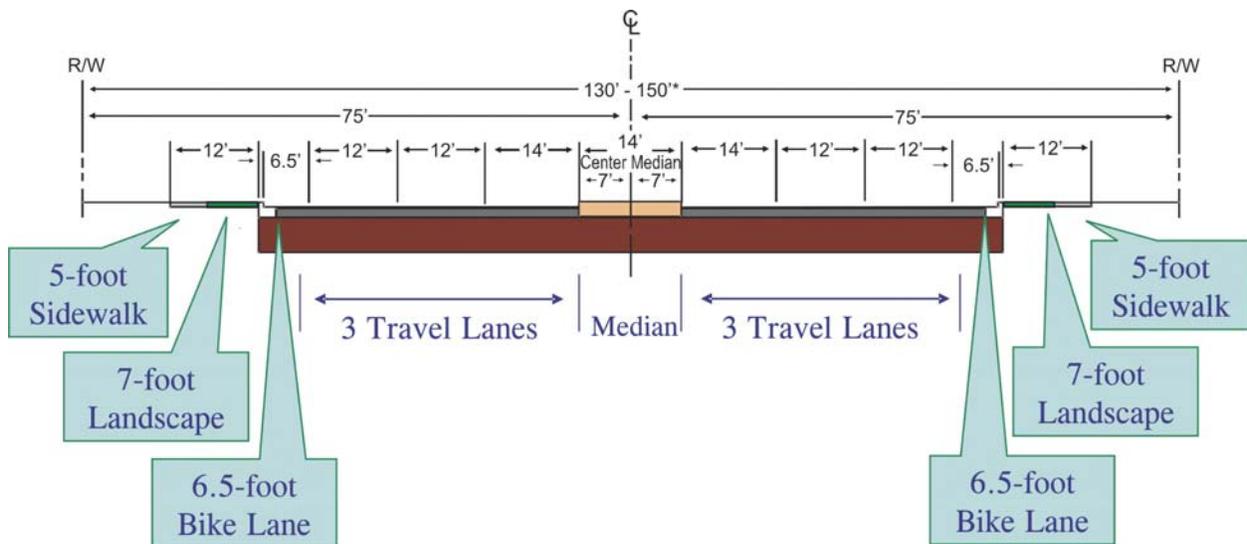
A comprehensive review was conducted to identify the practices of various regional governments, county and local governments, and state departments of transportation in planning and implementing regionally significant routes. Characteristics and standards for RSR were defined based on this review and input from by the Technical Advisory Committee and other stakeholders for the RSRSM study.

The primary characteristics of a regionally significant route are:

- High level of service for automobiles and transit, reducing travel times.
- High degree of access management.
- High level of safety.
- Connectivity between urban areas and major activity centers.
- Connectivity to state highway system and major urban arterials.
- Continuity across the County and through urban areas.

Two classifications of regionally significant routes were defined: 1) RSR Parkway; and 2) RSR Principal Arterial. Figure 7 illustrates the typical cross section of an RSR Principal Arterial. Table 5 presents the classification criteria for the two types of RSRs. Criteria are presented in the following categories: 1) laneage and planning capacity; 2) design standards; 3) access management guidelines; and 4) alternative travel modes. Current Pinal County design standards will be revised to conform to the access management criteria recommend by the RSRSM Plan.

FIGURE 7. TYPICAL SECTION, REGIONALLY SIGNIFICANT ROUTE PRINCIPAL ARTERIAL



1. Additional right-of-way may be required at intersections to provide additional turning lanes and pedestrian refuge space in the median.
 2. Sidewalk and landscape widths will transition to local jurisdiction standards.
- * Right-of-way widths of 130' to 150' will accommodate a modified divided six-lane cross section.

TABLE 5. REGIONALLY SIGNIFICANT ROUTES CLASSIFICATION AND ACCESS CRITERIA

Item	RSR Parkway	RSR Principal Arterial
Laneage and Planning Capacity		
Number of Lanes	Six lanes	Six lanes
Planning Capacity	88,000 vehicles per day	50,000 vehicles per day
Design Standards		
Posted Speed	50-65 mph	35-50 mph
Right-of-Way	200 feet	130-150 feet
Medians	To be determined by Pinal County in reference to the Final Arizona Parkway Guidelines	Divided with full or directional median openings at ¼ mile spacing
Lane Width		Lane widths as in Typical Section
Left Turn Lanes		At all locations where left turns are permitted
Right Turn Lanes		At all locations where right turns are permitted and volumes warrant
Access Management Guidelines		
Publicly Dedicated Roadways	To be determined by Pinal County in reference to the Final Arizona Parkway Guidelines	¼ mile to ½ mile spacing
Traffic Signal Spacing		¼ mile and ½ mile locations Fully coordinated and progressed where warranted
Typical Traffic Control		Signalized, two-way stop
*Private Access/Driveways:		
Full Access Driveway from Signal		660 feet
Partial Access Driveway from Signal		330 feet See Note 5
Driveway Spacing		330 feet
Grade Separated Interchanges Spacing		One mile locations where warranted
Grade Separated Interchanges Type		May include SPUI or tight diamond if warranted and feasible
Frontage Roads		Possible
On-Street Parking	Prohibited	
Alternate Travel Modes		
Transit	Provide for pull-outs and queue jumper lanes where warranted	Provide for pull-outs and queue jumper lanes where warranted
Bicycle and Pedestrian Facilities	Provide roadway width for bicycles and sidewalks for pedestrians Grade-separated pedestrian/ bicycle crossings where warranted.	Provide roadway width for bicycles and sidewalks for pedestrians Grade-separated pedestrian/ bicycle crossings where warranted.

*Driveway examples; commercial, institutional, schools, private driveways that are not dedicated to the public.

- Notes: 1. Additional right-of way may be required at intersections to provide additional turning lanes and pedestrian refuge space in the median.
2. Sidewalk and landscape widths will transition to local government standards.
3. U-turn movements will be permitted at the median openings of RSR Principal Arterials if conditions warrant.
4. All standards are subject to the approval of the Pinal County Engineer.
5. For parcels with short frontage, proposed driveways with less than 330 feet spacing will be considered case by case.

RSR PARKWAY

This facility type has been identified as the “Arizona Parkway.” Pinal County will review and adopt the RSR Parkways at a future date. These guidelines will include the interim RSR Parkway criteria.

RSR PRINCIPAL ARTERIAL

RSR Principal Arterials are major roadways that emphasize a high level of traffic mobility and a low level of access to land; generally roadways of regional importance, intended to serve moderate to high volumes of traffic traveling relatively long distances and at higher speeds.

Access limitations on RSR Principal Arterials are intended to increase capacity and safety, and improve travel time. Access management strategies that might be implemented to accomplish this include: continuous median barriers, prohibition of left-out movements from driveways and minor side streets, and driveway consolidation. Access to individual businesses and residences will be well managed, and where provided may be right-in/right-out. Four (4) to six (6) lanes, two to three in each direction, will be considered the minimum number of lanes for these roadways and typical right-of-way requirements will be 130 feet to 150 feet.

Desired Access to Adjacent Properties

Pinal County desires that for properties adjacent to RSRs access be provided on the minor side streets. Special consideration will be made for properties located at the corner of two RSRs of those immediately adjacent to residential properties. In cases where properties are land locked, special access considerations, or access has been entitled to a property, the property owner can request an access exception or the “grandfathering” of the access.

INTERSECTION, DRIVEWAY, AND ROADWAY DESIGN ELEMENTS

Design criteria for roadways, intersections, and driveways will follow the appropriate Pinal County design standards. The warrants for right- and left-turn lanes will follow those in the *Pinal County Traffic Impact Assessment Guidelines & Procedures*, January 2007.

5. ACCESS DECISION-MAKING

This chapter presents the decision-making process for the consistent implementation of effective access management on RSRs. The decision-making process includes the following steps:

- Corridor Preservation Map
- Coordination by Regional Implementation Committee
- Early Alert Process
- Development Process
- Capital Improvement Plan

CORRIDOR PRESERVATION MAP

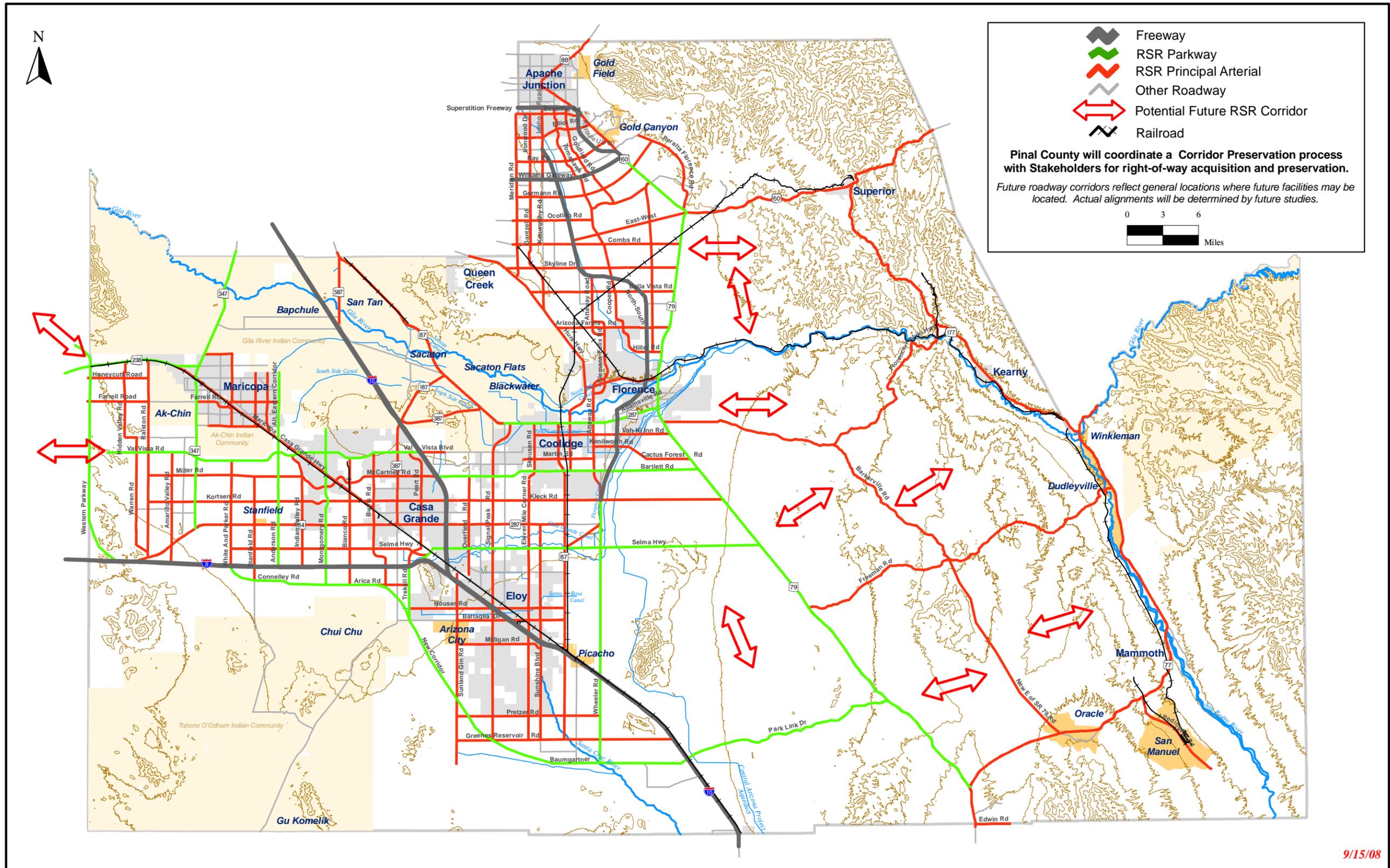
The corridor preservation map illustrated in Figure 8 is the official map informing ADOT, local governments, Native American Communities, and developers of the designation of the Regionally Significant Routes and RSR classification. Preservation of principal arterials, parkways, and freeway corridors is identified in Figure 8. Additionally, preservation of the local network is necessary to maintain the integrity of the total system.

REGIONAL IMPLEMENTATION COMMITTEE

A standing implementation committee will be established composed of representatives from the ADOT, State Land Department, Bureau of Land Management, Pinal County, CAAG, local jurisdictions, and Native American Communities. The Committee will be charged to coordinate the following activities:

- Protecting one-mile spacing for minor arterials.
- Adoption by the County, jurisdiction, and Native American Communities of the Corridor Preservation Map and Priority Maps.
- Continuous update of the Corridor Preservation Map and Priority Maps.
- Implementation of the Early Alert Process to preserve right-of-way.
- Implementation of a region-wide permit process.
- Identification of RSRs for Design Concept Studies (DCRs).
- Monitoring the design and construction of Regionally Significant Routes.
- Identifying funding sources and assist local governments, Native American Communities, and ADOT to obtain funding for planning and implementing RSRs.

FIGURE 8. REGIONALLY SIGNIFICANT ROUTES FOR SAFETY AND MOBILITY CORRIDOR PRESERVATION MAP



9/15/08

EARLY ALERT PROCESS

Overview of RSR Early Alert Process

The RSRSM plan includes a set of RSR guidelines for access management and roadway cross-sections. The design guidelines represent the information on the RSR system, including mapping of the routes themselves and guidelines with respect to right-of-way, cross-section, signal spacing, median control, and median opening spacing. Local governments and Native American Communities should adopt and incorporate the guidelines into their planning activities including general and comprehensive plans and zoning ordinances. A key component of the RSRSM *Plan* is the *Early Alert Process*. The Early Alert Process consists of a set of Early Alert Resources and an Early Alert procedure.

Figure 9 illustrates how these steps will integrate with development and capital improvement planning processes of local governments and Native American Communities. Later sections describe more specifically how the Early Alert Process can be incorporated into development plan reviews, rezoning, road improvement plans, and into the framework for making planning decisions.

Early Alert Resources

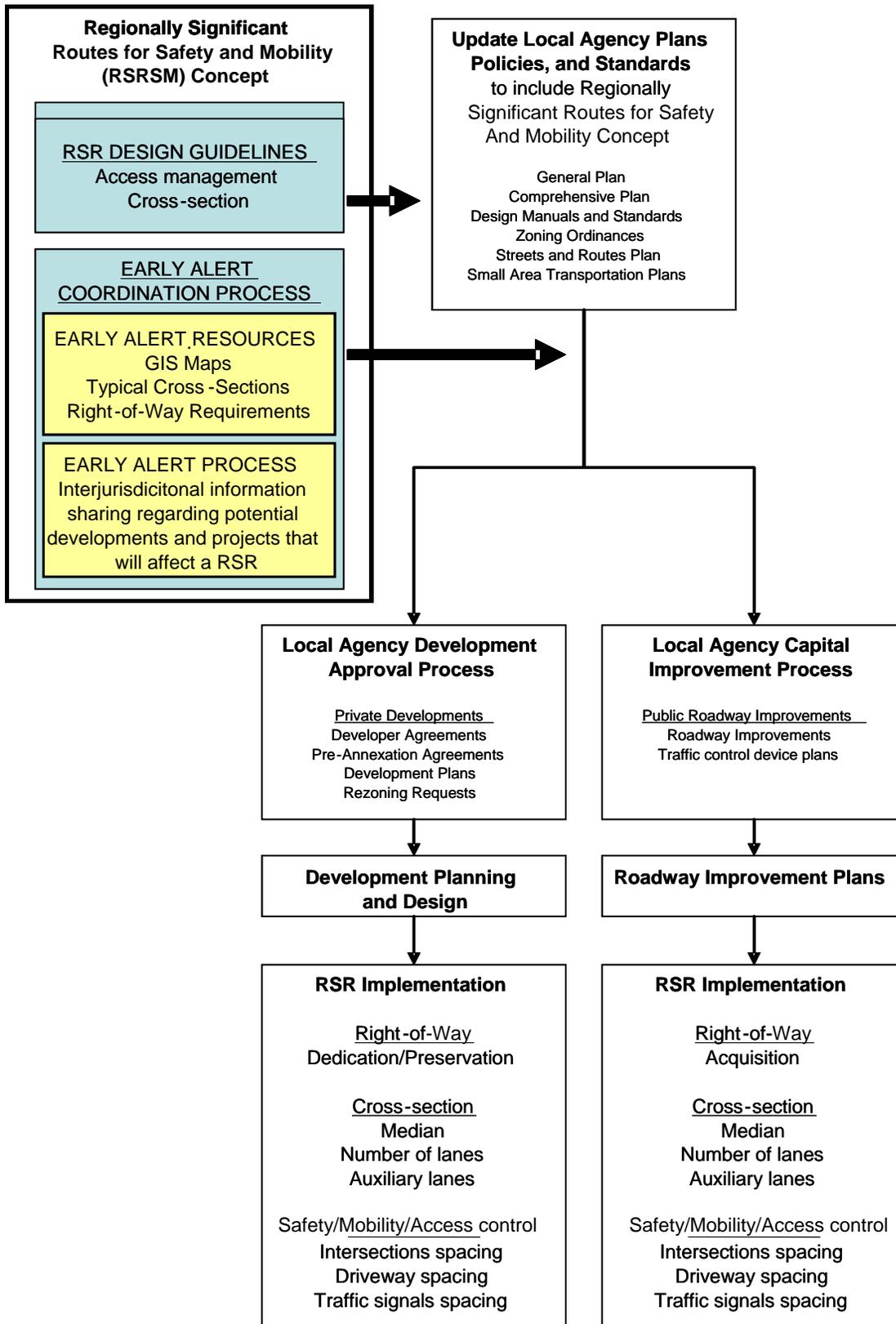
As local governments, Native American Communities, and ADOT become aware of proposed projects and developments, the early alert resources help those entities to determine whether the proposed project or improvement will potentially affect a Regionally Significant Route. The Early Alert Resources will include a GIS database of:

- Regionally Significant Routes and their right-of-way requirements
- Planned/in-progress developments
- Jurisdictional boundaries
- RSR Early Alert Process

The proposed RSR Early Alert Process is patterned after the existing ADOT Red-Letter notification process. ADOT uses their Red Letter Notification Process to help limit future escalation of right-of-way costs by requesting that local governments and Native American Communities notify ADOT of potential development plans within or near right-of-way corridors.

Local municipalities provide notice to the ADOT Right-of-Way Project Management Office of proposed zoning changes, building permit applications, or planned development projects that are within a one-half mile of state highway corridors. ADOT reviews the notices and makes a determination if the proposed development or project is located within an existing or future freeway corridor and if there would be a financial benefit to the State by acquiring the property under the early acquisition program. If the property is not located in a corridor, or is not anticipated to impact the state highway system, a form letter is sent back. If ADOT determines that the project or development may potentially affect the state highway system, the municipality or developer is notified and advance acquisition is explored further.

FIGURE 9. INTEGRATION OF RSRSM INTO THE LOCAL PLANNING PROCESS



The proposed RSR Early Alert Process would operate in a similar manner. The objective of the RSR Early Alert Process would be to make all involved parties aware of development or roadway plans on, adjacent to, or nearby a RSR. The Early Alert Process would facilitate coordination between county and local jurisdiction staff, better enabling them to cooperatively preserve access on Regionally Significant Routes by incorporating access management considerations into their development review and capital improvement planning processes. With advance early notification, county and local agency staff can consider and apply RSR guidelines with respect to access, traffic control, and median openings.

The Early Alert Process will provide a brief background of the proposed project and an initial understanding of the potential impacts to the RSR. The Early Alert should answer the following questions:

- Is the proposed improvement/development adjacent to an existing or future Regionally Significant Route right-of-way?
- Do the proposed facilities encroach onto existing or future RSR right-of-way?
- Will the proposed improvement potentially generate traffic volumes significant enough to warrant new traffic control devices (e.g. traffic signal) on a nearby RSR?

Local Jurisdiction/Pinal County Responsibilities

When Pinal County, local governments, Native American Communities, or ADOT are ready to implement a proposed project or improvement, they would utilize the Early Alert Resources (GIS maps, right-of-way information, etc.) to make a preliminary determination if the proposed project/development might impact an existing or future RSR. Examples of activities that might warrant a review with respect to RSRs are:

- A developer/property owner performs due diligence activities for property located adjacent to a RSR.
- A rezoning application is submitted for a parcel(s) located adjacent to a RSR.
- Development plans for parcels located adjacent to a RSR are submitted for approval.
- Arizona State Land Department coordinates planning activities for parcels located adjacent to a RSR with a local jurisdiction.
- State Land parcels located adjacent to a RSR are considered for auction.

If it were determined that the proposed project/improvement might potentially affect an existing or future RSR, the affected local government, Native American Community, or ADOT would send a “Early Alert” to other entities on the RSR route that includes a brief summary of the proposed project. Local governments, Native American Communities, or ADOT receiving the Early Alert Process would respond back to confirm they are aware of the project. This would serve to make all affected entities and developers aware that if a project is planned on a RSR, it has associated requirements for access control.

Ideally, the Early Alert notifications are sent well in advance of when formal development plans and zoning or rezoning requests are submitted to the local jurisdiction for review. Early coordination and communication would better enable jurisdictions to cooperatively preserve access and right-of-way for the future RSR.

Additional Pinal County Responsibilities

Pinal County serves as a library and clearinghouse of RSR information, access management plans and GIS mapping for RSR routes. The County would maintain the RSR maps and design standards and would be responsible for sending any updated maps and/or design standards to each jurisdiction.

INCORPORATION OF EARLY ALERT PROCESS INTO DEVELOPMENT REVIEW PROCEDURES

This section describes the steps to incorporate the *Early Alert Process* into local development review processes. Table 6 summarizes the how the *Early Alert Process* can be incorporated into the development review processes. The Pinal County processes are used as the example. An effective RSRS plan can only be accomplished with the full cooperation, coordination, and communication among all of the jurisdictions in the Early Alert Process. For each step described below for Pinal County, there would be an equivalent step for each municipality to incorporate the process into its own procedures. The Pinal County Planning & Development Department has the lead role in coordinating the Early Alert Process supported by the Public Works Department.

Incorporation into Pinal County Comprehensive Plan

In order for RSRs to be considered in the planning process, the RSRs should be incorporated into the Comprehensive Plan. An Arizona county comprehensive plan according to the Growing Smarter legislation (ARS 11-801 to 11-833) is effective for one of the following: up to ten years, until the plan is readopted, or until a new plan is adopted. The Pinal County Comprehensive Plan was adopted in 2001, but spurred by the rapid development of the County, officials decided to undertake a Comprehensive Plan Update. Additional elements that are typically done only for the larger counties in the state are to be a part of the Pinal County plan for the first time. The steps to incorporate RSRs into the Comprehensive plan might occur as a major amendment (see below), and would then be carried into the overall update of the Plan.

The Comprehensive Plan Major Amendment process is an opportunity for landowners to apply for changes to the Comprehensive Plan for their properties, and for the County to update the Comprehensive Plan to have it match new County Policies or Ordinances. The State of Arizona mandates that the major Comprehensive Plan Amendments occur once a year, and must be completed in the year they were started. Minor amendments to the plan can occur through the year.

TABLE 6. SUMMARY OF DEVELOPMENT REVIEW PROCESSES

Development Phase	Agency Activities	How RSR is Incorporated in this process	Agency Actions Items
Pre-Development Process			
Due-diligence by developer Information exchange on upcoming plans	Preliminary staff coordination	Provide general RSR information to the public (e.g., overview maps) Provide RSR information to developer: <ul style="list-style-type: none"> ▪ RSR policies ▪ RSR design standards and design criteria ▪ RSR maps and reference 	Send a <i>Early Alert Process</i> regarding plan of development submittal to neighboring jurisdictions and to Pinal County
Development Process – No Rezoning, Commercial or Industrial Property			
Initial Meeting	Agency staff provides the developer with site plan requirements.	Provide general RSR information to the public (e.g., overview maps) Provide RSR information to developer: <ul style="list-style-type: none"> ▪ RSR Policies ▪ RSR design standards and design criteria ▪ RSR maps and reference Determine right-of-way requirements (does ROW need to be dedicated?)	Designate appropriate review staff to be the lead on RSR requirements. Send an <i>Early Alert Process</i> regarding plan of development submittal to neighboring jurisdictions and to Pinal County. Are there requirements from neighboring communities that should be addressed?
Plan of development Submittal	Reviewed by staff – if it meets criteria, it is approved.	Include RSR requirements into plan of development checklist. If the development is within 3 miles of neighboring jurisdictions, send plan of development to neighboring jurisdictions.	Amend plan of development checklist to include RSR review. Send plan of development to neighboring jurisdictions if appropriate.
Improvement plan submittal	Reviewed by staff – if it meets approval then construction can commence.	RSR requirements part of review process.	Amend review process to include RSR review.

TABLE 6. SUMMARY OF DEVELOPMENT REVIEW PROCESSES (Continued)

Development Phase	Agency Activities	How RSR is Incorporated in this process	Agency Actions Items
Development Process – No Rezoning, Residential Subdivision			
Initial Meeting – Tentative Plat Pre-Application Review	Agency staff (Planning Department and the Public Works Department) meets with developer to review the initial design concept and provides the developer with site plan requirements and relevant plans.	<p>Provide general RSR information to the public (e.g., overview maps)</p> <p>Make information available to developer:</p> <ul style="list-style-type: none"> ▪ RSR Policies ▪ RSR design standards and design criteria ▪ RSR maps and reference <p>Determine right-of-way requirements (does ROW need to be dedicated?)</p>	<p>Designate appropriate review staff to be the lead on RSR requirements.</p> <p>Assure that the Subdivision Coordinating Committee members are aware of RSR that the project will impact.</p> <p>Send <i>Early Alert Process</i> regarding tentative plat submittal to neighboring jurisdictions and to Pinal County.</p> <p>Are there requirements from neighboring communities that should be addressed?</p>
Tentative Plat Submittal / Revisions	Application submittal and plat are reviewed by staff and if completeness criteria are met, plat is forwarded to the Subdivision Coordinating Committee. When the Planning Director has considered all required reviews, the plat is declared ready to be forwarded to the Planning & Zoning (P&Z) Commission and is scheduled for P&Z review. The P&Z can continue the matter, conditionally approve the tentative plat, or deny the tentative plat.	<p>Incorporate RSR requirements into the specifications for Tentative Plats (e.g. enhance Comprehensive and Area Plan data submittal).</p> <p>If the development is within 3 miles of neighboring jurisdictions, send tentative plat submittal to neighboring jurisdictions</p>	<p>Amend the specifications for tentative plats (Article 4 of Regulations) to include RSR review.</p> <p>Send tentative plat to neighboring jurisdictions if appropriate (the Pinal County Subdivision regulations state that any City, county, or incorporated town within a 3-mile radius, or if subdivision is within an established municipal planning area). ADOT is also a reviewer if the project is adjacent to a state highway.</p>
Final Plat	Application submittal and final plat are reviewed by the Planning Department, and the other county departments and agencies. After any revisions the Planning Director may deem the final plat ready for Board review and action. Board action is to approve and record the final plat with the County Recorder, or to disapprove.	RSR requirements part of review process. (e.g. enhance improvement plans section).	<p>Amend the specifications for final plats (Article 4 of Regulations) to include RSR review.</p> <p>Send tentative plat to neighboring jurisdictions if appropriate.</p>
Improvement plan submittal	Reviewed by staff – if it meets approval then construction can commence.	RSR requirements part of review process.	Amend improvement plan review to include RSR check.

TABLE 6. SUMMARY OF DEVELOPMENT REVIEW PROCESSES (Continued)

Development Phase	Agency Activities	How RSR is Incorporated in this process	Agency Actions Items
Development Process – Rezoning Required (PAD Example)			
Preliminary Staff Coordination		Provide map of RSR to public and development community. Make RSR information available to developer: <ul style="list-style-type: none"> ▪ RSR Policies ▪ RSR design standards and design criteria ▪ RSR maps and reference Right-of-way requirements (does ROW need to be dedicated)? 	Develop information packet of RSR requirements and distribute. Send <i>Early Alert Process</i> to surrounding jurisdictions and to Pinal County.
Zoning Application and documents and, if for a PAD, Preliminary Plan of development submitted	Preliminary Staff review – Revise and Resubmit as required	Incorporate RSR requirements into staff review process.	Designate appropriate review staff to be the lead on RSR requirements.
If for a PAD: Determine if the plan of development is in conformance with Comprehensive Plan, any area plan, and Zoning Ordinance	In conformance – plan to P&Z Commission Public Hearing Not in conformance – plan goes to P&Z Preliminary Hearing	Review plan of development for compliance to RSR guidelines.	Incorporate RSR guidelines into zoning plans, area plans. Designate appropriate review staff to be the lead on RSR requirements.
Planning & Zoning Commission Preliminary Hearing	Either: Approved: goes to P&Z Public Hearing, or Denied: developer can submit a consent petition, which if successful, project will go to the P&Z public hearing. If unsuccessful, rezoning case will be closed.	Comments on RSR compliance can be part of input to P&Z Commission	Provide input on RSR to P&Z Commission Preliminary Hearing.
Planning & Zoning Commission Public Hearing	Either: Recommend approval or denial to Board of Supervisors or Mayor and Council.	Comments on RSR compliance can be part of input to P&Z Commission	Provide input on RSR to P&Z Commission.
Board of Supervisors or Mayor and Council Public Hearing	Either: Conditional approval with time limits and rezoning requirements, or Denial (rezoning case closed)	Comments on RSR compliance can be part of input to Public Hearing	Provide input on RSR to Public Hearing and to elected officials.

Key steps to incorporate RSRs and the Early Alert Process into the annual Comprehensive Plan program involve:

- Planning and Development Services can recommend amendment of specific elements of the Comprehensive Plan. This would likely include the Circulation Element of the Comprehensive Plan, the Roadways Map, and possibly any related Special Policies.
- Draft changes to the Comprehensive Plan.
- Present changes to the public, obtain public comments, revise the document if required, and make available to the public. Public comments must be received two weeks prior to the Planning and Zoning Commission (the “Commission”) Study session.
- Commission reviews in study session.
- Public Hearing of the Commission to make recommendations to the Board of Supervisors.
- A final draft of the plan changes to be approved by the Planning and Zoning Commission, at least 15 days prior to the Commission hearing. 15 days notice of the meeting should be given. The recommendation of the plan should be by resolution and requires a majority vote of the members present.
- Public Hearing by the Board of Supervisors and decision to amend the Comprehensive Plan. The notice of the meeting must be given 15 days in advance.

For the municipalities, the equivalent step necessary for full effectiveness of RSRs, would be to incorporate RSRs into their General Plans, whether during an overall update or during a major amendment.

Incorporation into Pinal County Zoning Ordinance

In order for RSRs to be considered in the re-zoning process, the RSRs should be incorporated into the Pinal County Zoning Ordinance. The Pinal County Zoning Code contains application requirements for Planned Area Developments, as well as Design Review Overlay Zones. The Planned Area Development District permits alternatives to some zoning requirements in Pinal County’s Zoning Ordinance. Design Review Overlay Zones are areas subject to review of additional architectural and environmental impact standards as outlined in the associated design review plan. Guidelines may include design criteria related to driveways, pedestrian walks, off-street parking areas, including entrances and exits, and other aspects of the development.

The Pinal County Zoning Ordinance could be amended with respect to application requirements for Planned Area Developments and Design Review Overlay Zones on Regionally Significant Routes.

Other sections of the zoning ordinance should be modified to deal with amending the zoning classification of a property adjacent to an RSR, in the absence of a Planned Area Development or Design Review Overlay Zone. Examples would be a rezoning to a commercial or industrial use.

For the municipalities the equivalent step, necessary for full effectiveness of RSRs, would be to incorporate RSRs into their Zoning Ordinances. The seven larger municipalities each has a form of planned development overlay district.

Incorporation into Other Review Procedures

Revisions to other review procedures can be summarized as follows:

- Provide information resources to Pinal County and affected jurisdictions regarding the Early Alert Process and how it would be used to trigger certain reviews of access using RSR guidelines.
- Require that traffic impact study requirements include a statement whether the project is on a Regionally Significant Route, and how that would affect access requirements.

Incorporation into Development Review Procedures

The Early Alert Process can be incorporated into development projects that require a rezoning approval as well as into development projects that do not require a rezoning. The general requirements and procedures for submission of tentative and final plats for subdivisions are contained in the Pinal County Subdivision Regulations. Table 6 describes how the RSR and Early Alert Process can be incorporated into development projects during:

- The pre-development process
- The development process where no rezoning is required for commercial and for residential projects
- The development process when rezoning is required
- Certain procedures (such as repeat review) that would apply in the same way to the Early Alert Process as to other aspects of the existing development review process are not listed in detail

In the case where a rezoning would be required, Table 6 presents the example of the addition of a PAD overlay. The incorporation of the Early Alert Process into a rezoning process that does not include an overlay district would be very similar except that there would be only “underlying” zoning, so there would be no conformance check.

While the County’s authority to regulate is more limited for Minor Land Divisions than for subdivisions, adjustments in Minor Land Division processes to support RSRSM should be considered.

Incorporation of RSR Process into Capital Improvement Plan Process

RSR design guidelines and standards should be considered during all phases of capital/roadway improvement projects. Activities that may warrant a review of RSR considerations include:

- The county or local jurisdiction begins planning and design activities for a RSR road widening/improvement project.
- Planning/design activities begin for a traffic signal installation or intersection improvements on a RSR or on a route that intersects a RSR within one-half mile of the RSR.
- Corridor studies and design concept reports commence for a RSR or a corridor within one-half mile of a RSR.

Incorporation of the RSR considerations into a road improvement plan review process could be accomplished for the following types of projects:

- **Request for traffic signal installation or other traffic control devices** – On RSR routes, plan review should include a check as to whether the traffic signal will maintain the traffic signal spacing specified in the access management plan to achieve safety and mobility on the route.
- **Intersection Improvements** – Intersection improvements should be developed using the criteria for signal spacing and median control developed for the routes.
- **Corridor Plans** – Corridor plans on RSR should be developed using the access management plans developed to achieve safety and mobility on the specific route. The corridor plan review process should verify that this has been done.
- **Design Concept Reports** – Design concept reports should identify the route as an RSR route. Design criteria should include access management criteria, including safety and mobility standards.
- **Design Plans and Traffic Control Plans during Construction** – Plan review check should note that the plans were developed in accordance with the access management plan for the road.

A general overview of how the Early Alert Process and RSR process can be incorporated into design plans is summarized in Table 7.

TABLE 7. SUMMARY OF DESIGN PLAN REVIEW PROCESS

Project Phase	Agency Action	How RSR is Incorporated in this process	Actions
Pre – Design and Pre- Design Planning studies (e.g. corridor studies, Design Concept Reports)	Staff coordination	Provide RSR information to design team: <ul style="list-style-type: none"> ▪ RSR Policies ▪ RSR design standards and design criteria ▪ Right-of-way requirements (is ROW needed?) ▪ RSR maps and reference 	Develop information packet of RSR requirements and distribute. Send <i>Early Alert Process</i> to surrounding jurisdictions and to Pinal County
Preliminary Plans, Specifications, and cost estimates	Staff review and approval	RSR requirements part of review process.	Amend construction plan review process to include RSR check.
Interim Plans, Specifications, and cost estimates	Staff review and approval	RSR requirements part of review process.	Amend construction plan review process to include RSR check.
Final Plans, Specifications, and cost estimates	Staff review and approval	RSR requirements part of review process.	Amend construction plan review process to include RSR check.

REGIONWIDE ACCESS PERMITTING PROCESS (TO BE DEVELOPED)

The Regional Implementation Committee will work with the communities, developers, and other stakeholders to develop a regionwide access permitting process.

6. ACCESS MANAGEMENT TOOLKIT

This chapter presents land use and development strategies and technical tools that may be used for access management.

LAND USE AND DEVELOPMENT STRATEGIES

The following describes tools for planning, design, and regulatory tools for managing land use and development.

Acquisition of Access Rights

Property ownership is accompanied by a bundle of rights. Some of these rights can be separated and sold or acquired separately from the remaining property interest. The right of access to an abutting roadway, for example, may be acquired through negotiation, purchase, or the power of eminent domain. The clear benefit of this method to a regulating agency is that the access restriction is recorded with the deed of the land and therefore runs with the land, allowing the agency to clearly retain the right of access control. This technique has been most frequently used along freeways but is increasingly applied to arterial roadways and bypasses. Access rights should be acquired before development occurs, when the cost of the land is still low.

Dedications and Exactions

Local governments can require monetary payments or contributions of land by an applicant as a condition of development approval. Usually such exactions are determined through open-ended negotiations between the local government and the developer. In the case of subdivision regulations, dedications are required from the developer for site related improvements. Voluntary and informal measures also can be effective if it is successfully communicated that dedicated rights-of-way will contribute to the success of a development.

Interim Use Allowances

Interim use allowances restrict structural improvements within transportation rights-of-way and allow for modest structural investments, such as nurseries and storage yards. These types of allowances ensure the owner of the potential for some economic use of the property until the property is acquired as right-of-way for a transportation project.

Purchase of Development Rights

Development rights can be separated from other property rights or from the remainder of the property and purchased, donated, sold, or condemned for public purpose. The property owner from which the rights are purchased is compensated for maintaining the property in an undeveloped state.

Transfer of Development Rights

Instead of purchasing development rights through the governmental agency the rights are transferred from one area of the parcel to another through the establishment of a sending and receiving area. The sending area is usually established around an area in need of protection from development and can include future transportation right-of-way. The receiving area might be an area with higher intensity uses than prescribed in the underlying zoning. To date, Pinal County has not adopted an ordinance providing for transfer of development rights.

Land Development Regulation

Access management can be implemented successfully in areas where local jurisdictions participate in managing development through comprehensive planning, land development regulation, and development review (*Listokin and Walker, 1989 in Land Development and Subdivision Regulation that Support Access Management*). Local plans and ordinances provide a policy foundation for managing access, which is carried out through development review and permitting actions.

The information contained in general and land use plans, for example, provides the overall guidance on how to balance mobility with access. A community's transportation plan, on the other hand, describes a community's future roadway network based on anticipated development patterns. Based on the anticipated future development and the future functional classification of the roadways, access management categories can be established. These categories provide guidance in regard to the application of access management strategies and help identify the type and number of access points required along a highway.

Overall, the comprehensive planning process will:

- Promote orderly and efficient development
- Protect property values
- Preserve community character, natural resources, and environment
- Promote economic development
- Increase the public awareness of the forces of community change

Flexible or Cluster Zoning

In order to promote creative site design, land-use and lot dimensional zoning are relaxed. The application of performance standards measures whether a desired result is achieved without limiting how it will be achieved. Planned Unit Development incorporates flexible zoning in order to achieve the same gross densities while avoiding encroachment of development into future rights-of-way.

Overlay Zones

Overlay zoning can add special requirements onto an existing zoning district. With overlay zoning, standards can be tailored by priority or intensity of access, safety, and congestion problems of a corridor. Flexible zoning is another way of achieving access control. Planned unit developments often incorporate flexible zoning concepts for the purpose of clustering denser development in one portion of a development and leaving open space in another portion. Access points can be few in number yet designed to optimally serve the more densely developed areas.

Subdivision Regulations and Site Plan Review

Subdivision regulations provide guidance on the division or subdivision of land into lots, blocks, and public ways. These regulations complement the underlying zoning. The subdivision plat review can require documentation of all access points and the internal circulation system. Access and design standards can require such items as traffic signals, medians, and on-site circulation.

The subdivision review process should result in an affirmative response to questions such as:

- Is the road system designed to meet the projected traffic demand and does the road network consist of a hierarchy of roads designed according to function?
- Is access properly placed in relation to sight distance, driveway spacing, and other related considerations?
- Do units front on residential access streets rather than major roadways?
- Does the project avoid areas unsuitable for development?
- Does the pedestrian path system link buildings with parking areas, entrances to the development, open space, and recreational and other community facilities?
- Have utilities been properly placed?

The site plan review process for large-scale uses on individual property parcels (such as large commercial developments) can include procedures similar to a subdivision review process.

Zoning Regulation

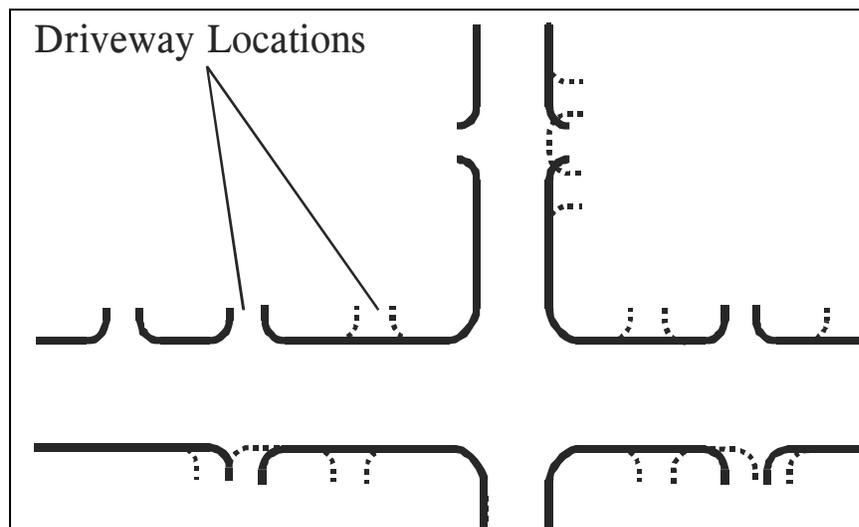
Zoning regulations provide information on the type of land use or development that can occur within each defined parcel. Zoning regulations work in conjunction with land use plans and subdivision regulations. Some types of lot configurations encourage inadequate spacing between access points. Zoning regulation can help re-orient lots in order to access local streets instead of the main highway as well as to ensure adequate spacing between access points. Controlling lot dimensions can have impacts on driveway spacing, on-site circulation, and driveway lengths.

TECHNICAL TOOLS

Driveway Consolidation

Driveways are consolidated in order to limit the number of access points along a roadway and to provide adequate access spacing (Figure 10). Retrofit strategies include:

FIGURE 10. DRIVEWAY TREATMENTS



- Selectively relocate or reconstruct substandard driveways.
- Negotiate driveway closure, reconstruction, or relocation during roadway resurfacing or improvement projects.
- Require improvement of access during redevelopment or expansion of an existing use, including joint and cross access with abutting properties.
- Negotiate redesign of driveway access during sidewalk maintenance, reconstruction, or additions.
- Consolidate access when adjacent properties come under common ownership.

- Improve the traffic signal system through longer, more uniform intervals with advance traffic monitoring and control capabilities.
- Use raised medians or other traffic barriers at hazardous intersections or along certain roadway segments to control mid-block turning movements and improve safety.
- Develop special corridor overlay zoning districts that are tailored to the circumstances of build-up areas.

Joint Driveway/Cross-Access

Joint Driveway/Cross-Access provides for a unified on-site circulation plan serving several properties on a commercial corridor. Cross access connects adjacent parcels and allows for circulation between the parcels without using the arterial street system. In the case that lot frontage is inadequate, joint access/cross access can achieve adequate driveway spacing. The method requires that joint-use driveways and cross access easements need to be established between the adjacent properties. Additionally building sites must reflect the circulation system. The jurisdiction with the zoning authority would need to adopt cross access standards.

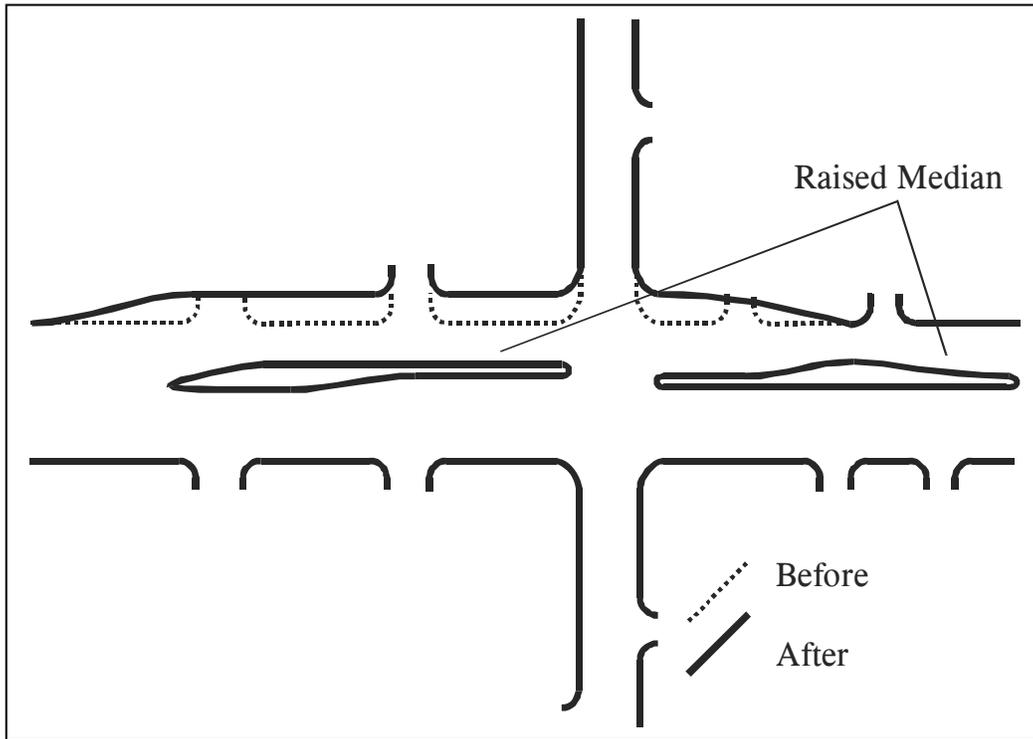
Raised Medians at Intersections

Raised medians at intersections, as shown in Figure 11, provide a center barrier to prevent certain turning movements, such as left turn-in only/no left turn-out which allows greater access to the adjacent property and leaves right turns unrestricted. Right-in right-out driveways are also commonly used. The overall advantage of raised medians at intersections is the ability to define allowed movements while eliminating undesirable ones.

Full Raised Medians

Medians are effective for the control and management of left turns and crossing movements – they may be located at intersection approaches or along the full length of a road between intersections. See Figure 11 for illustration. A variety of designs allows for full or restricted turning movements. The presence or absence of a median barrier has a substantial effect on the safety and operations of major roadways. The main advantage of a raised median is that it reduces conflict points by restricting turn movements to right-in and right-out movements. In addition it provides a means of controlling highway crossings to specific locations where sight distance and vehicle storage can be provided. A sufficiently wide enough median can provide shelter for vehicles or pedestrians crossing the roadway. The disadvantage of a raised median is that through the limitations of crossing movements the number of U-turns will most likely increase which might lead to an increase in rear-end crashes.

FIGURE 11. RAISED MEDIAN AT INTERSECTIONS

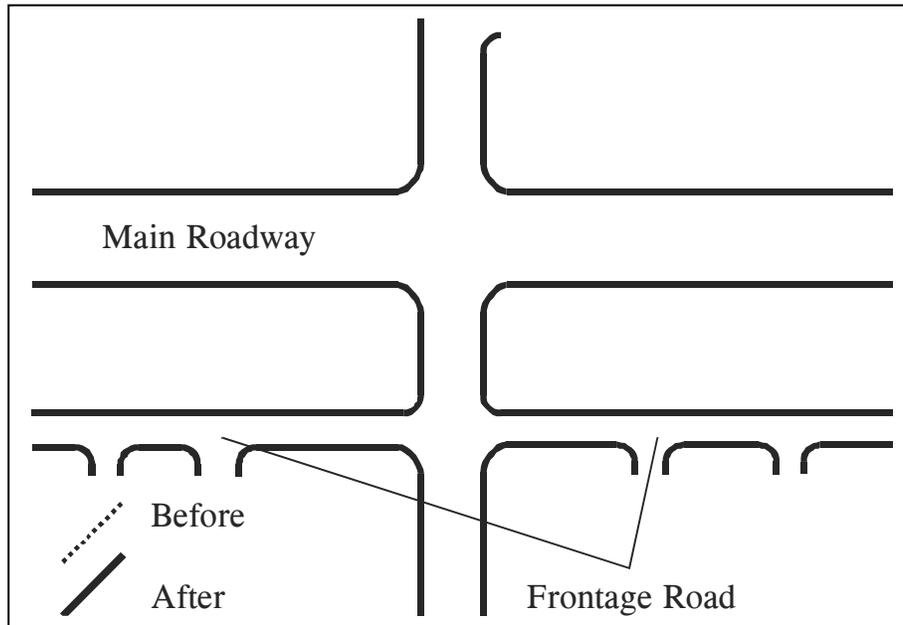


Alternative Access Ways

The long-term planning objective for major corridors is to develop a system of side streets, parallel roads, and traffic control features to support existing and planned development. Main components of such a system are frontage or reverse access roads, which together with inter-parcel connections provide alternative routes for short local trips; thereby, helping reduce local traffic on the arterial.

Frontage roads are typically constructed adjacent to the main corridor highway, but outside the highway right-of-way, and provide access to properties fronting the highway, funneling local traffic to a common point gaining access to the highway. An example is shown in Figure 12. Reverse access roads or backage roads are also paralleling the highway but are off-set from the right-of-way to provide site access at the back of the property rather than the highway side. Both concepts help to provide access to local properties while preserving the safety and capacity of the highway. One issue to consider is the provision for adequate separation between the highway and the frontage road especially in areas where cross streets intersect with the highway at at-grade intersections. If not properly designed, traffic might backup into the intersection of the backage road and cross street.

FIGURE 12. FRONTAGE ROAD



APPLICATION OF RETROFIT TO EXISTING CORRIDORS

Access management can be applied to existing, developed corridors as a "retrofit" process or to future or currently undeveloped corridors as an adopted comprehensive/sub-area plan. Introducing access management techniques into corridors that currently are developed is sometimes difficult and controversial. Unique solutions often need to be used in this reactive process to achieve corridor objectives. Most likely, the consolidation or removal of existing access will be sought in conjunction with roadway reconstruction or urban redevelopment projects.

Access management is easier to preplan as part of a proactive comprehensive planning process, which carefully integrates land use and access elements of an adopted sub-area plan. It is primarily on the urban fringes and beyond where it is possible to coordinate transportation system improvements with land development in order to protect the functional integrity of the roadway.

The "retrofit" program to manage access to an existing roadway is often difficult. Restraints, such as the unavailability of land are making certain access management techniques impossible. In addition, property rights need to be respected and the resulting legal, social, and political aspects of access management need to be thoroughly understood by the implementing agency and all stakeholders. The Transportation Access Management Guidelines for the City of Tucson identify the following condition possibly warranting an access management retrofit program:

- Safety: increased congestion and crashes along a given section of road exists which can be attributed to random or inadequate access.
- Major Reconstruction: Major reconstruction or design plans make access management and control essential.
- Street expansion: Improvements make it practical to reorient access to a cross street and remove (or reduce) arterial access.
- Coordinating Driveways: Planned new driveways on one side of the street lead to coordination of existing driveways on the other side.

The following Tables 8 through 11 outline retrofit techniques identified in the City of Tucson Transportation Access Management Guidelines.

TABLE 8. RETROFIT TECHNIQUES — CATEGORY A: LIMIT NUMBER OF CONFLICT POINTS

No.	Description
A-1	Install median barrier with no direct left-turn access
A-2	Install raised median divider with left-turn deceleration lanes
A-3	Install one-way operations on the roadway
A-4	Install traffic signal at high/-volume driveways
A-5	Channelize median openings to prevent left-turn ingress and/or egress maneuvers
A-6	Widen right through lane to limit right-turn encroachment onto the adjacent lane to the left
A-7	Install channelizing islands to prevent left-turn deceleration lane vehicles from returning to the through lanes
A-8	Install physical barrier to prevent uncontrolled access along property frontages
A-9	Install median channelization to control the merge of left-turn egress vehicles
A-10	Offset opposing driveways
A-11	Locate driveway opposite a three-leg intersection or driveway and install traffic-signals where warranted
A-12	Install two one-way driveways in lieu of one two-way driveway
A-13	Install two two-way driveways with limited turns in lieu of one standard two-way driveway
A-14	Install two one-way driveways in lieu of two driveways
A-15	Install two way driveways with limited turns in lieu of two standard two-way driveways
A-16	Install driveway channelizing island to prevent left-turn maneuvers
A-17	Install driveway channelizing island to prevent driveway encroachment conflicts
A-18	Install channelizing island to prevent right-turn deceleration lane vehicles from returning to the through lanes
A-19	Install channelizing island to control the merge area of right-turn egress vehicles
A-20	Regulate the maximum width of driveways

Source: Transportation Access Management Guidelines for the City of Tucson, March 17, 2003

TABLE 9. RETROFIT TECHNIQUES — CATEGORY B: SEPARATE BASIC CONFLICT AREAS

No.	Description
B-1*	Regulate minimum spacing of driveways
B-2	Regulate minimum corner clearance
B-3	Regulate minimum property clearance
B-4*	Optimize driveway spacing in the permit authorization stage
B-5*	Regulate maximum number of driveways per property frontage
B-6	Consolidate access for adjacent properties
B-7	Require roadway damages for extra driveways
B-8	Purchase abutting properties
B-9	Deny access to small frontage
B-10	Consolidate existing access whenever separate parcels are assembled under one purpose, plan, entity or usage
B-11*	Designate the number of driveways regardless of future subdivision of that property
B-12	Require access on collector street (when available) in lieu of additional driveway on arterial

*not directly applicable for retrofit

Source: Transportation Access Management Guidelines for the City of Tucson, Arizona, May 17, 2003,

TABLE 10. RETROFIT TECHNIQUES — CATEGORY C: LIMIT SPEED ADJUSTMENT PROBLEMS

No.	Description
C-1	Install traffic signals to slow roadway speeds and meter traffic for larger gaps
C-2	Restrict parking on the roadway next to driveways to increase driveway turning speeds
C-3	Install visual cues of the driveway
C-4	Improve driveway sight distance
C-5	Regulate minimum sight distance
C-6*	Optimize sight distance in the permit authorization stage
C-7	Increase the effective approach width of the driveway (horizontal geometrics)
C-8	Improve the driveway profile (vertical geometrics)
C-9	Require driveway paving
C-10	Regulate driveway construction (performance bond) and maintenance
C-11	Install right-turn acceleration lane
C-12	Install channelizing islands to prevent driveway vehicles from backing onto the arterial
C-13	Install channelizing islands to move ingress merge point laterally away from the arterial
C-14	Move sidewalk-driveway crossing laterally away from the arterial

* =not directly applicable for retrofit

Source: Transportation Access Management Guidelines for the City of Tucson, Arizona, May 17, 2003

TABLE 11. RETROFIT TECHNIQUES — CATEGORY D: REMOVE TURNING VEHICLES FROM THROUGH LANES

No.	Description
D-1	Install two-way left-turn lane
D-2	Install continuous left-turn lane
D-3	Install alternating left-turn lane
D-4	Install isolated median and deceleration lane to shadow and store left-turning vehicles
D-5	Install left-turn deceleration lane in lieu of right-angle crossover
D-6	Install median storage for left-turn egress vehicles
D-7	Increase storage capacity of existing left-turn deceleration lane
D-8	Increase the turning speed of right-angle median crossovers by increasing the effective approach width
D-9	Install continuous right-turn lane
D-10	Construct a local service road
D-11*	Construct a bypass road
D-12*	Reroute through traffic
D-13	Install supplementary one-way right-turn driveways to divided roadway (non-capacity warrant)
D-14	Install supplementary access on collector street when available (non-capacity warranted)
D-15	Install additional driveway when total driveway demand exceeds capacity
D-16	Install right-turn deceleration lanes
D-17	Install additional exit lane on driveway
D-18	Encourage connections between adjacent properties (even when each has arterial access)
D-19	Require two-way driveway operation where internal circulation is not available
D-20	Require adequate internal design and circulation plan

* = not directly applicable for retrofit

Source: Transportation Access Management Guidelines for the City of Tucson, Arizona, May 17, 2003