City of Coolidge, Arizona

Comprehensive Transportation Feasibility Study

June 2012

ADOT

CITY OF COOLIDGE · ARIZONA

WILSON & COMPANY

City of Coolidge Comprehensive Transportation Feasibility Study

A Cooperative Effort of

City of Coolidge

Arizona Department of Transportation

ADOT Planning Assistance for Rural Areas (PARA)

ADOT Project MPD 17-11

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Prepared by:

WILSON & COMPANY

410 N. 44th Street, Suite 460

Phoenix, Arizona 85008

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Credits

City of Coolidge, City Council

Mayor Thomas R. Shope
Vice-Mayor Gilbert Lopez
Councilmember Judy Rotz-Lopez
Councilmember Jon Thompson
Councilmember Richard Lister
Councilmember Steve Hudson
Councilmember William Pertzborn Jr.

Technical Working Group

Susanna Struble, Public Works Director/City Engineer, City of Coolidge
Alton Bruce, Growth Management Director, City of Coolidge
Robert Flatley, City Manager, City of Coolidge
Jill Dusenberry, Assistance City Manager, City of Coolidge
Rick LaPaglia, Parks and Recreation Director, City of Coolidge
Joe Brugman, Chief of Police, City of Coolidge
Marcus Hoffman, Coolidge Transit
Andrew Smith, Transportation Planner, Pinal County
David Maestes, Transit Planner, Pinal County
Todd Emery, Tucson District Engineer, ADOT
Charla Glendening, Regional Planner, ADOT Multimodal Planning Division
Michael Kies, Assistant Director of Planning and Programming - Rail, ADOT
Ken Potts, Airport Planning Grants Manager, ADOT
Michelle Green, Project Manager, Arizona State Land Department
Ruben Ojeda, ROW, Arizona State land Department
Mark Griffin, Director of Transportation, CAAG
Jim Townsend, Project Manager, Wilson & Company
Dan Marum, Principal, Wilson & Company
Melissa Anguiz, Public Involvement Planner, Gordley Design Group

Study Overview

This report is a result of the Comprehensive Transportation Feasibility Study (Study) prepared for the City of Coolidge in Pinal County, Arizona. It was funded and supported through Arizona Department of Transportation's (ADOT) Planning Assistance for Rural Areas (PARA) program. The Study addresses multimodal transportation improvements to roads and infrastructure serving motorists, transit patrons, pedestrians, and bicyclists. The Study recommendations contained in this report replace the Coolidge-Florence Regional Transportation Plan developed in 2008.

The study area includes the area within the City of Coolidge Metropolitan Planning Area (MPA), matching the City's General Plan, Zoning and Future Land Use Plan. The planning effort also accounts for an area of influence surrounding the planning area to address and account for regional mobility and transportation system demands.

Key objectives of the Study include identifying and establishing a multimodal transportation plan that provides a vision that promotes community growth and economic development, accommodates anticipated local and regional travel demand, and supports regional multimodal initiatives in a manner that informs regional decision making. This guidance document provides a sustainable comprehensive multimodal vision for future transportation infrastructure investments. Embracing complete streets to provide safe transportation systems to enable and enhance walking, bicycling, riding transit is a critical component to the ultimate success of this Plan. Also, supporting regional mobility needs in a manner that promotes sustainable growth with minimal community impact is essential for the Coolidge community prosperity.

The recommendations and direction provided in this Plan is the first of several required steps to implementation. This Plan provides the community vision for transportation investments. Decision making during implementation will occur in several phases including further corridor specific study and design, during development proposal and traffic impact analysis review, and during environmental review. Each step in the project development process may propose minor changes to what is proposed herein; however, the integrity of the Plan should be held. Any major changes in this vision should be revisited and reviewed periodically to ensure growth assumptions and other local and regional factors are adequately accommodated in this Plan.

Planning Process

The Plan was developed in a collaborative manner with the participation from regional technical staff serving on the Plan's Technical Working Group (TWG). The TWG was made up of regional agency staff members that include both Planning Partners and Funding Partners for Plan implementation. In addition, the study team held three City Council Work Sessions, two public Open Houses and several small group meetings and discussions with key area stakeholders including:

- Property owners
- Owner representatives
- Development interests
- Canal owners
- Power suppliers; and
- Other regional study teams

This broad reaching process provided the City of Coolidge with this widely supported Transportation Plan that can be carried forward not only by the City, but also by the citizens, business owners and future investors. The implementation if this Plan is heavily reliant upon all of the above groups working together. Based on current funding streams, Coolidge will be relying heavily on private developers to fund transportation improvements as the community grows. This investment in the community, and the return on investment for a long lasting and capable multimodal transportation system to enable local and regional mobility for sustainable and attractive growth was broadly supported through this process.

Forecasted Travel Demand

The urbanization process and general population growth is expected to add significantly to the number of households in the study area through year 2040, and beyond. Household and employment growth will be further enhanced by the regional transportation investments being contemplated. Being directly between the two metropolitan areas of Phoenix and Tucson, Coolidge is situated to provide residents and businesses a great amount of flexibility and proximity to these two key established population and employment areas of Arizona, while providing the framework to grow jobs and households locally. At this regional level, Coolidge is also positioned to be a central hub to support regional travel demand and tie into other regional transportation investments such as a North-South Corridor and an Intercity Rail system.

Table 1 summarizes the projected growth of households, population, and employment in the study area for the years 2010, 2020, 2030, and 2040 based on projections provided by the Central Arizona Association of Governments (CAAG). The regional household and employment forecasts were included to provide valuable insight to the regional travel demand needs primarily due to the extensive growth in Pinal County. In fact, with the 2010 Census, discussions relating to Metropolitan Planning Organization

(MPO) boundary adjustments could provide for additional change in how transportation planning is conducted in the Coolidge MPA.

CAAG is forecasting year 2040 households to grow by approximately 570%. Employment is anticipated to also increase dramatically, outpacing the population projections by approximately double (1,160%).

Table 1: Study Area Socioeconomic Growth: 2010 – 2040

	Year					
	Year 2010 CAAG Summary	Year 2020 CAAG Summary	Year 2030 CAAG Summary	Year 2040 CAAG Summary	2010-2040 Change	2010-2040 Percent Change
Households	5,641	12,905	23,823	37,772	32,131	570%
Population	17,666	40,552	75,471	120,436	102,770	582%
Employment	3,502	10,824	20,275	44,122	40,620	1,160%

The year 2040 and year 2050 traffic forecast and network performance assessment based on the ADOT North-South Corridor Study allowed for an assessment of base travel conditions to understand the magnitude of transportation system improvements needed to accommodate future travel demand.

Transportation System Demands

The evaluations documented in *Working Paper No. 2: Comprehensive Transportation Feasibility Plan* identify extensive system level deficiencies that need to be addressed for both north-south and east-west travel demands. The demands are both local and regional in nature, so both local and regional mobility improvements will be critical to address overall transportation demands. The evaluations examined how to address these system deficiencies by not only evaluating capacity, but also examined how the potential improvements could impact the natural and built environments. The evaluations and recommendations included herein rely heavily on this system of regional and local network improvements, including the North-South corridor as a new freeway.

Coolidge's Current Transportation System

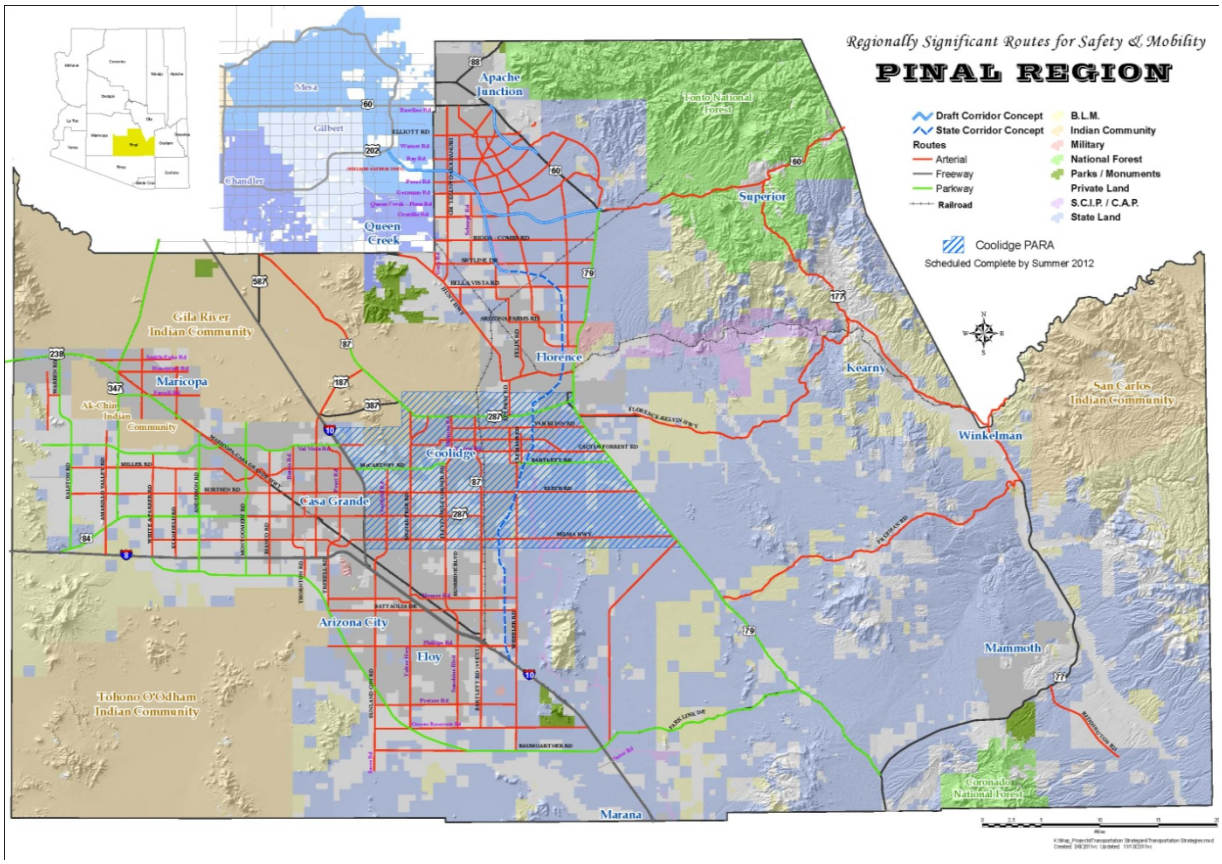
Approximately 30 percent of the future primary roadway network is currently paved, but these paved roads are not in the form of an ultimate arterial or parkway standard. In addition, of the arterial network in place, more than half of that system needs major or significant maintenance. The strategy outlined in this Plan provides an approach to establish the critical transportation corridors in a phased manner so to maximize system mobility and connectivity while minimizing maintenance activity requirements.

Regional Coordination

Pinal County Regionally Significant Routes for Safety and Mobility

This plan worked closely with other regional stakeholders to ensure that plans were coordinated in an efficient manner. One of the key studies referenced throughout this work effort was the Pinal County Regionally Significant Routes for Safety and Mobility Study (RSRSM). The recommendations from this study will inform and augment the County's Regionally Significant Routes (RSR) map (Figure 1). The significance of this map is that it illustrates those regional facilities designated for preservation through planning and access management applications. The principal arterials and parkway facilities illustrated in Figure 8 of this Plan should be integrated as Regionally Significant Routes for Pinal County.

Figure 1: Regionally Significant Routes



The Coolidge Transportation Plan

There are three key multimodal elements of the Coolidge Comprehensive Transportation Feasibility Study (Plan) including roadways, transit, and bicycle/pedestrian elements. Although described separately, they are all interrelated and must be implemented as a system.

ROADWAY

The future roadway facilities described herein are based on the existing and committed model network used for the North/South Corridor Study. The current travel demand model does not identify Principal Arterials versus Minor Arterials, and it does not differentiate between Major and Minor Collectors. The proposed changes, later described in this section, will correct these issues.

Roadway Functional Classification

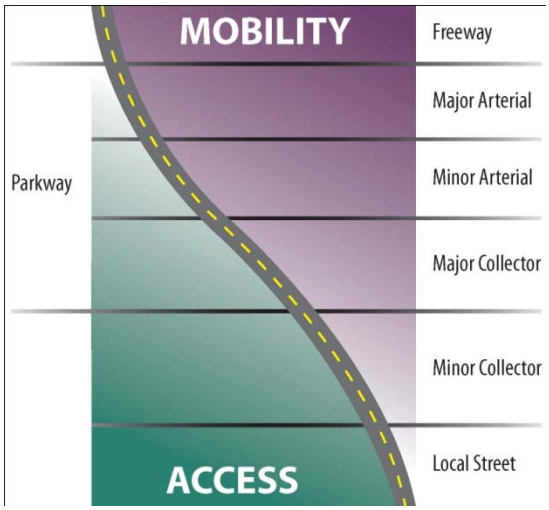
Roads are classified according to specific design and traffic characteristics. The functional classification process categorizes roads by how they perform in regard to providing access and mobility within the community. The region's roadway network includes five roadway functional classifications.

The following roadway functional classifications are recommended to provide a sound transportation system for the City of Coolidge to accommodate local growth and regional transportation demands. The functional classification of the roadway network in Coolidge has been established in accordance with the definitions provided by ADOT and FHWA, as summarized below:

- **Freeway –** a multi-lane, high-speed, controlled access, divided roadway with the primary purpose of efficiently serving longer regional or interregional trips;
- **Parkway –** a high capacity multi-lane, higher speed, controlled access, divided roadway with the primary purpose of efficiently and safely serving longer regional trips, major activity centers, providing access to freeways and arterials, and providing controlled access to abutting property owners;
- **Principal Arterial –** a higher speed, controlled access, divided roadway of two or more lanes in each direction, designed for efficient travel between major activity centers, providing access to freeways with limited access to/from abutting property;
- **Minor Arterial –** a higher speed, controlled access, divided roadway of two or more lanes in each direction connecting lower and higher functionally classified facilities as well as major activity centers, and facilitating access to and connectivity between larger land tracts and commercial developments;
- **Major Collector / Commerce Park Collector –** a two-lane roadway facilitating connectivity to the higher order arterial network, while providing direct access to the roadway network for larger commercial parcels and larger residential developments; and
- **Minor Collector / Residential Collector –** a two-lane roadway providing direct access to the roadway network for commercial parcels and multi-family residential developments via major collector and minor arterial roadways.

The Transportation Plan graphically depicts all freeway, parkway, principal and minor arterial routes planned for the Coolidge MPA. The regional routes that include the freeways, parkways and principal arterials facilitate regional travel and have the greatest amount of access control and management. These facilities should be integrated into the Pinal County Regionally Significant Routes system. If and when the City of Coolidge is integrated into a Metropolitan Planning Organization, the freeways, parkways and principal arterials should all be considered part of the MPO's Long Range Transportation Plan and part of the Regional Transportation Plan network.

Figure 2: Access vs. Mobility



The major and minor collector facilities are not all identified as many of those facilities have the greatest potential for change as development occurs. The major collector facilities described above include all Commerce Park Collectors in the Transportation Plan. As the collector transportation system develops, these roadways should generally extend east and west, or north and south to facilitate travel and access to the arterial transportation system. Collectors that change cardinal direction should be discouraged as it creates out of direction travel and additional turning traffic movements, ultimately reducing capacity and decreasing intersection safety.

As the functional classification transitions from arterial roadways to local roadways, the level of access generally increases, the capacity decreases, and the purpose of the roadway changes from efficiently moving vehicles to providing direct property access. This system of functional classifications is critical to provide a network capable of accommodating regional mobility and local property access (Figure 2).

Functional Classification Capacities

Roadway capacity corresponds directly with roadway functional classification. In general, as the roadway classification is elevated, the roadway can handle higher traffic volumes. Factors such as level of access control, number of driveways, availability of left-turn lanes, and if the roadway is divided or undivided play a critical role in overall capacity. The *Highway Capacity Manual* (2000) defines the measurements for effectiveness in all types of roadways and intersections in terms of qualitative levels of service (LOS). This is the common method to measure traffic capacity and operations. LOS measures the quality of traffic flow, maneuverability, driver comfort, average speed, and the ratio of the level of traffic or traffic volume to the capacity of the roadway (v/c ratio).

Table 2 below provides planning level capacities that should be considered as the transportation system is being phased and implemented. The capacities below also illustrate the significance of improved capacity for divided versus undivided roadways. Dividing the freeway, parkway, principal and minor arterial roadways with a raised median can provide approximately 40% additional capacity and greatly enhanced safety without a significant difference in investment costs.

Table 2: Roadway Capacities (Daily Volume Threshold)

Functional Classification	Number of Lanes	Divided/ Undivided	Left-Turn Lane	Description	ADT Capacity Threshold (LOS D)
Freeway	4	Divided	n/a		101,600
	6	Divided	n/a		152,400
Arizona Parkway	4	Divided	ILT		60,000
	6	Divided	ILT		90,000
Principal Arterial	2	Undivided	Yes	State Class 1	15,500
	4	Undivided	No	Arterials	23,940
	4	Divided	Yes		34,200
	6	Divided	Yes		51,400
Minor Arterial	2	Undivided	No	State Class 2	11,600
	2	Undivided	Yes	Arterials	14,500
	4	Undivided	No		22,900
	4	Divided	Yes		30,600
Major Collector	2	Undivided	No		10,800
	2	Undivided	Yes		13,600
	3	Continuous LTL	Yes		15,000
	4	Undivided	No		15,200
Minor Collector	2	Undivided	No		7,500
	2	Undivided	Yes		9,400
	3	Continuous LTL	Yes		12,000

Source: Florida Department of Transportation *Quality Level of Service Handbook, 2002*

Intersection Capacities

Tables 3 through 5 provide a guideline for understanding potential intersection performance related to two-way stop control, four-way stop control and roundabout intersections. The volumes used in Tables 3 through 5 are planning level capacities. Specific level of service measurements should be conducted to identify intersection level of service via an engineering study in order to properly evaluate a specific intersection location and corresponding performance.

Unsignalized Intersections

Unsignalized intersections are very common in Coolidge. As traffic increases due to local or regional development pressure, it will be very important to understand how potential traffic control will perform, and when potential intersection and traffic control improvements will be needed. In order to estimate the performance at an intersection level, service volumes for both the major and minor street approaches are required. Table 3 summarizes the corresponding level of service (LOS) for the various hourly volumes on the major and minor streets at a two-way stop-controlled intersection.

Table 3: Intersection Capacity, Two-Way Stop-Controlled (Vehicles Per Hour)

Major Street Volume	Minor Street Maximum Service Volume (VPH)				
	LOS A	LOS B	LOS C	LOS D	LOS E
Major street = one lane, minor street = one lane and no turn pockets					
500	N/A	200	400	400	400
1000	N/A	N/A	100	200	200
1500	N/A	N/A	N/A	N/A	N/A
Major street = one lane, minor street = one lane plus turn pockets					
500	N/A	100	200	400	400
1000	N/A	N/A	N/A	100	100
1500	N/A	N/A	N/A	N/A	N/A
Major street = two lanes plus turn pockets, minor street = one lane and no turn pockets					
500	N/A	200	400	400	400
1000	N/A	N/A	100	200	200
1500	N/A	N/A	N/A	N/A	N/A
Major street = two lanes plus turn pockets, minor street = one lane plus turn pockets					
500	N/A	N/A	200	400	400
1000	N/A	N/A	N/A	N/A	100
1500	N/A	N/A	N/A	N/A	N/A

Source: Institute of Transportation Engineers *Transportation Planning Handbook, 2nd Edition*

Notes:
N/A = not achievable under given conditions
Assumptions used to generate the values in the above table are: both approach legs of minor street have same volume; minor street LTs and RTs are equal to 33 percent of total minor street approach volume; major street LTs and RTs are each 10 percent of the approach volume; PHF = 0.88; default PCE of 1.10 was used; no flared minor street approach; and no channelization.

At an all-way stop-controlled intersection, the corresponding level of service depends on the number of through lanes on each approach and if there are left- and right-turn pockets at the intersection. Table 4 summarizes planning level, level of service thresholds for various volumes on the major and minor streets at an all-way stop-controlled intersection.

Table 4: Intersection Capacity, All-Way Stop-Controlled (Vehicles Per Hour)

Through Lanes	Left- and Right-Turn Pockets	LOS A	LOS B	LOS C	LOS D	LOS E
1	No	100	200	300	300	400
1	Yes	200	300	400	500	600
2	No	200	300	400	400	500

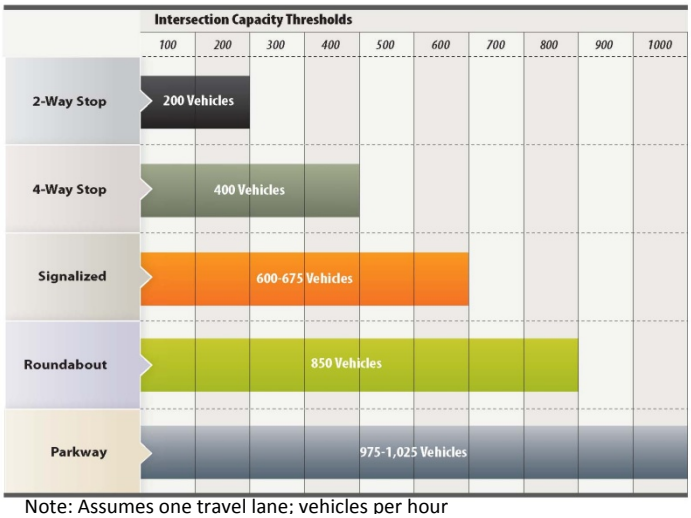
Source: Institute of Transportation Engineers *Transportation Planning Handbook, 2nd Edition*

Notes:
Assumption used to generate the values in this table are: equal demand on all four approaches; identical lanes on all four approaches; PHF = 0.85; 10 percent left-turns; and 10 percent right-turns

Roundabout Intersections

Roundabouts are another type of traffic control that is gaining popularity and acceptance in cities and communities throughout the country. One of the main benefits of roundabouts is that they are typically safer than traditional stop sign or signal controlled intersections and have the potential of reducing overall collisions by approximately 40 percent. In addition to the safety benefit, roundabouts can generally carry a greater amount of traffic, reduce delay, improve traffic flow through an intersection and are less expensive than signalized intersections over the long-term. For a developing community such as the City of Coolidge, roundabouts present an opportunity to provide long-term, high capacity, safe intersection control treatments without the need to hire traffic signal staff. Figure 3 illustrates planning level hourly service traffic volume capacities for various intersection treatments.

Figure 3: Hourly Intersection Capacity Threshold



Note: Assumes one travel lane; vehicles per hour

The typical capacity of a single lane roundabout ranges up to 850 vph, depending on the amount of truck traffic and directional traffic. Table 5 provides typical entering volumes on a daily basis (ADT) for the different types of roundabouts.

Table 5: Intersection Capacity, Roundabouts (Daily Volume)

Type	Typical Diameter	Typical Entering Volumes
Mini-roundabout	45-90’	15,000 ADT
Single lane	90-180’	25,000 ADT
Multi-lane	150-300’	45,000-70,000 ADT

Source: Minnesota Department of Transportation

Notes: Assuming balanced flows on 4-legs

As shown in the table, the multi-lane roundabout has the ability to more than double the capacity of vehicles traveling through a location, but would also require a larger footprint within the actual intersection. Currently, there is a substantial amount of discussion relating to multi-lane roundabouts and how to accommodate disabled individuals safely. The United States Access Board is examining the potential of signalizing multi-lane roundabouts due to the inability of blind individuals to accurately sense the location of traffic in the intersection. For this reason, multi-lane roundabouts are not recommended as viable intersection treatments in Coolidge now; additionally, Access Board findings should be monitored for future potential use.

Functional Classification Cross Sections

Roadway cross sections provide the framework for a community to understand how to move people from their travel origins to their destinations. Several factors are balanced when developing cross sections to best manage future traffic demand based on existing and future land uses, including:

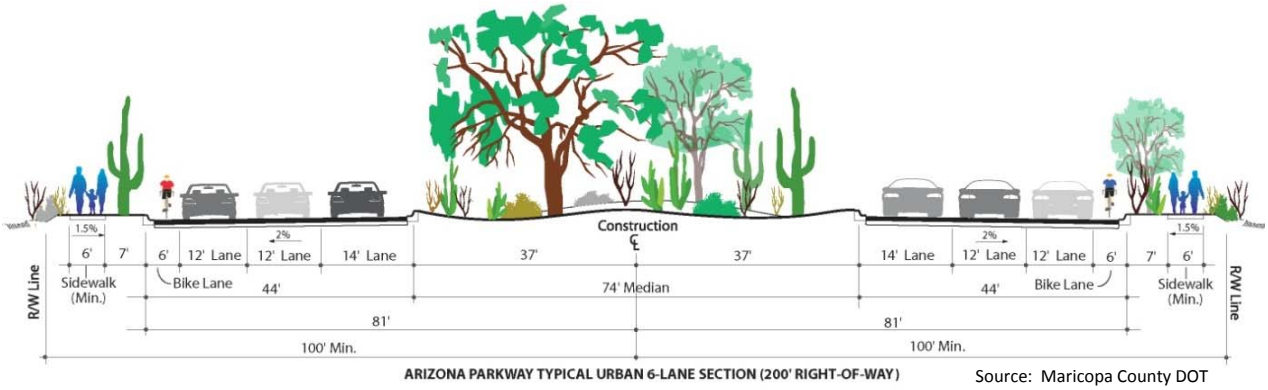
- Amount of traffic (high-volume versus low-volume)
- Type of traffic (large vehicles, heavy vehicles, buses, cars)
- Level of pedestrian activity
- Level of bicyclist activity
- Density of driveways
- Turning traffic volume (driveways, street intersections, offset versus aligned intersections)
- Surrounding land uses (schools, residential, industrial, commercial)
- Regional mobility corridors (through route, established bicycle route)

In communities across the nation, transportation system investments have strived to better accommodate multiple travel modes through "Complete Streets" initiatives. Whether it is providing sidewalks for pedestrians, shared-use paths or shoulders for bicyclists, wide outside travel lanes to allow for a safe area for cyclists to ride either in the shoulder or in a signed bicycle lane, bus pull-outs for transit stops, or trails for equestrians, communities are making the investments to provide safe mobility options to their residents, employers and visitors.

Many of the proposed cross sections include a shared-use path that would be wide enough for more than two people to walk side-by-side, bicycle use and/or equestrian use. Each cross section also includes a detached sidewalk that is at least five-feet wide, and is separated from the roadway by at least five-feet as indicated in the Arizona Department of Transportation (ADOT) *Roadway Design Guidelines*.

All roadways should be designed in a context-sensitive manner; meaning the roadway condition should be proportional in scale to the adjacent development. This is particularly true in the two collector cross-sections (Commerce Park and Residential), which should be designed according to their adjacent land uses. Figures 4 and 6 through 9 depict the typical cross sections for each functional classification, and Figure 5 illustrates an indirect left-turn lane treatment for Parkway functional classification roadways.

Figure 4: Arizona Parkway Typical 6-Lane Section



Source: Maricopa County DOT

Figure 5: Indirect Left-Turn Treatment

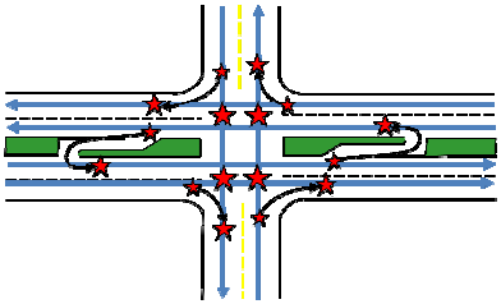


Figure 6: Principal Arterial Typical Section

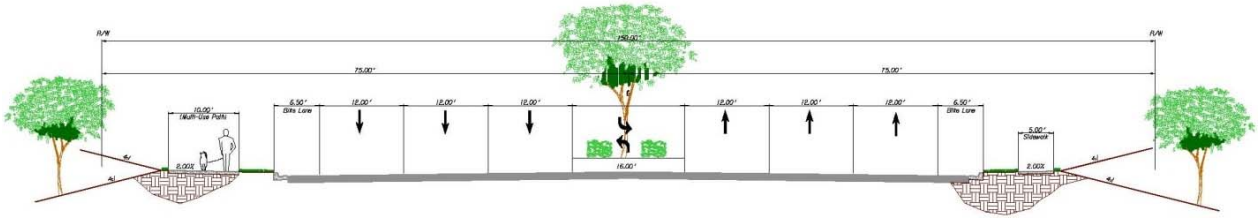


Figure 7: Minor Arterial Typical Section

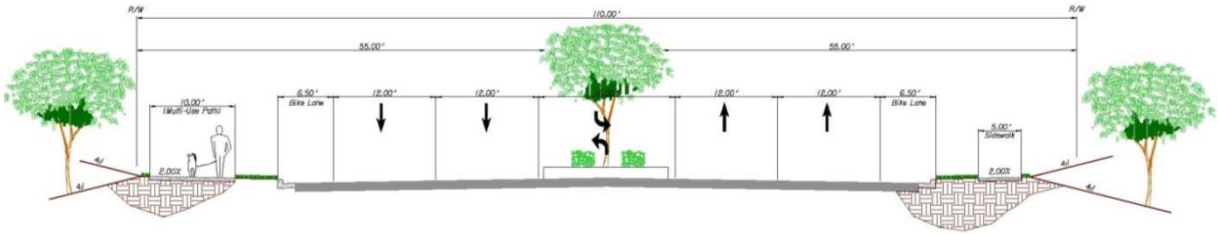


Figure 8: Commerce Park Collector Typical Section

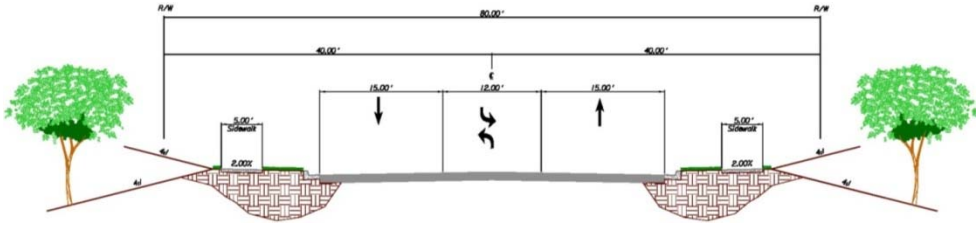
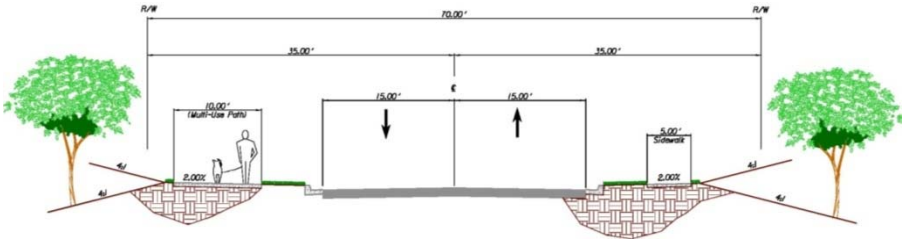


Figure 9: Residential Collector Typical Section



Transportation Plan and Access Management

Table 6 documents the roadway criteria and design standards including the applicable access management strategy for each cross section above. Figure 10 is the Coolidge Transportation Plan and Figure 11 provides the planned number of travel lanes for planned improvements.

Table 6: Access Management

Criteria	Functional Classification				
	Arizona Parkway	**Principal/Major Arterial**	**Minor Arterial**	**Commerce Park Collector**	**Residential Collector**
Road Purpose	Mobility	Mobility	Mobility/Access	Access	Access
Planning Average Daily Traffic	60,000 – 90,000	45,000 – 60,000	30,000	10,000	8,000
Design Standards					
Design Speed	55 mph	55 mph	45 mph	35 mph	35 mph
Right-of-Way Width	200’	130’ - 150’	110’	80’	70’
Median	Divided	Divided	Divided	TWTL	NA
Number of Lanes	6	4 - 6	4 – 5	2 – 4	2 – 3
Left-turn Lanes	Indirect Left-Turn. Spacing at 1320’ or 660’ as permitted	1/4 - 1/2 mile	1/4 - 1/2 mile	At all locations where permitted	At all locations where permitted
Right-turn Lanes	At all locations where permitted and warranted	At all locations where permitted and warranted	At all locations where permitted and warranted	At all locations where permitted and warranted	At all locations where permitted and warranted
Access Management Guidelines					
Public Access	1/8 – 1/2 mile	1/8 – 1/2 mile	1/8 – 1/4 mile	1/8 – 1/4 mile	1/8 mile
Property Access	Right in/Right out	Right in/Right out. Full access where approved	Right in/Right out. Full access where approved	Full access where approved	Full access where approved
Traffic Signal Spacing	1 mile; 1/2 mile where warranted and permitted	Mile and 1/2 mile locations where warranted, fully coordinated and progressed	1/2 mile locations, 1/4 mile locations where warranted, fully coordinated and progressed	1/2 mile locations, 1/4 mile locations where warranted	NA
Typical Traffic Control	Signalized, two-way stop	Signalized, two-way stop (interim – roundabout allowed)	Signalized, two-way stop (interim – roundabout allowed)	Signalized, roundabout stop	Signalized, roundabout stop
Parking	Prohibited	Prohibited	Prohibited	Restricted	Restricted
Alternative Modes					
Transit	Bus pull-outs and queue jumpers where warranted	Bus pull-outs and queue jumpers where warranted	Bus pull-outs and queue jumpers where warranted	NA	NA
Bike Lanes	Yes	Yes	Yes	Share the Road	Share the Road
Multi-use Path	10’	10’	10’	NA	10’
Sidewalk	6’	6’	6’	5’ (both sides)	5’

TWTL – Two-way Turning Lanes

Figure 10: Transportation Plan – Functional Classification

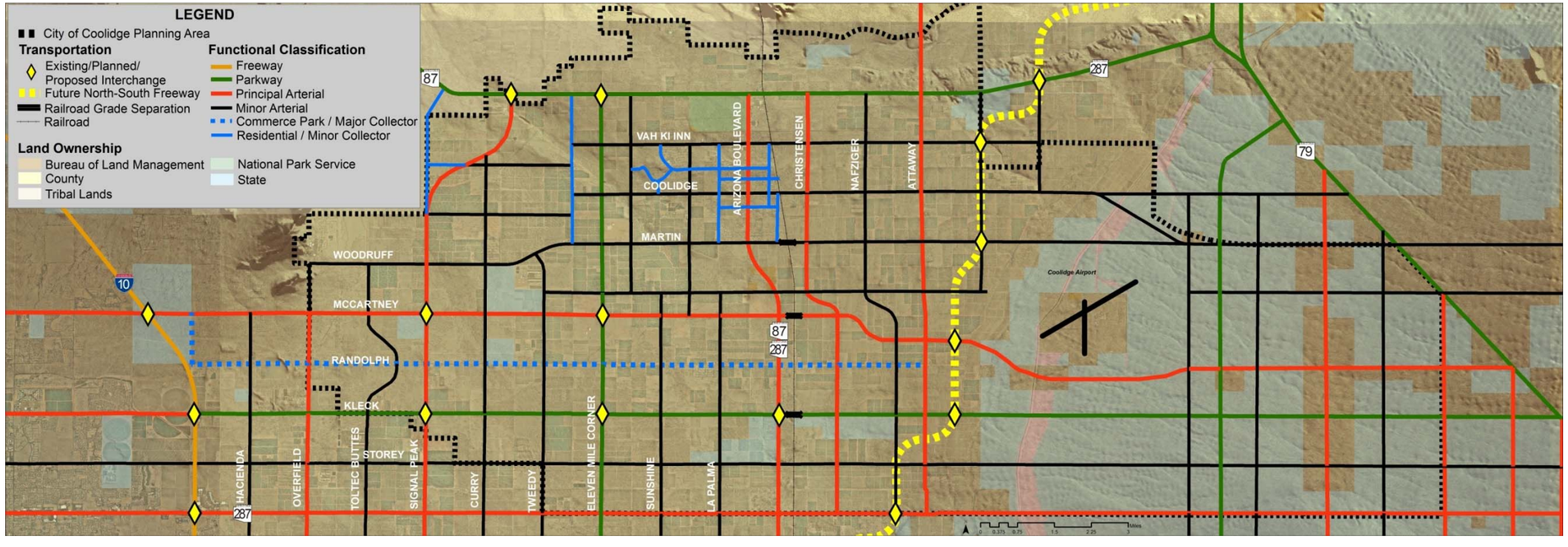
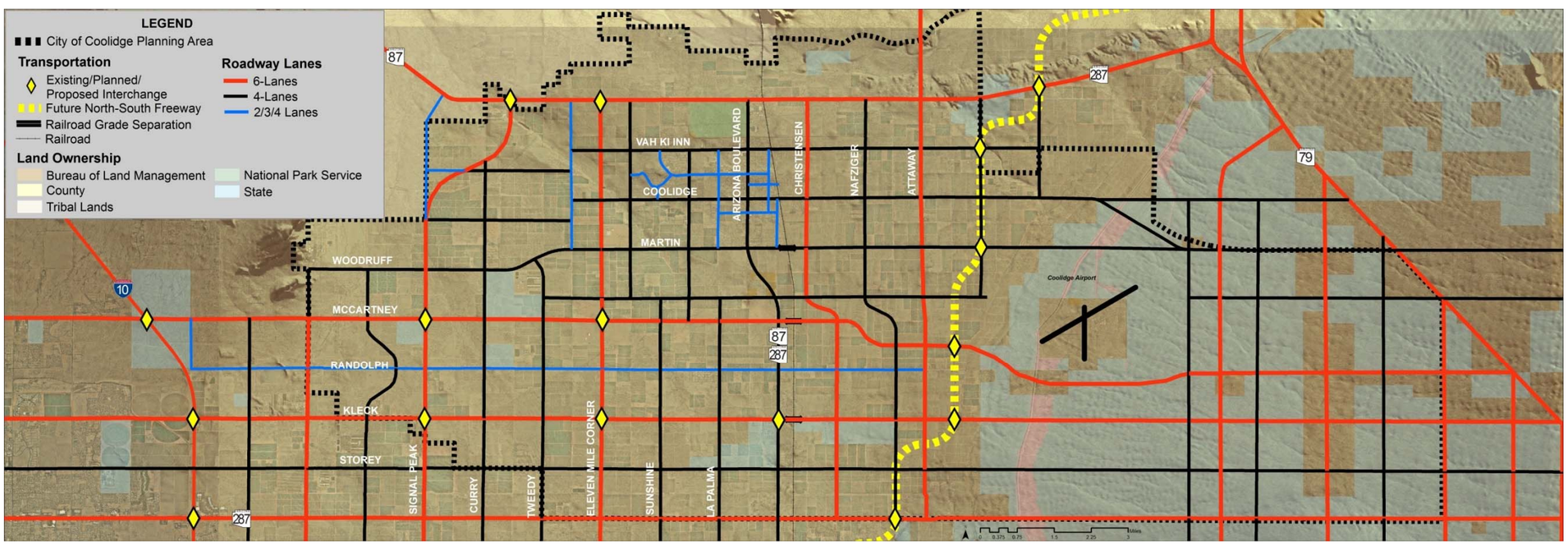


Figure 11: Transportation Plan – Number of Lanes



Transit

The provision of transit, both at a local level and at a regional level, is very important to the Coolidge community. Successful transit is a core component of a stable economic program to serve not only social service needs, but support and promote employer needs. Successful transit requires continued system investments that integrate transit into the framework of a community so as roads are improved, as developments are constructed and as new employment centers are attracted, transit can be a viable means of transportation for those patrons, visitors and employees.

There are several key factors that directly apply for a transit provider to operate and manage a successful transit system. Seven key factors that relate to the City of Coolidge Cotton Express system success include:

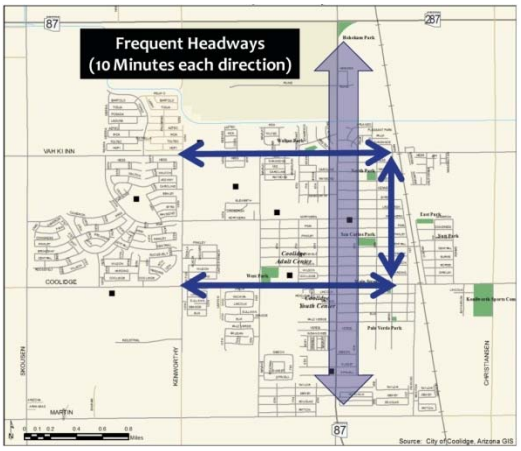
1. **Reliability:** Reliable transit service is critical to ensure users that the bus will pick up patrons at a scheduled time.
2. **Predictability:** Predictable transit service is very important to those users that have to arrive at their destination at a certain time. For work, school and trips that involve a scheduled appointment, predictability of when the bus will arrive at the destination stop is critical.
3. **Cost Effectiveness:** Cost effective transit service is a balanced equation between the cost of attracting transit users and the expense to the users to make it a viable alternative to driving.
4. **Frequency/Headways:** Many systems have different needs during the morning and evening peak hours than during the mid-day or late evening travel periods. The frequency of service should be set in a manner that allows the user to have choices and flexibility regarding scheduled service. Service frequencies of less than 20 minutes by direction should be developed.
5. **Ties to Origins and Destinations:** Providing safe, direct and easy access for transit users to access the transit stop and providing safe direct easy mobility for transit users to reach their destination once they depart from the bus is critical for a successful transit system. When it is easy for users to access transit, the user identifies transit as a potential viable alternative to driving. Additionally, when the user can reach their destination safely and easily after being dropped off at a transit stop, that ease of making their complete trip is directly measured against the cost and ease of using other modes such as driving.
6. **Bus Stop Accessibility:** Due to the high degree of pedestrian and bicycle use to access transit, eliminating barriers transit patrons face as they arrive at / depart from transit stops is critical for the ultimate success of the transit system. Typically, the average transit user is willing to walk one-quarter (¼) mile to a station or stop, although external factors can affect this distance. There are both soft and hard factors that affect the experience of the pedestrian transit user. Hard factors include the street design, land use, and frequency of transit service. Soft factors include weather protection, landscaping, social experience, and personal safety.
7. **Trip Duration:** Minimizing the need to transfer ultimately reduces the amount of time dedicated to making the transit trip which therefore increases the potential reliability and predictability.

Providing transit services that incorporate the seven factors above will result in a successful and well used transit system.

Local and Regional Transit Service

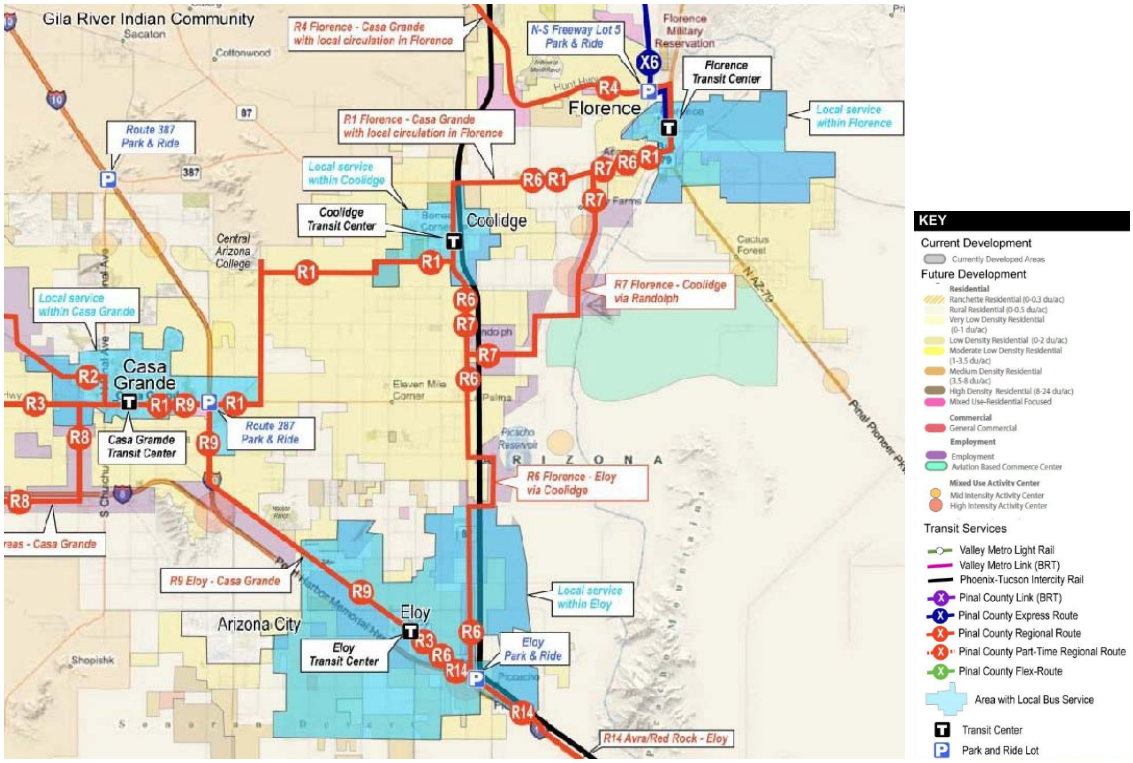
In 2009, the *Cotton Express: City of Coolidge Five Year Transit Plan* was completed, which identified transit issues and suggested a simplified route be created along SR-87/Arizona Boulevard that would offer more frequent, 10-minute headways. This suggested route would improve transit access along Coolidge's most heavily traveled commercial corridor. Additionally, the 2009 plan recommended an additional transit study to determine the feasibility of the SR-87 route including the need for bus bays (pull-outs).

Figure 12: Proposed Transit Service



After further examining the potential improvement with the SR-87 route, the future transit recommendation includes a local circulator route to be created to improve transit service throughout the Coolidge community. Similar to the SR-87 route, the local circulator route is recommended to have 10-minute headways but would connect Coolidge east-to-west (Figure 12). The local service would provide direct support for planned long-term regional transit services (Figure 13). In addition, ADOT is examining prospective regional intercity passenger rail services between Phoenix and Tucson. Cotton Express can actively support this with a potential passenger rail stop in Coolidge.

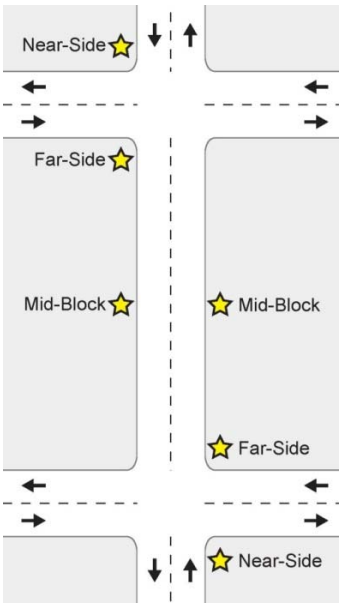
Figure 13: Regional Long-Term Transit Improvements



Transit Stops

The frequency of bus stops locations provides a balance between service reliability and service access. This plan recommends that directional bus stops be spaced no closer than ¼-mile apart for residential areas and commercial activity centers. These stops should be integrated when possible.

Figure 14: Bus Stop Position



Bus stops should typically be located as close to an intersection as possible, typically in an acceleration lane at the far side of an arterial intersection, so to encourage use of sidewalks and crosswalks by transit riders (Figure 14). Far-side stops located in an acceleration lane are preferred because they cause minimal interference to traffic flow as the bus is out of the traffic stream, minimal interference with intersection sight distance, there is a greatly reduced chance of passengers crossing in front of a bus, less conflict with automobile's right turns, less obstructions for vehicles entering the intersection from a side street, and more effective re-entry for buses into traffic flow.

Near-side stops should be considered only when far-side stops are not feasible or when a transit study recommends such a stop. Mid-block stops are typically discouraged because of the likelihood that pedestrians would cross streets at a mid-block location instead of at an intersection. However, surrounding transit supportive development could warrant mid-block transit stops on arterials.

Accessibility

The accessibility of a transit system is a major factor in determining the success (i.e., ridership) of the transit system. The Americans with Disabilities Act (ADA) is a federal standard used in determining the best accessibility guidelines for public facilities. All transit facilities must comply with these standards.

In addition to meeting ADA guidelines, the pedestrian facilities near bus stops should be improved to provide a more pedestrian-friendly environment. All transit riders begin and end their trip as pedestrians; therefore, a friendly pedestrian environment should include wide sidewalks, pedestrian lighting, and landscaping, among other features.

Figure 15: Cotton Express Bus Shelter

Transit Amenities

Passenger waiting areas should be comfortable and secure, including a range of improvements depending on the specific needs of each site (i.e. ridership and site logistics). Typical transit amenities include benches, shelters, bus bays (pull-outs), park-and-ride lots, major transfer centers, and landscaping as appropriate. Figure 15 illustrates the standard design for Cotton Express bus shelters.

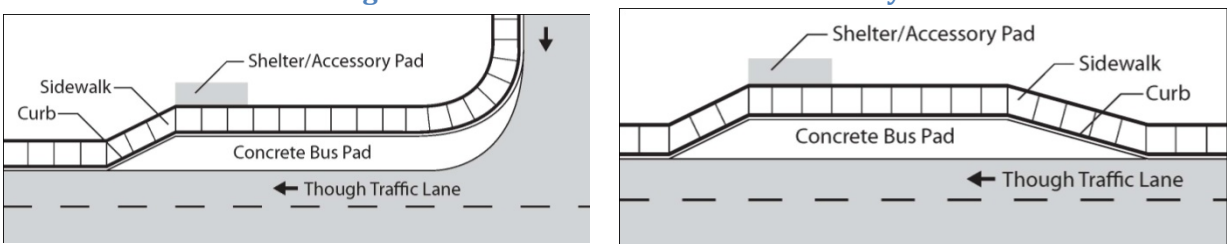
The sun's angle should be considered when determining a shelter location. Maximum shade should be provided during the peak hours of summer. Additionally, shelters should be arranged to provide

passengers a clear view of oncoming traffic and provide bus drivers with a clear view of waiting passengers.

Bus Bays (Pull-outs)

Bus bays on arterial roadways allow for traffic to have a continuous flow while buses pull into a separate lane to load and unload passengers. Bus bays are recommended at or near transfer points, at layovers, along arterial streets, and where recommended by City staff. Bus bays are only allowed at far-side and mid-block stops. Near-sided bus bays are not allowed as they would interfere with right-turning traffic. Figure 16 illustrates a far-side bus bay and a mid-block bus bay.

Figure 16: Far-side and Mid Block Bus Bays



Park-and-Ride Lots

Park-and-ride facilities should be located at major regional intersections, particularly in close proximity to interchanges. These facilities provide free automobile parking and allow convenient access to transit. These facilities may be combined with transit and transit centers, major transfer centers, or at other major activity centers so trips can be combined with other retail shopping activities.

Transfer centers should have many transit amenities including, but not limited to, information kiosks, bike lockers, shelters, parking, and drinking fountains. They often are located off-street and include a bus turn-around point, but may be located on-street where many transfers occur. These centers typically require 1.5 acres of land and should accommodate at least 45 parking spaces which could be shared with other land uses if determined acceptable by the City.

Landscaping

Strategic landscaping can provide both shade from the sun and protection from adjacent automobile traffic. Where possible, landscaping should be used to improve the transit facility and consequently, the pedestrian environment. In new developments with integrated transit facilities, landscaping design should be strategic to provide: an adequate tree canopy to provide shade (priority given to shading afternoon summer sun); low water consumption trees and shrubs; compatibility with adjacent frontage landscaping; and adequate visibility for transit users and bus operators.

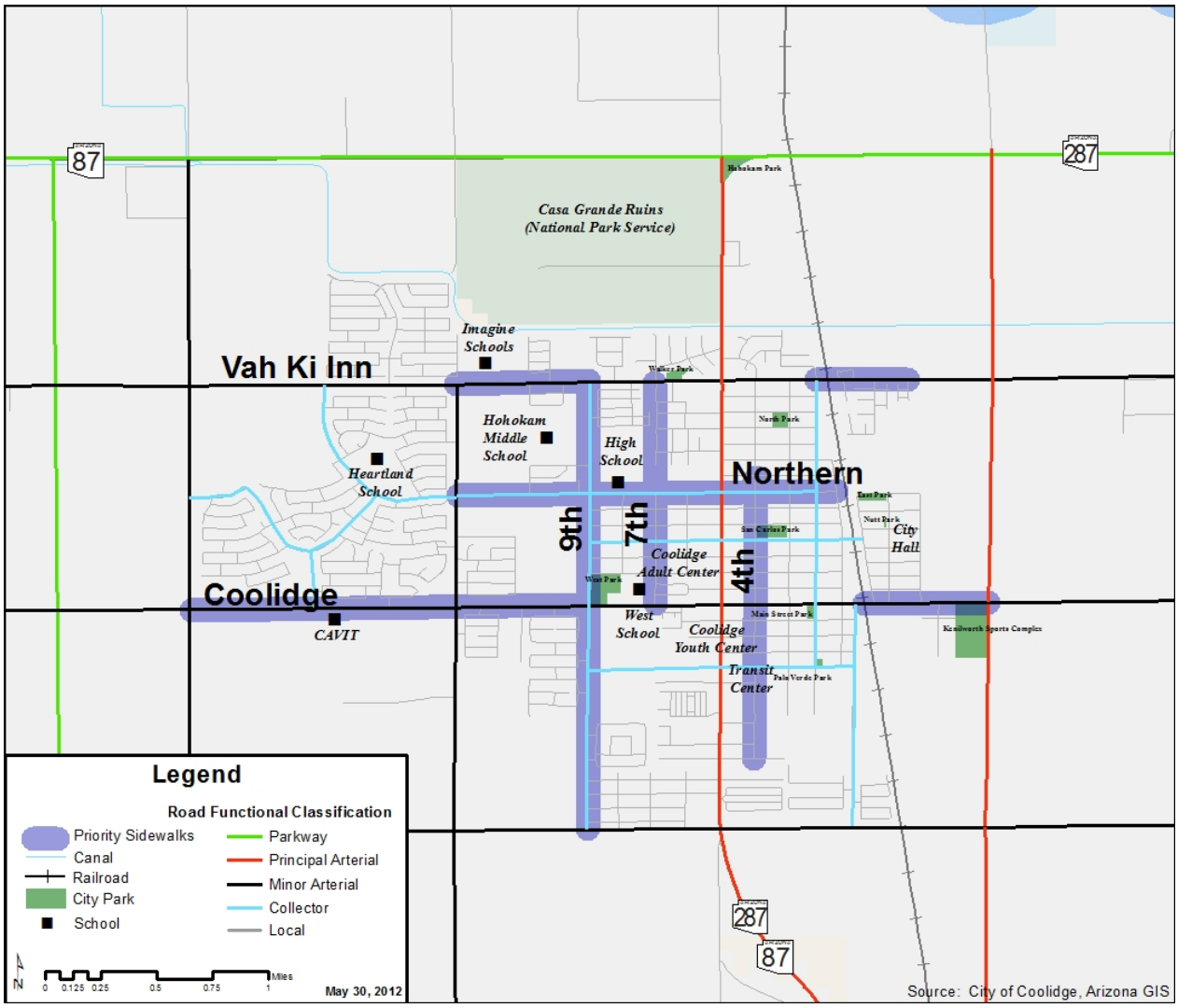
Submittal Requirements and Review Procedures

Preliminary site plans or preliminary plat submittals to the City should delineate transit facilities, including: transfer centers, bus stops, park-and-ride lots, bus bays, shelters, and benches. During the development approval process, the design and location of such facilities are to be approved by staff.

Bicycle/Pedestrian

The City of Coolidge has an extensive local roadway network, and a developing collector and arterial network. Developing a network of sidewalks and paths within the community provides opportunities to walk or ride to a near-by destination instead of driving. Additionally, connecting key nodes in the City, such as schools, parks, and commercial centers are of utmost importance. The grid street pattern found in Coolidge helps to promote pedestrian mobility; however many of the existing roadways do not have sidewalks for pedestrians. The roadway cross sections included herein, when implemented, will provide a safe system of paths and detached walkways for non-motorized use. Within the built environment of Coolidge, there are key corridors that should be improved to provide existing Coolidge residents, transit riders and activity center patrons safe corridors for pedestrian mobility. Figure 17 below shows the corridors where sidewalks should be constructed or continued as a priority.

Figure 17: Priority Pedestrian Improvement Corridors



Detached Sidewalks

Figure 18: Detached Sidewalk Layout

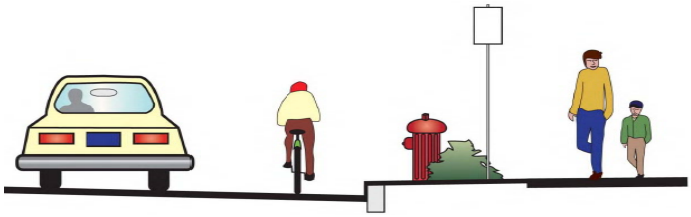


Figure 18 to the right shows a detached sidewalk with a defined curb and gutter, buffer zone, and sidewalk. Signs and other utilities are located in the buffer zone or in the area adjacent to the sidewalk so that pedestrians have a clear walking path along the sidewalk. This provides a defined zone or area to place items such as street signs, fire hydrants, light poles, street furnishings, utilities and greenery all while leaving the sidewalk free and clear of obstacles. This area can also be useful for future construction projects and updates since it is unlikely that additional right-of-way will be needed.

A five-foot paved shoulder services the bicycle traffic and also provides an additional buffer between the pedestrians and the vehicles along the roadway. Detaching the sidewalk and path from the curb and gutter can offer several advantages, including:

- Increased safety for the pedestrian;
- Lower cost for maintenance since the sidewalk and curb/gutter are not monolithic;
- Pedestrians would potentially not be impacted by roadway and curb/gutter maintenance activities;
- Improved ability to maintain sidewalk use during maintenance activities; and
- Improved ADA accessibility, particularly during roadway maintenance activities.

Pedestrian Comfort:

Utility placement and pedestrian comfort go hand and hand. Comfort for the pedestrian is very important and should not be overlooked since it ultimately is the determining factor if sidewalks are used or not. Other factors such as sidewalk width, proximity to a building or fence, obstructions, and aesthetics all come into play for the comfort of pedestrians.

Safety:

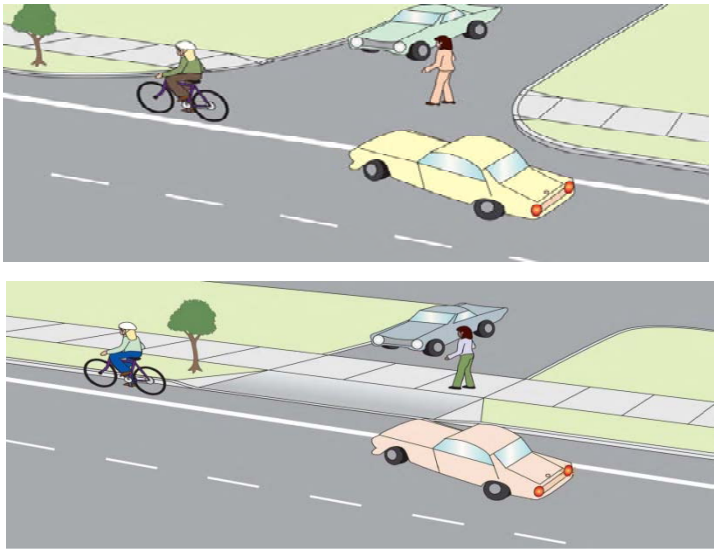
From Federal Highway Administration (FHWA) "Safety Benefits of Walkways, Sidewalks, and Paved Shoulders":

> *Annually, around 4,500 pedestrians are killed in traffic crashes with motor vehicles in the United States. Pedestrians killed while "walking along the roadway" account for almost 8 percent of these deaths. Many of these tragedies are preventable. Providing walkways separated from the travel lanes could help to prevent up to 88 percent of these "walking along roadway crashes."*

Walkways are defined by FHWA as either sidewalks or wide paved shoulders. Sidewalks with a curb and gutter provide an additional barrier between the motor vehicle and pedestrian, and the detached sidewalk provides the greatest safety since there is a buffer zone that the motor vehicle would have to go through before hitting the pedestrian.

Driveways are the source of most conflicts with motor vehicles on sidewalks. Figure 19 illustrates two options on how to construct a driveway, as either a road intersection (top picture) or a driveway (bottom picture). Designing the driveway as an intersection promotes cars traveling at greater speeds, and cross slopes for sidewalks are ignored. Designing the driveway as a driveway continues the sidewalk across the entire length of the driveway and facilitates the pedestrian and stays in accordance with Americans with Disabilities Act (ADA) requirements.

Figure 19: Driveway as a Road Intersection or as a Driveway



Prioritization Criteria

As pedestrian and bicycle improvements are contemplated for the built environment of Coolidge, the improvements will need to be prioritized due to funding constraints. Below is a list of suggested criteria to consider when prioritizing bicycle and pedestrian improvements:

Speed: The higher the traffic speeds are the more critical it is to provide pedestrian safety.

Street Classification: Arterial streets usually move higher volumes of traffic than collectors, so higher priority should be given to major arterial roads.

Crash Data: If there is crash data, it may be helpful to find a trend of where crashes occur. But note that, crashes do not typically occur always at one particular location, but rather in a general area or street, so sidewalk improvements should be continuous not point repairs.

School Walking Zones: It is important to provide access to safe walking zones particular to children. Many children may walk to and from school, so sidewalks should be continued into the surrounding neighborhoods.

Transit Routes: Transit patrons walk to their transit stops; therefore, providing walking options can increase the ease of using transit, thus increasing ridership. Additionally, it is important to provide for the disabled, since disabled persons typically rely on public transit more than the general populous. Special consideration should be paid to adding accessible ramps at bus stops and making shelters accessible.

Neighborhoods with Low Vehicle Ownership: If this information is available it may be helpful in determining prioritization.

Neighborhood Commercial Areas: Walking is a viable form of transportation that is overlooked. Sidewalks that are desirable to walk on can increase walking as a form of transportation for short trips.

Other Pedestrian Generators: Parks, recreation centers, churches, and hospitals all generate pedestrian activity. Areas with these features should be of consideration.

Missing Links: Sometimes sidewalks are installed in critical areas, but right outside of those areas sidewalks are missing. These discontinuous sidewalks can cause pedestrians to walk into the street, or worse leave those with disabilities needing to back track since ramps are not available.

Neighborhood Priorities: Even if there is no commercial activity, people tend to enjoy walking whether it is to a friend's house or for recreation. Many times citizens will speak up if they need a sidewalk in their neighborhood.

Multi-use Paths

Multi-use paths serve multiple users including pedestrians and bicyclists. They are generally 10-feet wide. Similar to sidewalks that cross over railroad crossings, paths also have limitations and design concerns at rail crossings, as described below.

Complete Streets: Integrating multi-modal elements in a community's transportation system is critical for the ultimate success of achieving community mobility. The movement of "Complete Streets" has been in motion for several years. Complete Streets are designed to serve everyone – pedestrians, bicyclists, transit riders and drivers. Complete Streets in communities improve safety and mobility for all regardless of age or special needs.

Canals: Land adjacent to canals is a great resource for a larger community or regional trail system. An added benefit of locating a multi-use path adjacent to a canal is the immediate water access which can be rare to find in Arizona. There are several canals that cross through Coolidge. A 10- to 15-foot multi-use path adjacent to each of these canals would provide an excellent regional trail system.

Railroad Crossings: Railroad crossings can be dangerous for pedestrians, bicyclists, and especially wheelchair dependent pedestrians. There are several methods to reduce this hazard including approach treatments, signage, crosswalk design, additional warning mechanisms, and materials.

Phased Implementation

The results of this LRTP recommend that future arterial roadways be designed and built to an interim design standard when adjacent development is not anticipated to occur in the near future (Figures 20 and 21). This interim configuration should allow for an easier transition to the complete build-out design and construction in the future while maintaining safe mobility for all modes. This transitional arterial also solidifies access management expectations, and protects the integrity and capacity of the planned transportation system. This Transitional Arterial typical roadway section can utilize the existing 66-feet of easement prescribed through Arizona State Statutes. It also allows the City and area developers to work together to extend improvements further along arterial corridors. It will maximize private and public transportation investments without creating additional expenses to the development community for initial improvements and without additional expense to the City for ultimate arterial roadway construction or maintenance activities.

Figure 20: Transitional Arterial

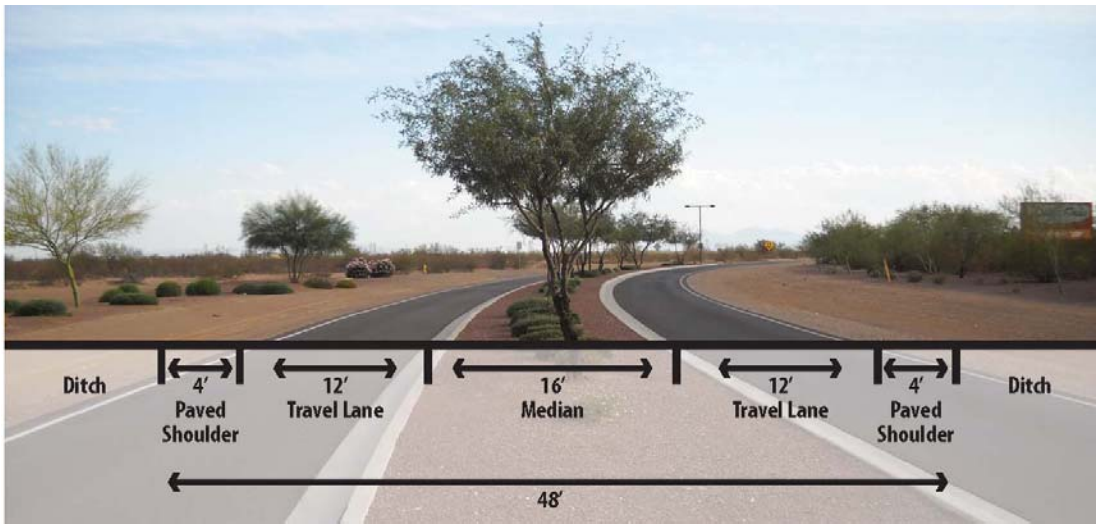
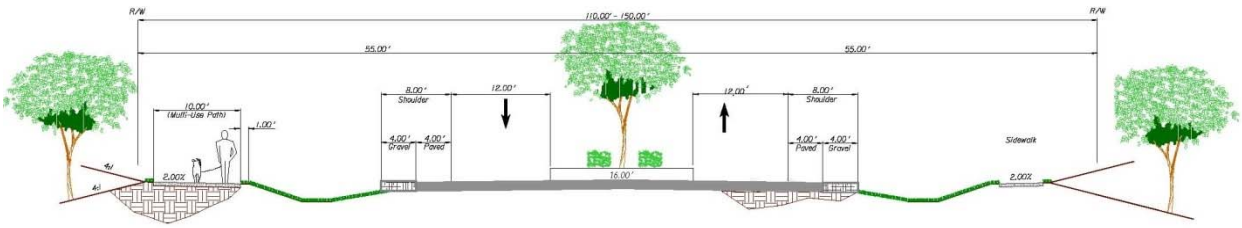


Figure 21: Transitional Arterial Typical Section



Implementation

The development of a long-range transportation plan is paramount in planning for a community's long-term growth. A LRTP identifies all regionally significant projects including transportation projects, private development, institutional development and capital improvements that will have an effect on the transportation network. Keeping the Transportation Plan updated is important in maintaining a high quality of life, including traffic congestion concerns, multimodal transportation options, and safety. The transportation system in this Plan provides for and supports local and regional travel demand, enhances economic development opportunities and embraces the provision of safe multimodal transportation. The projects and programs identified in this Transportation Plan may be completed in the near-term or may be completed beyond 20 years, as local and regional development occurs.

The Coolidge Comprehensive Transportation Feasibility Study includes several key findings:

1. The functionality of an arterial roadway network is paramount in the success of facilitating local and regional travel while supporting economic development. It must work as a system of auto, transit, bicycle and pedestrian facilities to maintain a functioning transportation system.
2. The hierarchical system of functionally classified roadways must be maintained to support local and regional travel demand needs and desires. The functional classifications identified in this Transportation Plan relate to the future system as it is built-out. As Coolidge continues to grow, close coordination with the Arizona Department of Transportation is required to ensure that the Federal functional classifications are consistent with roadway use and demand so Federal funding can be accessed.
3. The parkway and arterial roadway network integrity must be protected and preserved to ensure that the system will be long lasting and functional for existing residents, business owners and patrons, while maintaining the ability to service future investment interests.
4. The design of roadways should accommodate all users. This Transportation Plan establishes the multimodal transportation direction in Coolidge, including bus, bicycles, and pedestrians. These alternative transportation modal investments are critical for a sustainable transportation system in Coolidge.
5. The public transit system should be simplified with frequent, predictable and reliable service. The transit stops, centers, park-n-ride locations and stations should be easily accessible for pedestrians and bicyclists. Seamless connectivity between the stops and surrounding development should be safe and accommodating to pedestrians and transit patrons to enhance the transit experience. Successful transit is a core component of a stable economic program to serve not only social service needs, but support and promote employer

needs. Successful transit requires continued system investments that integrate transit into the framework of a community so as roads are improved, as developments are constructed and as new employment centers are attracted, transit can be a viable means of transportation for those patrons, visitors and employees.

6. The built environment of Coolidge has several pedestrian and bicycle accommodation needs. Key corridor improvements are identified in this Transportation Plan that will provide for and facilitate safe bicycle and pedestrian travel. The roadway cross sections associated with this Transportation Plan will provide for safe bicycle and pedestrian accommodation.
7. Paramount to the implementation of this plan is the fiscal reality that improving and expanding the transportation system requires additional funding beyond the current funding available for transportation improvements. Additional funding mechanisms and partnerships should be examined for transportation system development and implementation.
8. As development occurs, and transportation system demand increases, the use of an interim design strategy that provides for a phased implementation approach will allow Coolidge to establish arterial corridors with appropriate access management provisions. This recommended approach will make final system build out both less complicated and less costly to the City in terms of interim maintenance activity and ultimate construction costs.
9. Coordination and mutual support among the many governmental bodies and agencies that represent the Coolidge study area provide increased opportunities for implementation success. This study emphasizes the need to work together and coordinate activities in a systematic and mutually beneficial manner.

Project List

Several items were identified outside of the scope of this Plan effort. The studies listed in Table 7 should be considered by the City to better identify corridor needs, conceptual designs and multimodal needs based on the recommendations included in this Study.

Table 7: Future Study Recommendations

Future Study	Description	Responsibility	Notes
Kleck Parkway Corridor Study	Corridor study to determine conceptual alignment, preliminary right-of-way requirements, conceptual interchange layouts and planning and environmental linkages (PEL) assessment.	City of Coolidge, Pinal County, ADOT	Potential funding sources could include ADOT PARA program and Pinal County Regionally Significant Routes program.
McCartney Road Corridor Study	Corridor study to determine conceptual alignment, preliminary right-of-way requirements, conceptual interchange layouts and planning and environmental linkages (PEL) assessment.	City of Coolidge, Pinal County, ADOT	Potential funding sources could include ADOT PARA program and Pinal County Regionally Significant Routes program.
Eleven Mile Corner Corridor and Interchange Study	Corridor study to determine conceptual alignment, preliminary right-of-way requirements, conceptual interchange layouts and planning and environmental linkages (PEL) assessment.	City of Coolidge, Pinal County, ADOT	Potential funding sources could include ADOT PARA program and Pinal County Regionally Significant Routes program.
Signal Peak Road Corridor Study	Corridor study to determine conceptual alignment, preliminary right-of-way requirements, conceptual interchange layouts and planning and environmental linkages (PEL) assessment.	City of Coolidge, Pinal County, ADOT	Potential funding sources could include ADOT PARA program and Pinal County Regionally Significant Routes program.
North-South Detailed Access/Interchange Study	Detailed evaluation to identify interchange locations based on refined travel demand needs once a regional travel demand model is developed for the region.	City of Coolidge, Pinal County, ADOT, CAAG	Potential funding sources could include ADOT PARA program and Pinal County Regionally Significant Routes program.

Future Study	Description	Responsibility	Notes
North-South Freeway Park-n-Ride Location Study	Park-n-Ride assessment to identify potential locations for future park-n-Rides. Findings from the North/South Corridor Study and the Intercity Rail Study will help to identify needs.	City of Coolidge, Pinal County, ADOT	Potential funding sources could include ADOT SPR funds.
Arizona Boulevard Transit Study	Corridor study to determine development and refinement of the existing transit system in Coolidge to a linear based system.	City of Coolidge, Pinal County, ADOT	Potential funding sources could include ADOT PARA program and ADOT Transit Program.
Regional Master Drainage Plan	Area study to determine master drainage ways to establish roadway storm sewer plan, a potential linear park plan and associated trail plan.	City of Coolidge	City of Coolidge

System Implementation Costs

There is a monumental gap in funding that the City of Coolidge will need to overcome as the needs for system improvements increases. Pinal County and ADOT have limited planning, engineering design and construction funding, associated with CAAG regional funding. Additionally, the improvements associated with regional mobility needs will need to be balanced so to maintain the need for regional improvements such as the North/South Freeway.

Planning level construction costs associated with system implementation are summarized in Table 8. The costs listed in Table 8 are for the roadway construction improvements only and do not include right-of-way, utilities, traffic control, major drainage, extensive grading or other location specific costs. Potential additional costs associated with corridor transportation improvement projects could include:

- Traffic Signals: $150,000 (interim) - $300,000 (ultimate)
- Roundabouts: $150,000 - $200,000
- Major Power Utility Corridors: $250,000 per pole, 3 poles minimum

The interim costs included in Table 8 reflect the costs associated with implementing the Transitional Arterial section, which is applicable to both arterials and parkways. The total cost shown is based on the phased improvement strategy outlined in this Plan.

Table 8: Planning Level Construction Costs

Improvement/Corridor	From	To	Distance (mi)	Interim Cost ($000's)	Cost ($000's)
Parkways					
Eleven Mile Corner Road	SR-87	Florence Blvd	8.5	$11,985	$50,100
Kleck Parkway	I-10	SR-79	23.4	$32,994	$138,100
Principal Arterials					
Overfield Road	McCartney Road	Florence Blvd	4.0	$5,640	$22,800
Signal Peak Road	SR-87	Florence Blvd	9.1	$12,831	$51,900
Christensen Road	SR-287	Steele	8.8	$12,408	$50,200
Attaway Road	SR-287	Steele	8.5	$11,985	$48,500
McCartney Road	I-10	SR-79	23.9	$33,699	$136,200
Minor Arterials					
Toltec Buttes Road	Woodruff Road	Florence Blvd	5.4	$7,614	$28,600
Curry Road	Signal Peak Road	Florence Blvd	7.3	$10,293	$38,700
Tweedy Road	Woodruff/Martin	Florence Blvd	5.8	$8,178	$30,700
Skousen Road	SR-87	Bartlett Road	4.0	$5,640	$21,200
Kenworthy Road	Vah Ki Inn Road	McCartney Road	3.5	$4,935	$18,600
Sunshine Road	Bartlett Road	Florence Blvd	4.5	$6,345	$23,900
La Palma Road	Bartlett Road	Florence Blvd	4.5	$6,345	$23,900
Nafziger Road	SR-287	Steele	8.8	$12,408	$46,600
Clemens Road	SR-287	Bartlett Road	4.0	$5,640	$21,200
Vah Ki Inn Road	Macrae Road	Clemens Road	7.0	$9,870	$37,100
Coolidge Avenue	Macrae Road	SR-79	13.3	$18,753	$70,500
Val Vista Avenue	Signal Peak Road	Macrae Road	1.8	$2,538	$9,600
Woodruff/Martin	Overfield Road	SR-79	18.8	$26,508	$99,600
Bartlett Road	Tweedy Road	Clemens Road	7.5	$10,575	$39,800
Storey Road	West of I-10	SR-79	20.4	$28,764	$108,100
Interchanges					Cost (Each)
SR-87 / Signal Peak Road					$20,000
SR-87 / Eleven Mile Corner Road					$20,000
McCartney Road / Signal Peak Road					$21,000
McCartney Road / Eleven Mile Corner Road					$20-30,000
I/10 / Kleck Parkway					$25-50,000
Kleck Parkway / Signal Peak Road					$20-30,000
Kleck Parkway / Eleven Mile Corner Road					$20-30,000
Kleck Parkway / SR-87					$20-30,000
New North-South Freeway	SR-287; Vah Ki Inn Rd; Martin Rd; McCartney Rd;Kleck Pkwy; Steele Rd				$25-40,000
Priority Sidewalks / Multi-use Paths					Cost
Vah Ki Inn Road					$270
Northern Avenue					$450
Coolidge Avenue					$600
4th Street					$390
7th Street					$300
9th Street					$600
				Total: (low/high)	**$1,434,510 / $1,589,510**

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