City of Apache Junction, Arizona

Small Area Transportation Study

Project No. 0207970

Final Report

KIRKHAM MICHAEL
CONSULTING ENGINEERS

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CITY OF APACHE JUNCTION
ARIZONA

CITY OF APACHE JUNCTION

SMALL AREA TRANSPORTATION STUDY

FINAL REPORT

PREPARED FOR:
CITY OF APACHE JUNCTION
PUBLIC WORKS DEPARTMENT

PREPARED BY:
KIRKHAM MICHAEL CONSULTING ENGINEERS
9201 N. 25TH AVENUE, SUITE 150
PHOENIX, ARIZONA 85021
(602) 944-6564

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

LIST OF APPENDICES

1.0 EXECUTIVE SUMMARY

The purpose of this study is to develop a comprehensive multi-modal transportation plan that meets the current and future transportation needs of the rapidly growing community of Apache Junction. This study documents the transportation vision and goals that will help manage the upcoming growth.

The City of Apache Junction is located on the eastern edge of the Phoenix Metropolitan area in Pinal County, Arizona. The City attracts a significant amount of tourist population in the winter months due to the weather and the natural allures of the Goldfield & Superstition Mountains, Canyon Lake, and Apache Lake. In the winter season alone, the City has been known to increase to 70,000+ total residents, of which over half are seasonal. The City's incorporated area covers approximately 36 square miles of land. 60% of that land is currently vacant. The City has currently made an application to the State Land Department to annex a large portion of land from Elliot Road south to Ray Road and Meridian Road east to Barkley Road. This 18 square mile growth aids in expanding the City limits to approximately 54 square miles. It is important to note that an increase in residential and commercial available land means an increase in future population. Based on U.S. Census Bureau data, the population of the City is currently 34,400 residents, which is nearly double the 1990 population of 18,100. It is estimated from future socioeconomic data gathered from the Maricopa Association of Governments (MAG), that by the year 2030, there could be approximately 250,000 total residents.

The City of Apache Junction is responsible for all of the city roadways while the Arizona Department of Transportation is responsible for State Route 88 (Apache Trail/Idaho Road), Superstition Freeway (US 60), US 60 south of Goldfield Road and the potential US 60 re-alignment.

Roadway and right-of-way data was collected during a field visit to the study area. Right of way varies from 66 feet to 300 feet for all arterials.

The City of Apache Junction collected roadway segment approach traffic counts in 2002. Counts were separated by seasonal months to obtain the most accurate existing volumes. The rationale behind separating counts by seasonal months include:

- ✧ The winter season begins in mid-October and ends in mid-April
- ✧ Traffic volumes typically increase two-fold and
- ✧ Population typically doubles from 34,400 to 70,000 or more residents.

Accident records were collected from the Arizona Department of Transportation (ADOT) and the City of Apache Junction. Records were analyzed based on type, frequency and injuries/fatalities within the accident report. KM assumed arterial intersections and arterial segments in excess of 9 total accidents within a three-year period were of concern.

Before future conditions could be modeled, a future network for the roads south of Baseline road had to be determined. The new roadways provide interconnection opportunity between the City of Apache Junction, Gold Canyon and the City of Mesa.

The City of Apache Junction wanted to differentiate itself from other cities as well as accommodate environmental planning practices used by the Maricopa County Flood Control District (MCFCD). In determining the new roadway alignments south of Baseline Road and east of Ironwood Road, the City choose to introduce radial alignments that would allow the roadways to follow the existing washes. Following the flow of natural drainage patterns promote overall drainage, open space, linear park usage, and assist in limiting the bridge structures needed to cross the washes. The new alignments would also be able to connect to the potential realignment of US 60 and a majority of Gold Canyon area.

The Apache Junction/Coolidge Corridor was introduced into the study area though the Southeast Maricopa/Northern Pinal County Area Transportation Study, 2003. The study recommends constructing the 36-mile north-south freeway to ease congestion on southbound I-10 and to provide access to Pinal County and Casa Grande. The freeway would connect the Superstition Freeway (US 60) to I-10, I-8 or both. The Southeast Maricopa/Northern Pinal County Area Transportation Study established the Apache Junction/Coolidge Corridor and Superstition Freeway (US 60) interchange at Ironwood Road. However, the Superstition Freeway (US 60) interchange at Ironwood Road is currently at full build-out and the Ironwood Road alignment corridor is experiencing a tremendous amount of commercial and residential development. Therefore, establishing the freeway along Ironwood Road would not be feasible.

Providing a system interchange at the intersection of two freeways is often necessary to keep vehicles flowing freely at a high rate of speed. The fact that a high-speed interchange cannot be constructed at the Superstition Freeway (US 60) interchange at Ironwood Road further verifies the validity of moving the alignment to a more preferred location. The Idaho Road (SR 88) alignment south of the Superstition Freeway (US 60) has not yet been constructed nor developed. As a result, the future Idaho Road corridor to the south is better equipped for reserving future right-of-way for the proposed Apache Junction/Coolidge Corridor.

For purposes of this study, it is assumed that the proposed Apache Junction/Coolidge Corridor will be constructed in phases with the initial phase including a single point urban interchange with a six-lane principal arterial to the south. Once funding of the freeway system is approved, studies will be undertaken to construct a system interchange at the intersection of Idaho Road and the Superstition Freeway (US 60) and upgrade the principal arterial to freeway classification.

Once the future roadway network was established, the TransCAD model was prepared using the existing data collected by the City of Apache Junction and MAG. TransCAD

modeling was performed by Lima & Associates. A separate modeling report provided by Lima & Associates can be found in Appendix B.

The year 2003 transportation network and estimated 2002 socioeconomic data along with the MAG model network and socioeconomic data were used for the base 2030 TransCAD analysis. It is important to note that the study area for the TransCAD modeling also includes some population, dwelling and employment information from both the City of Mesa and Pinal County. The base analysis assumed signalization at all intersections and 4-lane roadway configurations. It should be noted that a traffic signal warrant analysis should be completed prior to any future signal installation.

With growth in the area increasing to an approximate population of 250,000 residents by the year 2030, many of the existing and proposed roadways modeled using the base network as described above will require improvements. Since the base network is already improved per traffic control, roadway widening is the final opportunity to ensure acceptable traffic flow during the planning process.

A potential realignment of US 60 through the Gold Canyon area is currently being planned under an ADOT project. The purpose would be to move the majority of through traffic outside of the rapidly developing Gold Canyon Area. A significant amount of commercial growth is expected along the potential realignment once construction is complete as a substantial amount of land surrounding the freeway will be available for development. The realignment, whether built or not, will affect the City of Apache Junction's future development and roadway improvement plans.

The City of Apache Junction is currently working on a Transit Feasibility Study in which future transit issues will be addressed. Based on the recently released 2003 Regional Transit System Study, completed by Valley Metro, there will be transit services extended into the Apache Junction area at a time when services are warranted.

The City of Apache Junction is currently not served by Valley Metro or Pinal County transit services. Taxi services, Greyhound bus services, and Sky Harbor Airport shuttle services (SuperShuttle) are the only three major transit services available for community residents. The Apache Junction Senior Center does offer transportation for senior citizens or disabled citizens to/from the senior center and to/from medical appointments.

Alternatives for both fixed route and paratransit service were analyzed. Recommended service alternatives include:

- ✧ Fixed Route Bus System
- ✧ Dial-A-Ride Service
- ✧ Reserve-A-Ride Service
- ✧ TRIP: Transportation Reimbursement and Information Program
- ✧ Cab Connection
- ✧ Point Deviation Service
- ✧ User Side Subsidy

- ✧ Rideshare (Carpool/Vanpool)
- ✧ Light Rail (Rapid Transit)

A public transit starter system may be needed by 2007, especially with the population increasing at 8% to 10% per year. Because a long-term commitment will depend on demonstrated demand, a "bare bones" system could be implemented on a trial basis for two to three years. Initially, a single fixed route and dial-a-ride van route would operate on weekdays during regular business hours. These hours would enable transit dependent persons to make employment, medical, social service or shopping trips. The proposed starter system would extend and complement the current Valley Metro system until a full system can be put in place.

As the population of Apache Junction increases, transit service can be increased to meet demand. Establishing transit centers, park and ride facilities and telecommuter centers could provide a focal point for transit service and assist in the continuing coordination between local and regional transit services between cities and counties.

Marketing for transit is a distinctive specialization that requires not only marketing "know how" but also expertise in transportation planning. Traditionally, public transportation agencies have marketed transit services directly to riders and potential riders. In recent years, transit agencies, and even regional planning agencies, have directed more of their marketing efforts toward businesses to counteract declining market share. The key responsibility of transportation marketing is to develop effective programs to enhance and maintain demand for the product. A strong marketing program integrates the mission of the transit agency, the targeted population, the services provided, cost savings, and the appropriate means for information distribution and service promotion. It is suggested that a public research firm be retained to implement all publicity, marketing materials and programs.

The success of this report and planning effort is dependent upon the implementation of the plan from this point on. It is critical that the plan is put into action through a comprehensive strategic implementation program. The City's role in implementing the plan is to provide direction to private and public sector development and investment. There are several ways of collecting and implementing funding for the program, they include:

- ✧ Surface Transportation Program (STP)
- ✧ Highway Users Revenue Fund (HURF)
- ✧ Local Transportation Assistance Fund (LTAF)
- ✧ Pinal County Transportation Excise Tax
- ✧ Pinal County Sales Tax
- ✧ Transportation Improvement Districts
- ✧ County Assistance Fund (Lottery)
- ✧ Methods of private/public involvement
- ✧ Developer contributions, mainly impact fees

The City of Apache Junction will determine the strategic plan of action and project implementation schedule at a later date. It is estimated that the improvement costs including the addition of new roadways and freeways could amount to $850 Million. It is assumed that the Arizona Department of Transportation would construct and improve the existing and future freeways, which indicate that the City of Apache Junction would need approximately $250 Million for all new and improved construction.

The City of Apache Junction policies and guidelines were reviewed for the insertion of Traffic Impact Analysis guidelines, landscape/hardscape guidelines and additional roadway functional classifications. All new development within the City of Apache Junction will be required to follow the Traffic Impact Analysis (TIA) Guidelines in the MCDOT Roadway Design Manual, 1993. All new or improved roadways within the City of Apache Junction will be required to follow the landscape and hardscape guidelines in the MCDOT Roadway Design Manual, 1993. A copy of the MCDOT TIA and Landscape Guidelines are located in Appendix E and F. Roadway design functional classifications were discussed and defined with the addition of Principal Arterial, Parkway and Freeway. Since the proposed roadways south of Baseline Road no longer follow a section line structure, the Section Line and Mid-Section Line cross sections were renamed to Major Arterial and Minor Arterial, respectively.

2.0 INTRODUCTION

This report represents the process involved in the development of a Small Area Transportation Study for the City of Apache Junction, Arizona.

2.1 Background

The City of Apache Junction is located on the eastern edge of the Phoenix Metropolitan Area in Pinal County, Arizona. Exhibit 1 illustrates the City of Apache Junction city limits and vicinity map. The proximity to the fast growing Phoenix Metropolitan Area and availability of large amounts of vacant land has resulted in rapid growth of this City. The City's incorporated area covers approximately 36 square miles of land. Of that land, approximately 40% is developed and 60% is vacant. Per the U.S. Census Bureau, the population of the city has nearly doubled from 18,100 in 1990 to 34,400 persons in July of 2003.

The City of Apache Junction serves primarily as a tourism hub. The City attracts a significant amount of tourist population in the winter months due to the weather and natural allures of the Goldfield & Superstition Mountains, Canyon Lake, and Apache Lake. Because of the Apache Junction attractions, the population has been known to increase to 70,000 residents during the winter. This indicates that approximately 35,000 visiting residents reside in the Apache Junction area during the winter season, which begins in mid-October and ends in mid-April.

The rapid growth of the City and the influx of visitors especially during the winter months are having an impact on the transportation infrastructure. Recognizing this immediate and long-term need for improving the transportation infrastructure, the City of Apache Junction and Arizona Department of Transportation (ADOT) initiated a Small Area Transportation Study for Apache Junction by signing the Inter-Governmental Agreement (IGA) on January 30, 2002. The City contracted with Kirkham Michael Consulting Engineers (KM) to conduct this study under the supervision of a Technical Advisory Committee (TAC) that included representatives from the City of Apache Junction, ADOT, Pinal County, Maricopa County Flood Control District (MCFCD), Arizona State Land Department, Central Arizona Association of Governments (CAAG) and Maricopa Association of Governments (MAG).

2.2 Purpose

The purpose of this study is to develop a comprehensive multi-modal transportation plan that meets the current and future transportation needs of this rapidly growing community. The study documents the transportation vision and goals for the community, existing conditions, future conditions, roadway improvements, public transit needs, funding sources, program implementation along with the necessary policies and guidelines that will help manage the up and coming growth.

2.3 Study Area Characteristics

The City of Apache Junction covers approximately 36 square-miles in Pinal County, which is the Upper Sonoran Desert in Central Arizona. The City of Apache Junction is surrounded by the City of Mesa to the west, Goldfield Mountains to the north, Superstition Mountains to the east and vacant land to the south. The population in 1990 was 18,100 residents. The population now as of July 2003 is approximately 34,400 residents and growing. This study takes into account the vacant land to the south. Currently, The City of Apache Junction has made an application to the State Land Department to annex the land from Elliot Road & Meridian Road south to Ray Road & US 60. This 18 square mile increase will lead to a total City of Apache Junction area of 54 square miles.

2.4 Report Organization

The report is organized in seven chapters as follows:

- ***Executive Summary*** – Presents a comprehensive glance at the contents of the entire report including recommendations.
- ***Introduction*** – Presents background information on Apache Junction and the purpose of conducting this study.
- ***Existing Conditions Analysis*** – Describes the current transportation infrastructure and its condition in the Apache Junction area.
- ***Transportation Vision, Issues, Goals and Policies*** – Documents key transportation issues and outlines proposed goals and policies to address these issues.
- ***Future Conditions Analysis*** – Presents traffic volume projections for year 2030, identifies roadway deficiencies, and recommends a roadway improvement plan on the new network.
- ***Public Transit*** – Presents a conceptual transit plan for the City.
- ***Implementation Program*** – Identifies the funding sources and methods for implementing the recommended roadway improvement plan over the next 20 years.
- ***Policies and Guidelines*** – Sets forth guidelines for traffic impact analysis, roadway design by functional classification along with landscape and hardscape design.

2.5 Previous Plans & Studies

There have been transportation and transit studies conducted for Apache Junction and Pinal County through the years. Documents reviewed during the preparation of Apache Junction Small Area Transportation Study are as follows:

- City of Apache Junction General Plan, 1999
- Apache Junction Transportation/Transit Studies, Final Report, Parsons Brinckerhoff, September 1988

- ✧ Southeast Maricopa/Northern Pinal County Area Transportation Study, Final Report Summary, November 2003

2.6 Community Involvement

Community involvement was of significant value to this study. It ensured opportunity of meaningful community input and inspired broad-based citizen participation and understanding of the study process. The following summarizes the primary components of community participation.

2.6.1 Transportation Advisory Committee

The Transportation Advisory Committee (TAC) was created to keep each representative's agency or group informed of the planning process and to bring appropriate issues to the attention of the Project Team. These meetings were conducted three (3) times during the length of the project to provide general direction during the planning process. Meeting Minutes are attached in Appendix C. The TAC team was comprised of committee and advisory members.

Committee members include:

- ✧ City of Apache Junction Public Works
  - Ron Grittman
- ✧ Arizona Department of Transportation (ADOT)
  - Al Kattan
  - Carol Slaker
- ✧ Central Arizona Association of Governments (CAAG)
  - Bill Liester
- ✧ Maricopa Association of Governments (MAG)
  - Roger Herzog
  - Ken Hall
- ✧ Pinal County Planning Department
  - Bonnie Bariola
- ✧ Pinal County Engineering Department
  - Garry Jaggers

Advisory members include:

- ✧ Arizona State Land Department (ASLD)
  - Victoria Carella
- ✧ Maricopa County Flood Control District (MCFCD)
  - Felicia Terry

2.6.2 Community Public Meetings

The project team conducted one public meeting on February 11, 2004 to determine local perception regarding community issues and to receive comments on key concerns within the study area. Notices were constructed on the City of Apache

Junction website, sent to the local newspapers, and mailers were sent to an array of people in the community.

The meeting was in open house format. The City, Kirkham Michael and Lima & Associates, to explain the project and answer any questions, gave a PowerPoint presentation. The public was free to look through nine display boards that presented the study area, existing conditions, future recommendations, typical sections and concurrent transit study.

6 people, primarily from the Gold Canyon area, attended the meeting. There were no comment cards turned in.

Copies of handout, advertisement and comment cards are contained in Appendix D.

3.0 TRANSPORTATION VISION, ISSUES, GOALS AND POLICIES

The vision and goals from the City of Apache Junction General Plan 1999 were reviewed and discussed as to whether further amendments needed to be added. It was determined that the vision and goals specified in the 1999 plan are acceptable for use in this study.

3.1 The City of Apache Junction Vision Statement

> "The people of Apache Junction envision their future community as a distinctive place that is unique in its friendliness, attractive and livable to its residents, and welcoming to its visitors. An attractive City image will result from planned improvements such as a unified downtown activity center, transportation improvements, conservation of water, wildlife habitats and other natural resources. A citizen-driven Plan calls for a balance of elements that emphasizes outdoor living enjoyment and the ability for all people to live, work and play in a wholesome, vital and secure environment."
>
> - City of Apache Junction General Plan, 1999

3.2 Fundamentals, Goals & Policies

Apache Junction's street network must be designed to provide safe scenic roadways as well as safe bicycle, equestrian and pedestrian routes while maintaining traffic flow through the peak season when population exceeds 70,000. This process can be maintained by following the circulation element section recommended in the Apache Junction General Plan, 1999. A simplified version of the fundamentals, goals and policies directly from the Circulation Element section are listed below.

3.3 Transportation Planning Fundamentals

3.3.1 Master Street Plan Development

Indications from traffic counts demonstrate that the City should develop a Master Street Plan, with corresponding Capital Improvement Program funding that responds to Apache Junction's unique traffic demand patterns.

3.3.2 Internal Circulation Improvement

Roadway redesign & redevelopment is being advocated by the City of Apache Junction to improve traffic flow balance throughout the downtown area. The City's plans include modifying Apache Trail, from Ironwood Road through the downtown "Y" area, for slower traffic speeds, improved retail access and including pedestrian convenient walkways as well using methods of traffic calming techniques on the surrounding residential streets to ensure limited congestion in neighborhoods and reserving future right-of-way for widening improvements as needed. The City would

prefer this redesign to occur before build out of the area, as traffic flow is likely to worsen.

3.3.3 Transportation Connections

New Interchanges on US 60 are suggested as means to keep pace with population and trip generation increases as well as to improve access for economic development. The City of Apache Junction is proposing new US 60 interchanges at Meridian Road as well as along the potential realignment of US 60 at Baseline Road, Elliot Road, Warner Road and Ray Road. Continued traffic monitoring is advocated, particularly regarding recreational vehicle through trips and peak season driving patterns, to help the City prioritize needs for traffic flow alternatives. Regional transit linkages and Rapid Transit (BRT/LRT) could add significantly to the City's trip reduction program. Park-and-ride, serviced by express buses, would allow long-distance commuters to interface with metro area service in Mesa; likewise, city-to-city service would accommodate seasonal resident's trips at non-peak hours, including visitors to the City from other East Valley wintering locations. Future transit alignments, such as freeway medians, light rail and rapid transit, should be reserved to allow for Apache Junction's integration with the metropolitan area systems.

3.4 Goals and Policies

Goals and policies provide direction and focus to transportation plan development and the project implementation process. Goals describe a general objective to be obtained while polices describe the means to achieve those objectives. A set of specific goals and policies were developed in response to the issues, constraints, and opportunities identified in the City of Apache Junction transportation planning process.

It is recognized that implementation of all the policies listed below may not be feasible for every project, because of limited funding, local priorities and related concerns. Professional judgment and community input can assist in applying and prioritizing these polices on a project-by-project basis. All of the policies that apply to a given project should at least be considered during the planning and design phase of the project.

3.4.1 Goal: Improve circulation within the city

Objectives:

- ✧ Redesign Apache Trail to slow traffic by
  - Reducing traffic speed, separating business traffic from "thru" traffic movements and adapt existing sidewalks and commercial structures into pedestrian-friendly sites.
- ✧ Provide alternative transportation opportunities by
  - Providing low cost transportation for those in need and arranging rides to social and recreational city services.
- ✧ Design transportation infrastructure that can "grow" with the community by

- Reserving and acquiring rights-of-way prior or during development
- Adopt a Capital Improvement Program (CIP) that includes road improvement along with the phasing.
- Locating high traffic generating uses along areas where road improvements are planned in order to accommodate the traffic increase.

✧ Develop and implement aesthetically pleasing "streetscape" by
- Developing guidelines for landscaping arterial and collector streets
- Continuing on-going road maintenance with Highway Users Revenue Fund (HURF) monies

Common Practice or Opportunity:

✧ Consider narrowing Apache Trail to add linear parks with additional sidewalks, benches and shade provided.
✧ Use "traffic calming" designs
✧ Provide alternative "thru" movements for non-business related traffic
✧ Monitor recreational vehicle traffic during the peak season
✧ Connection to the regional transportation systems
✧ Promote limited service for the youth and elderly citizens
✧ Emphasize city-wide multi-use trail system
✧ Prioritize CIP development and implementation
✧ Improve balance of "thru" traffic on east/west arterial streets
✧ Provide additional access points to/from US 60
✧ Implement traffic management techniques in new housing developments
✧ Create standard format for directional street signs
✧ Consider alternative pedestrian paving surfaces and/or materials for the purpose of providing safety as well as a pleasant appearance
✧ Provide on road and off road bike lanes and/or bikeways that are separated from vehicular traffic

3.4.2 Goal: Plan for regional transportation

Objectives:

✧ Seek bus service connections by
- Pursuing local extensions to surrounding city areas
- Targeting links for regional transit centers

✧ Plan for future "environmentally friendly" mass transit by
- Coordinating with surrounding cities for regional transit
- Exploring future transit in freeway medians
- Serving local needs using cost-effective manners

Common Practice or Opportunity:

✧ Plan "park-n-ride" lots for commuters
✧ Schedule seasonal visitor/resident service at non-peak hours
✧ Support clean fuel programs
✧ Participate in regional transportation plans

4.0 EXISTING CONDITIONS ANALYSIS

Existing conditions are used to show what currently exists in the study area. Existing conditions include posted speed limits, lane configuration and geometry, traffic control and current transit service. Exhibit 2 illustrates all of these important fields of data.

4.1 Jurisdictional Responsibilities

The City of Apache Junction is responsible for all of the city roadways. The Arizona Department of Transportation is responsible for State Route 88 (Apache Trail/Idaho Road), Superstition Freeway (US 60) and the potential US 60 re-alignment.

4.2 Demographics & Environmental Justice

The population in and around the City of Apache Junction has increased over the past several years. The population in 1990, as relayed from the U.S. Census Bureau, was 18,100. In 2000, the population was 31,814. Within those 10 years, the population has nearly doubled. As of July 2003, the population has grown to 34,400. That is a population growth of approximately 8.2% per year since 2000. Looking to the future, it is projected that the population in the City of Apache Junction will grow to approximately 250,000 people around the year 2030.

The City of Apache Junction is known as a seasonal community in which most of its residents reside in the area during the winter months of mid-October to mid-April. Most winter residents come from western Canada, the Pacific Northwest, and the states of the Great Plains. While the exact number of residents entering the city during those months is unknown, it is estimated that the population, during the months from October to April, grows to over 70,000 residents. This represents an increase of approximately 35,000 residents throughout the winter months.

4.3 Functional Classification

The City of Apache Junction's General Plan takes into consideration arterial roadways and freeway interchanges regarding roadway network circulation and access. The Superstition Freeway (US 60) is the only freeway in the area.

The following roadways are considered arterial roadways, as specified in the City of Apache Junction General Plan, 1999.

- ✧ Apache Trail
- ✧ Old West Highway
- ✧ Mountain View Road
- ✧ Goldfield Road
- ✧ Tomahawk Road
- ✧ Idaho Road
- ✧ Ironwood Drive

- ✧ Meridian Drive
- ✧ Baseline Avenue
- ✧ Southern Avenue
- ✧ Broadway Avenue
- ✧ Superstition Blvd
- ✧ Lost Dutchman Blvd
- ✧ McKellips Road

4.4 Right of Way Limits

The right of way limits for the study roadways were collected from the City Assessor Maps, provided by the City of Apache Junction. The right of way varies between 66 feet for minor arterials, 100 feet for major arterials and 300 feet for principal arterial roads. Table 4.4.1 lists the existing right-of-way lengths for each link in the study area.

TABLE 4.4.1: Existing Right-of-way Widths

Roadway	*Maximum Right-of-way Length*
Meridian Road	100
Ironwood Drive	100
Idaho Road	100
Tomahawk Road	100
Goldfield Road	66
Baseline Road	100
Superstition Freeway (US 60)	300
Southern Avenue	100
Broadway Avenue	100
Apache Trail	300
Old West Highway	300
Superstition Blvd	100
Lost Dutchman Road	50
McKellips Road	50

4.5 Roadway Widths and Number of Lanes

Data for the roadway widths and lane information was collected on a field visit to the study area. Curb and gutter may be sporadic on certain roadways with new development in the area. Table 4.5.1 and Table 4.5.2 show the segment length, width, posted speed limits and number of lanes for each arterial-arterial segment. Listed below is the legend for both tables.

Table 4.5.1 and Table 4.5.2 Legend	
Acronym	***Definition***
2L	2 lanes paved with curb & gutter
2LPC	2 lanes paved with partial curb & gutter
2LNO	2 lanes paved without curb & gutter
4L	4 lanes paved with curb & gutter
4LNO	4 lanes paved without curb & gutter
5L	5 lanes paved with curb & gutter
6L	6 lanes paved with curb & gutter
6LNO	6 lanes paved without curb & gutter

TABLE 4.5.1: Existing Number of Lanes, Lane Width & Posted Speed Limit
(North/South Direction)

Roadway	***Intersections Between***		***Posted Speed Limit (mph)***	***Lane Configuration***	***Roadway Length (Mi)***
Meridian Rd	Baseline Rd	Superstition Freeway (US 60)	35	2LNO	0.50
	Superstition Freeway (US 60)	Southern Ave	35	2LNO	0.50
	Southern Ave	Broadway Ave	35	2LNO	1.00
	Broadway Ave	Apache Trail	35	2LNO	0.50
	Apache Trail	Superstition Blvd	35	2LNO	0.50
	Superstition Blvd	Lost Dutchman Rd	35	2LPC	1.00
	Lost Dutchman Rd	McKellips Rd	35	2LNO	1.00
Ironwood Dr	Baseline Rd	Superstition Freeway (US 60)	35	2L	0.50
	Superstition Freeway (US 60)	Southern Ave	35	5L	0.50
	Southern Ave	Broadway Ave	35	5L	1.00
	Broadway Ave	Apache Trail	35	5L	0.50
	Apache Trail	Superstition Blvd	35	5L	0.50
	Superstition Blvd	Lost Dutchman Rd	35	2LNO	1.00
	Lost Dutchman Rd	McKellips Rd	35	2LNO	1.00
Phelps	Broadway	Apache Trail	30	2L	0.50
Idaho Rd	Baseline Rd	Superstition Freeway (US 60)	35	2LNO	0.50
	Superstition Freeway (US 60)	Southern Ave	35	5L	0.50
	Southern Ave	Broadway Ave	35	5L	1.00
	Broadway Ave	Old West Hwy	35	5LNO	0.30
	Old West Hwy	Apache Trail	35	5L	0.30
	Apache Trail	Superstition Blvd	35	5L	0.30
	Superstition Blvd	Lost Dutchman Rd	35	2L	1.00
	Lost Dutchman Rd	McKellips Rd	35	2LNO	1.00
Tomahawk Rd	Baseline Rd	Superstition Freeway (US 60)	35	2L	0.50
	Superstition Freeway (US 60)	Southern Ave	35	2LPC	0.50
	Southern Ave	Old West Hwy	35	2LPC	0.75
	Old West Hwy	Broadway Ave	35	2LNO	0.25
	Broadway Ave	Superstition Blvd	35	2LNO	1.00
	Superstition Blvd	Apache Trail	35	2LNO	0.70
	Apache Trail	Lost Dutchman Rd	35	2LNO	0.30
Goldfield Rd	Baseline Rd	Superstition Freeway (US 60)	35	5L	1.00
	Superstition Freeway (US 60)	Old West Hwy	35	5L	0.40
	Old West Hwy	Broadway Ave	35	2LNO	1.60
	Broadway Ave	Superstition Blvd	35	2LNO	1.00
	Superstition Blvd	Lost Dutchman Rd	35	2LNO	1.00

TABLE 4.5.2: Existing Number of Lanes, Lane Width & Posted Speed Limit
(East/West Direction)

Roadway	***Intersections Between***		***Posted Speed Limit (mph)***	***Lane Configuration***	***Roadway Length (Mi)***
Baseline	Meridian	Ironwood	45	2LNO	1.00
	Ironwood	Idaho	45	2LNO	1.00
	Idaho	Tomahawk	35	2LNO	1.00
	Tomahawk	Goldfield	35	2LNO	0.75
Superstition Freeway (US 60)	Meridian	Ironwood	65	4LNO	1.00
	Ironwood	Idaho	65	4LNO	1.00
	Idaho	Tomahawk	65	4LNO	1.00
	Tomahawk	Goldfield	65	4LNO	1.00
	Goldfield	Old West Hwy	65	4LNO	0.25
	Old West Highway	Mountain View Rd	55	4LNO	1.00
	Mountain View Rd	Superstition Mountain Rd	55	4LNO	1.00
	Superstition Mountain Rd	Mountain Brook Rd	55	4LNO	1.00
	Mountain Brook Rd	Kings Ranch Rd	55	4LNO	1.00
Southern Ave	Meridian	Ironwood	45	2LPC	1.00
	Ironwood	Idaho	35	2LPC	1.00
	Idaho	Tomahawk	35	2L	1.00
	Tomahawk	End of road	25	2L	0.75
Broadway Ave	Meridian	Ironwood	35	5L	1.00
	Ironwood	Phelps	35	5L	1.00
	Phelps	Idaho	35	5L	0.25
	Idaho	Old West Hwy	30	2LNO	0.50
	Old West Hwy	Tomahawk	30	2LNO	0.50
	Tomahawk	Goldfield	30	2LNO	1.00
Apache Trail	Meridian Rd	Ironwood Rd	45	6L	1.00
	Ironwood Rd	Old West Hwy/Phelps	45	6L	0.75
	Old West Hwy/Phelps	Idaho	35	5L	0.25
	Idaho	Superstition Blvd	35	5L	0.25
	Superstition Blvd	Tomahawk	35	4L	0.75
	Tomahawk	Lost Dutchman Rd	35	4L	0.25
Superstition	Meridian	Ironwood	35	2LNO	1.00
	Ironwood	Idaho	35	5L	1.00
	Idaho	Apache Trail	35	5L	0.20
	Apache Trail	Tomahawk	35	2LNO	0.80
	Tomahawk	Goldfield	35	2LNO	1.00
Lost Dutchman Road	Meridian	Ironwood	45	2LNO	1.00
	Ironwood	Idaho	45	2LNO	1.00
	Idaho	Tomahawk	45	2LNO	1.00
	Tomahawk	Apache Trail	35	2LNO	0.25
	Apache Trail	Goldfield	25	2LNO	0.75
McKellips	Meridian	Ironwood	45	2LNO	1.00
	Ironwood	Idaho	45	2LNO	1.00
Old West Highway	Apache Trail	Idaho	45	4LNO	1.00
	Idaho	Broadway	45	4LNO	1.00
	Broadway	Tomahawk	45	4LNO	1.00
	Tomahawk	Goldfield	55	4LNO	1.00

4.6 Speed Limits

The speed limits within the study area generally range from 25 miles per hour to 45 miles per hour except for the Superstition Freeway (US 60), which operates at a posted speed limit of 65 miles per hour. The streets surrounding the local schools operate at a posted speed limit of 15 miles per hour and those residential streets that do not have posted speed limit signs are generally 25 miles per hour according to Arizona State Law. Existing posted speed limits are located in Tables 4.5.1, Table 4.5.2 and Exhibit 2.

4.7 Intersection Traffic Control

The street intersections were inventoried to identify locations with traffic signals and stop signs. Exhibit 2 illustrates the locations of traffic signals and stop signs within the study area. Currently, there are seven (7) stop controlled T-intersections, nine (9) two-way stop controlled intersections, nine (9) all-way stop controlled intersections and fourteen (14) signalized intersections within the study area.

4.7.1 Stop Controlled T-Intersections

T-intersections are three-legged intersections where there's a stop sign on the minor approach. Locations of the T-intersections were observed only at the arterial network level.

Intersections in this category include:

- ✧ Meridian Road and McKellips Road
- ✧ Tomahawk Road and Lost Dutchman Blvd
- ✧ Goldfield Road and Lost Dutchman Blvd
- ✧ Meridian Road and Baseline Road
- ✧ Idaho Road (SR 88) and Baseline Road
- ✧ Goldfield Road and Baseline Road

4.7.2 Two--way Stop Intersections

Two-way stop controlled intersections are useful where the volume of traffic on the major roadway is larger than the volume of traffic on the minor roadway. Locations of the two-way stop controlled intersections were observed only at the arterial network level.

Intersections in this category include:

- ✧ Apache Trail (SR 88) and Superstition Blvd
- ✧ Tomahawk Road and Apache Trail (SR 88)
- ✧ Tomahawk Road and Superstition Blvd
- ✧ Goldfield Road and Superstition Blvd
- ✧ Old West Highway and Broadway Avenue
- ✧ Goldfield Road and Old West Highway

- ✧ Tomahawk Road and Southern Avenue
- ✧ Tomahawk Road and Baseline Road
- ✧ Apache Trail (SR 88) and Lost Dutchman Blvd

4.7.3 All-Way Stop Intersections

All-way stop controlled intersections are useful where the volume of traffic on each approach is approximately equal. Locations of the all-way stop controlled intersections were observed only at the arterial network level.

Intersections in this category include:

- ✧ Meridian Road and Southern Avenue
- ✧ Tomahawk Road and Broadway Avenue
- ✧ Goldfield Road and Broadway Avenue
- ✧ Meridian Road and Lost Dutchman Road
- ✧ Ironwood Drive and Lost Dutchman Road
- ✧ Idaho Road and Lost Dutchman Road
- ✧ Ironwood Drive and McKellips Road
- ✧ Idaho Road and McKellips Road

4.7.4 Signalized Intersections

Traffic signals are valuable vehicle and pedestrian control devices because they assign the traffic right-of-way to various traffic movements.

Intersections in this category include:

- ✧ Ironwood Drive and Baseline Road
- ✧ Ironwood Drive and Southern Avenue
- ✧ Ironwood Drive and Broadway Avenue
- ✧ Idaho Road (SR 88) and Southern Avenue
- ✧ Ironwood Drive and Superstition Blvd
- ✧ Idaho Road and Superstition Blvd
- ✧ Meridian Road and Broadway Avenue
- ✧ Idaho Road (SR 88) and Broadway Avenue
- ✧ Tomahawk Road and Old West Highway
- ✧ Meridian Road and Apache Trail
- ✧ Ironwood Drive and Apache Trail
- ✧ Apache Trail and Phelps Drive/Old West Highway
- ✧ Idaho Road (SR 88) and Old West Highway
- ✧ Idaho Road and Apache Trail
- ✧ Meridian Road and Superstition Blvd

4.8 Traffic Volumes

The City of Apache Junction took roadway segment approach counts in 2002-2003. Counts were separated by seasonal months to obtain the most accurate existing volumes.

Exhibit 3 illustrates the average daily traffic for the area. Winter season is when the traffic volumes increase two-fold and the population increases from the permanent 34,400 to a temporary 70,000 or more residents. The winter season typically begins in mid-October and ends in mid-April.

4.9 Safety Audit

Arizona Department of Transportation and City of Apache Junction Accident Records were collected and researched to show where the majority of accidents are occurring. Based on the accident data collected, it appears that the majority of accidents occurred during the seasonal months of October to April, when tourism is at its peak. Table 4.9.1 shows the intersection/segment accident information and types of accidents that have occurred in the past three years of operation. Exhibit 4, 5 & 6 show the intersection, segment and total accidents that have occurred during the years of 2000 to 2002.

4.9.1 Intersection Accidents

For this project, KM has assumed that intersection accidents are considered excessive when they reach or exceed a total of nine (9) accidents in three (3) years. Each intersection has been evaluated for the type of accident that has occurred. Exhibit 4 illustrates the number of accidents that have occurred at the intersections. KM has made recommendations for improving these intersections. However, a traffic warrant analysis and detailed traffic study should be done to validate each intersections improvement recommendation.

- *Apache Trail & Meridian Road*
  Apache Trail and Meridian Road, which is currently a signalized intersection, had a total of 20 accidents. KM recommends looking at the traffic signal timing and sight distance along with geometry configuration of the intersection.

- *Apache Trail & Ironwood Drive*
  Apache Trail and Ironwood Drive, which is currently a signalized intersection, had a total of 36 accidents. KM recommends looking at the traffic signal timing and sight distance of the intersection to decrease the number of accidents.

- *Apache Trail & Phelps/Old West Highway*
  With a total of 23 accidents, KM recommends analyzing the traffic signal timing and sight distance of this intersection. As with the other Apache Trail intersections, the accidents may be due to progression through the signal, queuing at the signal or "talk" between signals along these segments.

- *Apache Trail & Idaho Road*
  Apache Trail and Idaho Road, which is currently a signalized intersection, had a total of 15 accidents. It is entirely possible that most of the accidents are

occurring because of the skew of the intersection. KM recommends looking at the signal timing, sight distance along with the geometric configuration – in particular – the skew of the intersection to reduce the number of accidents.

- *Apache Trail & Superstition Boulevard*
  Apache Trail and Superstition Blvd, which is currently a two-way stop controlled intersection, had a total of 24 accidents. KM recommends analyzing the geometric configuration, in particular the skew. KM also recommends completing a traffic control warrant study to determine whether a traffic signal would ease congestion and geometric related accidents.

TABLE 4.9.1: Intersection and Segment Accident Analysis (9 or More)

- *Ironwood Drive & Superstition Boulevard*
  Ironwood Drive and Superstition Blvd, which is currently a signalized intersection, had a total of 15 accidents. KM recommends looking at the signal timing and sight distance to reduce the number of accidents at this intersection.

- *Ironwood Drive & Broadway Avenue*
  Ironwood Drive and Broadway Avenue, which is currently a signalized intersection, had a total of 15 accidents. Some of the accidents may be caused by excessive speeds. KM recommends analyzing the geometric configuration, posted speed limit and signal timing for this intersection.

- *Ironwood Drive & Southern Avenue*
  Ironwood Drive and Southern Avenue, which is currently a signalized intersection, had a total of 20 accidents. It is assumed that most of the accidents are caused by high speed as vehicles approach the intersection. KM recommends looking at the posted speed limit and the signal timing. KM also recommends adding traffic calming to reduce these accidents.

- *Ironwood Drive & Baseline Road*
  Ironwood Drive and Baseline Road, which is currently a signalized intersection, had a total of 23 accidents. It is assumed that most of the accidents are caused by either sight distance or high speed when approaching the intersection. KM recommends looking at the sight distance, posted speed limit and the signal timing. KM also recommends adding traffic calming to reduce these accidents.

- *Idaho Road & Broadway Road*
  Idaho Road and Broadway Road, which is currently a signalized intersection, had a total of 12 accidents. KM recommends looking at the signal timing to reduce the number of accidents at this intersection.

- *Old West Highway & Idaho Road*
  Idaho Road and Old West Highway, which is currently a signalized intersection, had a total of 13 accidents. Some accidents may have been caused by excessive speed. KM recommends looking at the posted speed limit and signal timing to reduce the number of accidents at this intersection.

4.9.2 Segment Accidents

Segment accidents are considered excessive when they exceed 9 accidents in total at the end of a three (3) year analysis period. Each segment has been evaluated for the type of accidents that have occurred and can be found in Table 4.9.1. Exhibit 5 illustrates the number of accidents that have occurred along the roadway segments.

- *Idaho Road between Broadway Avenue & Old West Highway*
  Idaho Road, which is a 4-lane roadway between Broadway Road and Old West Highway, had a total of 11 accidents. It is assumed that the angle and left turn accidents were at the intersections of driveways or alleys, whether residential or commercial. KM recommends adding deceleration lanes if needed to reduce the number of accidents along this roadway strip.

- *Apache Trail between Meridian Road & Ironwood Drive*
  Apache Trail, which is a 6-lane roadway between Meridian Road and Ironwood Drive, had a total of 19 accidents. It is assumed, with the amount of rear-end accidents, that there may be excessive queuing on that stretch of road and KM recommends adjusting the signal timing to reduce the amount of accidents. However, a detailed traffic analysis and study should be done to validate each segment and intersection recommendation.

- *Apache Trail between Ironwood Drive & Phelps Drive/Old West Highway*
  Apache Trail, which is a 6-lane roadway between Ironwood Drive and Phelps Drive/Old West Highway, had a total of 17 accidents. Most of the accidents seem to be occurring when vehicles turn into driveways along the segment. KM recommends adding deceleration lanes if needed to reduce the number of accidents along this roadway strip.

- *Superstition Freeway (US 60) between Ironwood Drive & Idaho Road*
  The segment of the Superstition Freeway (US 60) between Idaho Road and Tomahawk Road is currently a 4 lane divided highway with a posted speed limit of 65mph. During the 3-year accident history period, there were 15 accidents. Most of the rear-end accidents may be caused by queuing from the interchange ramps at Idaho Road. KM recommends conducting a feasibility study to modify the interchange ramps, if needed.

- *Superstition Freeway (US 60) between Idaho Road & Tomahawk Road*
  The segment of Superstition Freeway (US 60) between Idaho Road and Tomahawk Road is currently a 4 lane divided highway with a posted speed limit of 65 mph. During the 3-year accident history period, there were 15 total accidents. Most of the accidents were single vehicle in which fatigue, high speed or weather may have played a part.

- *US 60 between Mountain View Road (MP 199) and Superstition Mountain Road (MP 200)*
  The segment of US 60 between Mountain View Road and Superstition Mountain Road is currently a 4 lane divided highway with a posted speed limit of 55mph. During the 3-year accident history period, there were 15 total accidents. According to the accident records along this segment, most of the single vehicle accidents occurred when a large piece of debris fell onto the roadway.

- *US 60 between Superstition Mountain Road (MP 200) and Mountain Brook Road (MP 201)*

  The segment of US 60 between Superstition Mountain Road and Mountain Brook Road is currently a 4 lane divided highway with a posted speed limit of 55 mph. During the 3-year accident history period, there were 9 total accidents. The intersection is two-way stop controlled. 6 of the 9 accidents were rear-end accidents in which there may have been a queue built up of vehicles turning right or left onto Mountain Brook Road. The construction of the realigned US 60 should alleviate these accidents. However, until construction is complete, it may be beneficial to conduct a traffic warrant analysis to determine what improvements can be made to deter any future safety concerns.

5.0 FUTURE CONDITIONS ANALYSIS

The City of Apache Junction future conditions are based on the whether the application to annex land from the State Land Department is approved. Future conditions evaluate and approximate preliminary traffic volumes at build-out of the area. Based on the preliminary future traffic volumes, the City will know what existing roadways will need improvement in areas of traffic control, geometrics and land structure, to name a few.

5.1 Future Network Configuration

The future base 2030 model roadway network was developed to include all planned roadway improvements proposed in the recent MAG Long Range Transportation Plan, Southeast Maricopa/Northern Pinal County Area Transportation Study, and the improvements displayed in the circulation element of Apache Junction General Plan, 1999. To address the mobility needs of the area, an extensive network was developed for the growth area south of Baseline Road. The network consists of primarily six lane arterial roadways, and two freeways: the potential realignment of US 60 from Goldfield Road to Ray Road, and the Apache Junction/Coolidge Corridor, as specified in the Final Summary Report of the Southeast Maricopa/Northern Pinal County Area Transportation Study, 2003.

The City of Apache Junction city limits currently consist of 36 square miles of area bounded by McKellips Road to the north, Meridian Road to the west, Mountain View Road to the east and Elliot Road to the south. The City of Apache Junction is currently in negotiations to annex land bounded by Elliot Road to the north, Meridian Road to the west, Ray Road to the south and US 60 to the east. This new piece of land encompasses approximately 18 square miles, thereby increasing the size of Apache Junction to 54 square miles. With the City increasing in size, density and traffic volume, new roads will need to be constructed and existing roads will need to be improved.

The new roadways connecting Mesa, Apache Junction and Gold Canyon include:

- ✧ Tomahawk Road
- ✧ Goldfield Road
- ✧ Apache Junction/Coolidge Corridor (I-10 to US 60)
- ✧ Potential US 60 Realignment around Gold Canyon
- ✧ Ironwood Road
- ✧ Meridian Road
- ✧ Guadalupe Road
- ✧ Elliot Road
- ✧ Warner Road
- ✧ Ray Road

The City of Apache Junction wanted to differentiate itself from other cities as well as accommodate environmental planning practices used by the Maricopa County Flood

Control District (MCFCD). In determining the new roadway alignments south of Baseline Road and east of Ironwood Road, the City choose to introduce radial alignments that would allow the roadways to follow the existing washes. Following the flow of natural drainage patterns promote overall drainage, open space, linear park usage. The City of Apache Junction also desires to limit the roadways around the flood control structures and ponding areas as much as possible as this will satisfy MCFCD requirements and will save funding by limiting the amount of bridge or support structures needed. The new alignments would also be able to connect to the potential realignment of US 60 and a majority of Gold Canyon area.

It should be noted that the new roadways provide opportunity for the Mesa and Gold Canyon communities to interconnect and access the City of Apache Junction area. It should also be noted that in the future, McKellips road will be connected to Goldfield Road and Old West Highway will be connected to the existing US 60 due to the potential realignment of the US 60 freeway west of Gold Canyon.

The Southeast Maricopa/Northern Pinal County Area Transportation Study, 2003 has analyzed and recommended a 36-mile north-south freeway corridor that would provide controlled access between the Superstition Freeway (US 60) in Apache Junction, I-8 and I-10 in Casa Grande. The purpose of the new corridor is to aid in reducing travel time and congestion along I-10 south towards Tucson. The Southeast Maricopa/Northern Pinal County Area Transportation Study established the Apache Junction/Coolidge Corridor and Superstition Freeway (US 60) interchange at Ironwood Road. However, the interchange at Ironwood Road and the Ironwood Road corridor is currently experiencing a tremendous amount of commercial and residential development growth.

Providing a system interchange at the intersection of two freeways is often necessary to keep vehicles flowing freely at a high rate of speed. The Southeast Maricopa/Northern Pinal County Area Transportation Study discusses that a system level interchange also known, as a high-speed interchange could be required for the freeway-to-freeway connection. A high-speed interchange is not feasible at the Ironwood Road interchange since the surrounding property is fully developed.

The fact that a high-speed interchange cannot be constructed and growth along the Ironwood Road corridor is ongoing, further establishes the validity of moving the alignment to a more preferred location. The Idaho Road alignment south of the Superstition Freeway (US 60) has not yet been constructed nor developed. As a result, the future Idaho Road corridor is better equipped for reserving future right-of-way for the proposed Apache Junction/Coolidge Corridor.

For purposes of this study, it is assumed that the proposed Apache Junction/Coolidge Corridor will be constructed in phases with the initial phase including a single point urban interchange with a six-lane principal arterial to the south. Once funding of the freeway system is approved, studies will be undertaken to construct a system interchange at the

intersection of Idaho Road and the Superstition Freeway (US 60) and upgrade the principal arterial to the south to freeway classification.

The proposed southern Apache Junction network is illustrated in Exhibit 7.

5.2 Transportation Modeling using TransCAD

Transportation modeling for the City of Apache Junction was completed using TransCAD version 4.5. The TransCAD model documentation report, provided by Lima & Associates, is located in Appendix B.

5.2.1 TransCAD Traffic Analysis Zones (TAZ)

The transportation planning model is a representation of the Apache Junction area's transportation facilities and the travel patterns using these facilities. The traffic model contains inventories of the existing roadway facilities and of residential and non-residential units by traffic analysis zones (TAZ's).

In general, the traffic model process consists of several steps including estimating the number of daily vehicle trips by TAZ from the socioeconomic inventory, distribution of vehicle trips by TAZ, and then assigning the vehicle trips to the street network. The traffic model assignments are then compared with current traffic counts. When the model matches the traffic counts within acceptable ranges of error the model can then be used to test future year scenarios. These scenarios may contain changes in numbers of housing units, employment centers, travel behavior patterns, or roadway improvements. The transportation planner or engineer, using the traffic-forecasting model can project future traffic volumes, which in turn can aid in making planning and project programming decisions.

The transportation modeling process included the following steps:

- ✧ Development of 2002 transportation roadway network
- ✧ Determination of 2002 land use data
- ✧ Trip generation – generation of vehicle trips
- ✧ Trip distribution – geographical distribution of vehicle trips between origin and destination
- ✧ Trip assignment – assignment of traffic volumes to specific network routes.

A brief description of each modeling step is given below.

- ⌑ *Roadway Network Development*

  The initial step in the travel demand modeling process was the development of the geographical roadway network comprised of nodes and links. A node is an intersection of two or more links such as an intersection of two street segments. A network link is a street segment between two nodes (A node and B node).

The 2002 Apache Junction TransCAD base model network was created by converting the MAG 2002 model network and adding street center line that is available as part of the TransCAD software. The street center line file comprises of a roadway network, however, no associated transportation data such as number of lanes, speeds, etc is included is provided. Subsequently, the study team collected the necessary data in order to develop the model network parameters. The TransCAD model network database includes but it not limited to the following information.

- ✧ Roadway Functional Classification
- ✧ Link Distance
- ✧ Speed
- ✧ Daily Link Capacity
- ✧ Daily Traffic Volume (ground counts)
- ✧ Link Number of Lanes

As part of the model network development, streets classified as collector streets or higher were used to identify which streets to be included in the model. The model also included local streets and unpaved roads when necessary to "load" traffic to the model network. The street classifications are based on the MAG model functional classification for the City of Apache Junction. Exhibit 8 illustrates the defined network based on the roadway functional classification used in the modeling.

⌑ *Land Use Data*

Land use was developed for different categories and allocated to TAZs. TAZs are generally bounded by either the roadway network or another geographic boundary. Within the model network, a TAZ is defined by a node called a centroid. For transportation modeling, it is assumed that all trips within a TAZ begin and end at the zone centroid. Each TAZ centroid is connected to a roadway link by centroid connectors, which represent the local streets feeding traffic to the major streets. The MAG model TAZ structure was used a base for developing Apache Junction model TAZs. The Apache Junction TAZs are shown in Exhibit 9.

The Apache Junction model consisted of two zone types: internal and external. The internal zones were those zones central to the study area, and external zones were placed along roadways entering and leaving the Apache Junction model area.

⌑ *Trip Generation*

The final product of the trip generation phase is the total number of trips produced within and/or attracted to each TAZ. A trip is defined as a one-way trip between an origin and a destination.

The number of trips generated by a TAZ is a function of the residential and/or commercial land use characteristics. Residential land uses are generally referred to as "producers" or trips, commercial land uses are generally referred to as "attractors" of trips. Residential trip production is a function of the number of dwelling units. Commercial trip attraction is a function of non-residential employment data.

- *Trip Distribution*

The final product of the trip distribution phase is a vehicle trip table specifying the number of vehicle trips that travel among all the TAZs. Trip tables are estimated for each of the trip purposes. The distribution of trips between TAZs (for example, zone I and zone J) is a function of the following variables:

- The number of trips produced in zone I
- The number of trips produced in zone J
- The travel time between zone I and zone J
- The magnitude of the total "attractiveness" of all the zones in the network

The number of trips traveling between zone I and zone J are directly proportional to the total number of trips generated in zone I and the total number of trips attracted to zone J. For example, the total number of trips traveling between zones I and J increase as the number of residential trips increases in zone I. The number of trips between zones I and J are inversely proportional to the travel time between the two zones. The number of trips traveling between the two zones decreases as the travel time increases between the zones.

- *Traffic Assignment*

The traffic assignment phase allocates the trips to one specific network route based on the travel times between the various zones. The traffic assignment process includes the following:

- Computation of the minimum time paths between the TAZs based on free flow link speeds (i.e., Posted speed limits)
- Initial assignment of the trips to the links, which lie on the minimum time paths between the TAZs
- Computation of volume-to-capacity (v/c) ratios on the links after initial assignment
- Computation of travel times on the links as a function of the v/c ratio
- Reiteration of the assignment process until the traffic volumes on the links replicate the traffic ground counts

The final product of the traffic assignment process is the traffic volumes on each link in the network.

5.2.2 Existing 2002 Analysis

The primary goal of transportation modeling is to simulate the daily travel on a roadway network. In order for the simulation to be effective, it was important to create a "snapshot" in time using all of the transportation related data from Apache Junction, MAG and the U.S. Census Bureau.

The total 2002 population utilized in the model was 57,302, total dwelling units of 24,323 and total employment of 9,057. The 2003 transportation network along with the current MAG model network and estimated socioeconomic data from the various resources were used in the base analysis.

The population, employment and dwelling data was allocated to the centroids of the TAZ's developed in the model. It is important to note that the study area for the TransCAD modeling also includes population, dwelling and employment information from both the City of Mesa and Pinal County.

5.2.3 Future 2030 Analysis

The 2030 Apache Junction socioeconomic variables were developed using the MAG 2030 forecasted population and employment based on the Census 2000 data as base. The data was further reviewed and updated to ascertain that the latest Apache Junction general land use plan and its growth trends were reflected in the forecast. Additionally, growth information provided by Pinal County and other state agencies were incorporated in the socioeconomic projections. The data gathered was allocated to the centroids within each TAZ in the TransCAD model.

Table 5.2.1 summarizes the expected growth in the model area. A reminder, the model area is larger than the study area and encompasses portions of the City of Mesa and northern Pinal County.

TABLE 5.2.1: Demographic Projections Summary

	2002	***2030***
Population	57,302	275,417
Dwelling Units	24,323	102,997
Total Employment	9,057	52,393

A robust growth is forecasted for the area south of Baseline, which currently is vacant land, as well as in the Pinal County portion of the model area. Planned and approved developments in the Apache Junction area were assumed to be at 100 percent build-out.

5.3 Build-Out Base Network

The preliminary 2030 lane configuration is illustrated in Exhibit 10. The initial TransCAD model analyzed arterial roadways and freeways within the current Apache Junction city limits and within the proposed land area that Apache Junction will be acquiring. The model run analyzed all of the roadways, including existing roads, as 4-lane roadways except for Meridian Road, Ironwood Road and Apache Trail between Meridian Road and Idaho Road, which were analyzed as 6-lane roadways.

All assumptions are as follows:

- ✧ Posted Speed Limits
  - Existing roads to remain as is
  - Proposed 4-lane roads are 35 mph
  - Proposed 6-lane roads are 45 mph
  - Proposed freeways are 65 mph
- ✧ Roadway Intersections
  - All proposed new roadway intersections are signalized
  - All existing or proposed 6-lane roadway intersections are signalized
  - All existing roadways improved to a 4-lane roadway with any one approaching segment volume higher than 15,000 vehicles per day are signalized. However, a traffic signal warrant analysis is recommended before any signals are installed within the study area.

5.4 Build-Out Recommended Improvements

With growth in the area increasing to an approximate population of 250,000 residents by the year 2030, many of the existing and proposed roadways modeled using the base network as described in Section 5.3 and illustrated in Exhibit 8 & 10 will require improvements. Since the base network is already improved per traffic control, roadway widening is the final opportunity to ensure acceptable traffic flow during the planning process. Exhibit 11 illustrates the roadway network configuration after final improvements.

5.5 Special Topics

5.5.1 Freeway Improvements

All new interchanges and improvements to existing interchanges are illustrated on Exhibit 12.

- ⌑ *Interchange Ramps*

  Apache Junction currently has one lane interchange ramps along the Superstition Freeway (US 60). A one-lane ramp can typically carry 6,000 to 10,000 vehicles per day. Should the traffic volume exceed 10,000 vehicles per day, it is recommended that the ramp be improved from one-lane to two-lanes

or more. New ramp locations and existing ramp improvements will be needed with the increase in projected traffic. The number of lanes on the new ramps will vary based on vehicular daily volume. A queuing, progression and safety problem could be omitted by verifying the number of lanes needed prior to ramp construction and/or improvement. With the illustrations shown in Exhibit 11, new ramps to be constructed are located on the Superstition Freeway (US 60) at Meridian road and along the proposed Apache Junction/Coolidge Corridor south of the Superstition Freeway (US 60) and Idaho Road interchange. Since the potential realignment of US 60 is not yet built, it should be noted that Pinal County along with ADOT would be designing and installing the ramps for the bypass.

- *High Speed Ramps*

  The proposed Superstition Freeway (US 60) & Apache Junction/Coolidge Corridor interchange is currently planned as a single point urban interchange utilizing signal control. It is possible that a high-speed directional three-leg or high-speed trumpet system interchange can be constructed at this location. However, any high-speed system interchanges require additional study and pre-design planning.

  Topics of concern for a high-speed interchange in this area include:
  - Right-of-way
  - Proximity of commercial or residential communities
  - Noise
  - Safety
  - Driver expectancy
  - Funding feasibility
  - Traffic volumes and progression through the interchange
  - Traffic volumes along the surrounding arterials and/or ramps
  - Future modification if a fourth leg is added
  - Pedestrian, equestrian and bicycle consideration

5.5.2 US 60 Turnback Analysis

This 8-mile section of US 60 begins at the intersection of Old West Highway and Goldfield Road and continues southeast bypassing the community of Gold Canyon. Exhibit 7 and Exhibit 8 illustrate the location of the potential realignment in comparison to existing US 60. The purpose for realigning this portion of US 60 is to allow traffic to bypass the rapidly developing community of Gold Canyon. A significant amount of commercial growth is expected along the potential realignment once construction is complete as a substantial amount of land surrounding the freeway will be available for development. The amount of traffic using the realigned freeway approaching the year 2030 would be approximately 60,000 to 80,000 vehicles per day. The potential realignment has not yet been constructed. Therefore, it is not shown as an existing roadway in this study. However, it should be noted that

Pinal County along with ADOT would be designing and constructing the potential realignment of US 60. Since Pinal County and ADOT would be undertaking design and construction, the City of Apache Junction should not incur any cost relating to this section of freeway. The realignment, whether built or not, will affect the City of Apache Junction's future development and roadway improvement plans.

6.0 PUBLIC TRANSIT

The City of Apache Junction is currently working on a Transit Feasibility Study in which future transit issues will be addressed. Based on the recently released 2003 Regional Transit System Study, completed by Valley Metro, there will be transit services extended into the Apache Junction area at a time when services are warranted in the area.

6.1 Existing Local Transit Alternatives

The City of Apache Junction is currently not served by Valley Metro or Pinal County. Taxi services, Greyhound bus services, and Sky Harbor Airport shuttle services (SuperShuttle) are the only three major transit services available for community residents. The Apache Junction Senior Center also offers transportation for senior citizens or disabled citizens to/from the senior center and to/from medical appointments. The service area for the senior center includes the City of Apache Junction and Mesa between Highley Road and Mountain View Road.

6.2 Transit Service Planning Guidelines

The ITE Transportation Planning Handbook suggests the following guidelines for bus service planning in an urban area.

- ✧ Provide ¼ mile coverage service for at least 90% of area residents where the population density exceeds 4,000 persons in a square mile or three dwelling units per acre.
- ✧ Provide ½ mile coverage serving 50% to 75% of the population where population densities range from 2,000 to 4,000 persons per square mile.
- ✧ Service major employment concentrations, schools and hospitals.
- ✧ Space routes about ½ mile in urban areas and one mile in low-density suburban areas.

Para-Transit (Dial-a-ride) may be appropriate in specific areas until regular bus service can be supported. The applicability of these guidelines to Apache Junction, a small urban, low-density residential area, will be explored in the transit alternative element of this study.

6.3 Transit Alternatives

This section defines various public transportation methods and lists some of their advantages and disadvantages.

There are two main types of transit modes, fixed route and paratransit.

Fixed route system is for transporting individuals on which a vehicle is operated along a prescribed route according to a fixed schedule. A typical city bus system fits clearly into this category. With fixed route service, no action by the individual is needed to initiate service. If an individual is at a bus stop at the time the bus is scheduled to appear, then

that individual will be able to access the transportation system. If a service is provided along a given route, and a vehicle will arrive at certain times regardless of whether a passenger actively requests the vehicle, the service in most cases should be regarded as fixed route rather than demand responsive.

Paratransit is a comparable transportation service required by the ADA for individuals with disabilities who are unable to use fixed route transportation systems. Paratransit has a specialized meaning in the context of the transportation regulations. The term refers to the complementary paratransit service, comparable to public fixed route systems, which must be provided. Typically, paratransit is provided in a demand responsive mode. Obviously, the regulations refer to a wide variety of demand responsive services that are not "paratransit" in this specialized sense. Using these definitions, we can define the alternatives of using different methods of either a fixed route system or paratransit system. The different types of systems and their advantages/disadvantages are listed below.

6.3.1 Fixed Route Bus System

A system for transporting individuals on a vehicle that moves along a prescribed route per a fixed schedule.

Advantages:
- ✧ System has been in good operating condition for years.
- ✧ Pick-up and drop-off times are very reliable
- ✧ Is familiar to most community citizens

Disadvantages:
- ✧ Depending on location and time of pick-up, may leave potential riders waiting
- ✧ Prohibitive cost for adequate service coverage in low-density areas
- ✧ May require inconvenient transfers
- ✧ May not provide transportation on holidays

6.3.2 Dial-A-Ride Service

A demand responsive transit system in which vans, cars or other vehicles provide door to door shared ride transportation for ADA qualified citizens. This system does not use a fixed schedule and requires the individual(s) to call ahead to arrange a ride.

Advantages:
- ✧ Some cities will provide transportation to the general public as well as disabled persons or senior citizens.
- ✧ Has been actively used and is familiar with most community citizens

Disadvantages:
- ✧ Depending on location of pick-up, may leave potential riders unserved
- ✧ Pick-up and/or drop-off times may be unpredictable

6.3.3 Reserve-A-Ride Service

Specialized, door-to-door transportation provided for the elderly, age 60 and over; and certified disabled individuals, age 18 and over; to senior centers, adult centers, adult day care, medical appointments, social service agencies and shopping. Reservations are needed two working days in advance. All vehicles are wheelchair accessible.

Advantages:
- ✧ Easier to operate vs. Dial-A-Ride
- ✧ Can work well for medical and other appointments that are made in advance

Disadvantages:
- ✧ Does not meet unexpected last minute travel needs.

6.3.4 TRIP: Transportation Reimbursement and Information Program

A demand-responsive transit system, which volunteer participant drivers are used for carpooling purposes. This program reimburses the driver for mileage used on his/her own vehicle for this program.

Advantages:
- ✧ Reimbursement for sharing the use of your vehicle for a carpooling purpose.
- ✧ Not a fixed route system
- ✧ Alternative to a fixed route bus system

Disadvantages:
- ✧ Must be a resident of the city
- ✧ Must be disabled or over 65 years of age
- ✧ Must apply to the program in order to be in the program
- ✧ May eliminate many possible program users based on location of resident and how many residents live in or near the vicinity.

6.3.5 Cab Connection

A demand-responsive transit system in which cab companies provide door to door single rider services based on a voucher payment system.

Advantages:
- ✧ Offers more flexibility and independence for resident senior citizens or residents with disabilities
- ✧ Not a fixed route system
- ✧ Alternative to Dial-A-Ride or Reserve-A-Ride

Disadvantages:
- ✧ Must apply to the program to be able to use service
- ✧ Based on voucher system in which vouchers must be picked up in order to be used
- ✧ Pick-up and Drop-off times may be unpredictable

6.3.6 Route Deviation Service

Transit service that operates on a fixed route but not a fixed schedule.

Advantages:
- ✧ Serves a larger area than traditional fixed route systems
- ✧ Meets ADA requirement as long as it serves a ¾ mile boundary

Disadvantages:
- ✧ May deviate from route occasionally in response to passenger pick-up
- ✧ Deviations increase the operating cost and travel time

6.3.7 Point Deviation Service

Typical to a fixed route service yet does not follow a specific route between stops. This is more of a demand response service with a limited number of scheduled stops and possible deviations between stops.

Advantages:
- ✧ Combines fixed route predictability with paratransit flexibility and coverage
- ✧ Suited for areas with few activity centers and accommodates for dispersed demand elsewhere

Disadvantages:
- ✧ May deviate from route occasionally in response to passenger pick-up
- ✧ Deviations increase the operating cost and travel time
- ✧ Surges in demand may result in denial of service

6.3.8 User Side Subsidy

A subsidy in the form of a discount directly paid to riders of a transportation system. Usually dispenses using a voucher or coupon. This type of subsidy is sometimes used by social service agencies to provide discounted bus or taxi fares for their clients.

Advantages:
- ✧ Limited operational costs and no capital costs
- ✧ Maximize the use of existing resources
- ✧ Speed, convenience and flexibility
- ✧ Sponsor pays only for service used

Disadvantages:
- ✧ Serves the most neediest of populations
- ✧ Voucher enforcement can be difficult
- ✧ May be ineligible for federal funding
- ✧ Requires private transportation fleet and people to participate in it

6.3.9 Subscription Service

Bus or van service which routes and schedules are prearranged to meet the travel needs of a specific group of riders (typically commuters).

Advantages:
- ✧ May require little to no public subsidy if financed by employers
- ✧ Provides fast, convenient service for group of riders who commit to transit
- ✧ Can efficiently collect riders at central nodes

Disadvantages:
- ✧ Requires financial support from employers
- ✧ Does not serve non-commuters or social service clients
- ✧ Requires continual recruitment to ensure replacement of employees
- ✧ Liability insurance could be an issue

6.3.10 Rideshare (Carpool/Vanpool)

A carpool is an arrangement in which two or more people regularly ride together in privately owned vehicles between fixed locations. A vanpool is an organized ridesharing system in which several people regularly travel together in a seven or fifteen passenger van.

Advantages:
- ✧ Can save money for commuters
- ✧ Does not cost employers
- ✧ Requires little to no capital investment
- ✧ Tailored to individual riders needs
- ✧ No long term commitment is required

Disadvantages:
- ✧ No recruitment efforts means that it can fall apart if one person leaves the group
- ✧ Not convenient for riders with errands or children
- ✧ Not convenient for students with differing class schedules

6.3.11 Transit Service Brokerage

Public or private non-profit agency oversees and coordinates transportation services operated by social service providers and other existing organizations.

Advantages:
- ✧ Minimizes additional funding requirements
- ✧ Can target those in most need
- ✧ Facilitates small scale transit demonstration project without major financial or political commitment

Disadvantages:

- ✧ Requires active and committed coordinator
- ✧ Service providers must be willing to cooperate and share resources
- ✧ Does not serve commuter or general public transportation needs

6.3.12 Light Rail (Rapid Transit)

A metropolitan electric railway system characterized by its ability to operate single cars or short trains along exclusive rights-of-way at ground level, on aerial structures, in subways or, occasionally, in streets, and to board and discharge passengers at track or car-floor level.

Advantages:

- ✧ Offers highest passenger carrying capacity and can move more people per hour than a bus route
- ✧ Provides convenient, smooth, quiet, safe and comfortable alternative to driving
- ✧ Can accept any type of passenger, whether senior citizen or disabled
- ✧ Very practical due to it's ability to maneuver in mixed traffic settings
- ✧ Reduces traffic congestion and emissions since most rapid transit cars run on electricity
- ✧ New stops can be added at any time after construction completion

Disadvantages:

- ✧ Has most expensive up front cost to design and construct
- ✧ Needs a driver to operate the system
- ✧ Does not always offer the most suitable lines since train stations are few and far between
- ✧ May not be used much as most of the community would probably stay within the Apache Junction area
- ✧ Could cause traffic disruption during construction since most light rail systems are constructed in the middle of roadways
- ✧ May require more right-of-way takes depending on space needed for vehicles and light rail system corridors

6.4 Evaluation of Non-Recommended Alternatives

Several alternatives listed above may be unsuitable for the Apache Junction area and have been eliminated from consideration at this point. This section presents the reasons why these alternatives were eliminated.

- ⌑ *Route Deviation Service*

  Transit service that operates on a fixed route but not a fixed schedule will most likely not work for this area. This service requires a high ridership density along one or two demand corridors. Since the city is spread out vs. up, the likelihood of high ridership along one major corridor would be far fetched. Since this

system does not have a fixed schedule, it would make waiting times unpredictable.

- *Transit Service Brokerage*
  Public or private non-profit agency oversees and coordinates transportation services operated by social service providers and other existing organizations. This was the only service that was tried in Arizona and later on discontinued and abandoned. Large savings over other options are unlikely since social agencies are already providing as much service as possible with their existing resources.

- *Subscription Service*
  Bus or van service which routes and schedules are prearranged to meet the travel needs of a specific group of riders (typically commuters). Wouldn't work unless it's for the senior citizen center. Since this is mostly a residential and seasonal community, this option would not fit, as it needs a group of riders in order to perform successfully.

6.5 Recommended Alternatives

Based on the above analysis, the alternatives that remain open for consideration include:

- Fixed Route Bus System: This system will connect the City of Apache Junction to the Valley Metro Bus System, which currently serves the Mesa and Central Phoenix area and it's surroundings.
- Dial-A-Ride
- Reserve-A-Ride
- Cab Connection
- TRIP System: Although this system is not yet utilized in Apache Junction, it is currently being used throughout the valley during the summer months for Ozone Awareness Days.
- Rideshare (Carpool/Vanpool)
- User Side Subsidy: Although it has yet to be tried in the valley, it could work within the area because of the high concentration of senior citizens, whether seasonal or permanent, needing reliable transportation.
- Point Deviation Service: Although it has yet to be tried in the valley, it could work within the Apache Junction area because of the high concentration of senior citizens, whether seasonal or permanent, needing reliable transportation.
- Light Rail (Rapid Transit): Light Rail and Rapid Bus Routes will certainly assist those folks that have to commute to other areas of the valley for work on a daily basis.

6.6 Proposed Starter System

As the population of Apache Junction increases, there will be an increasing need for transit service within and outside of the city area. Establishing transit centers, park and

ride facilities and telecommuter centers could provide a focal point for transit service and assist in coordinating local and regional transit services between cities and counties.

A starter system may be needed by 2007, especially with the population increasing at 8% to 10% per year. Because a long-term commitment will depend on demonstrated demand, a "bare bones" system could be implemented on a trial basis for two to three years. Operating this extensive system in less than 24 months would be insufficient as it takes time to build ridership. Initially, a single fixed route and dial-a-ride van route would operate on weekdays during regular business hours. These hours would enable transit dependent persons to make employment, medical, social service or shopping trips. The proposed starter system would extend and complement the current Valley Metro system until a full system can be put in place.

6.7 Marketing and Publicity

Marketing for transit is a distinctive specialization that requires not only marketing "know how" but also expertise in transportation planning. Traditionally, public transportation agencies have marketed transit services directly to riders and potential riders. In recent years, transit agencies, and even regional planning agencies, have directed more of their marketing efforts toward businesses to counteract declining market share. In order to get a well-rounded collection of riders, it will be important to market to both groups accordingly.

The key responsibility of transportation marketing is to develop effective programs to enhance and maintain demand for the product. A strong transit marketing program integrates the mission of the transit agency, the targeted population, the services provided, cost savings, and the appropriate means for information distribution and service promotion.
Methods of marketing to the public include:

- ✧ System wide identity and information programs
- ✧ Niche marketing
- ✧ Special promotions and event sponsorship
- ✧ Direct Sales and Personal Selling
- ✧ Business Partnerships
- ✧ Advertising & Publications
- ✧ Transit brochures
- ✧ Surveys whether passenger, community or via internet
- ✧ Planned conferences
- ✧ Promotional events
- ✧ Telephone information services
- ✧ Web sites and on-line information kiosks
- ✧ Developed advertisements

It is suggested that a public research firm be retained to implement all publicity, marketing materials and programs.

7.0 IMPLEMENTATION PROGRAM

Measuring the success of any planning effort is dependent upon its effective implementation. The City of Apache Junction Small Area Transportation Study serves as the blueprint or guide for future transportation development in the City. The future transportation network outlined in this report is intended to support the land use and economic development objectives as the City of Apache Junction continues to grow. It is critical that the plan is put into action through a comprehensive strategic implementation program. The City's role in implementing the plan is to provide direction to private and public sector development and investment. This section outlines the different sources of funding and how/when this report will be implemented in the coming years.

7.1 Existing and Potential Funding Sources

Funding of transportation projects are based on federal, state, local, developer, private and/or public Sources. Specific funds from each group are listed below.

- ✧ Surface Transportation Program (STP) is a federal resource. STP has three areas of funding including transportation, enhancement and safety. The Surface Transportation Program is defined by the Transportation Equity Act for the 21st Century (TEA-21) as:
  - Transportation
    - The STP provides flexible funding that may be used by States and localities for projects on any Federal-aid highway, including the NHS, bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities. A portion of funds reserved for rural areas may be spent on rural minor collectors.
  - Enhancement
    - Provides funding facilities such as pedestrian walkways and bicycle paths, acquisition of scenic easements, restoration of scenic or historic sites, landscaping and other scenic beautification.
  - Safety
    - Provides funding for rail-highway crossings and hazard elimination activities on any public road.
- ✧ Highway Users Revenue Fund (HURF) or Arizona Highway Users Revenue (AHUR) Fund is a state resource and is defined by the Arizona Department of Transportation.
  - The State of Arizona taxes motor fuels and collects a variety of fees and charges relating to the registration and operation of motor vehicles on the public highways of the state. These collections include gasoline and use fuel taxes, motor carrier taxes, vehicle license taxes, motor vehicle registration fees, and other miscellaneous fees. These revenues are deposited in the Arizona Highway User Revenue Fund (HURF) and are then distributed to the cities, towns and counties and to the State Highway Fund. These taxes

represent the primary source of revenues available to the state for highway construction and improvements and other related expenses.

- ✧ Local Transportation Assistance Fund (LTAF) is a local resource. There are two LTAF funds namely LTAF I and LTAF II as defined by the Arizona Department of Transportation
  - LTAF I
    - The Local Transportation Assistance Fund is funded from state lottery proceeds up to $23 million per year. The funds are distributed to cities and towns on the basis of population. The funds can be used for public transportation and transportation purposes depending on the jurisdiction's population. This fund is not administered by the Arizona Department of Transportation.
  - LTAF II
    - The 1998 Legislature passed HB 2565 to provide additional statewide transit and transportation funding to incorporated cities and towns as well as the counties. The LTAF II funding is in the form of multistate lottery game and instant bingo game monies along with a portion of the State Highway Fund's Vehicle License Tax monies. The Department administers the LTAF II and the State Treasurer's Office distributes the funds to the Regional Public Transportation Authority (RPTA), Metropolitan Planning Organizations (MPOs), and cities and counties not represented by a RPTA or MPO. The distribution of VLT monies to LTAF II is effective through September 30, 2003.
- ✧ Pinal County Transportation Excise Tax
  - The Pinal County Transportation Excise Tax is an additional tax collected by the Department of Revenue for regional transportation projects within Pinal County. Pinal County distributes approximately $700,000 with the Excise Tax alone. Since Apache Junction is located within Pinal County, some of the taxes may be of benefit for improving the roadway system as Apache Junction grows.
- ✧ Pinal County Sales Tax
  - The sales tax for Pinal County is currently 1% of each dollar spent. 0.5% is considered roadway tax, which may be used for funding some of the City of Apache Junctions growth in the future.
- ✧ Transportation Improvement Districts
  - Roadway improvements can be provided in designated areas by means of improvement districts. An improvement district can be used to undertake a variety of public work improvements such as roadway widening and paving.
- ✧ County Assistance Fund (Lottery)
  - The County Assistance Fund consists of a percentage of lottery revenues, not to exceed $7.65 million per year. Pinal County received approximately $550,000 in Fiscal Year 2003. The State Treasurer distributes the money as follows:
    - 93.47% to counties with a population less than 500,000

- 6.53% to counties with a population more than 500,000. (currently Maricopa and Pima County)

✧ Methods of private/public involvement
- Public/private funding sources have been common in street transportation projects for many years. Common sources include transportation and municipal bonds as well as dedicated right-of-ways, impact fees and special fees.

✧ Developer contributions
- Impact Fees
  - Impact fees are funds used to build a portion of the new infrastructure that is needed to provide services to new development. Impact fees are based on the type of land use being developed, the building area, gross site area, water meter sizes and the drainage fixture characteristics of the proposed development. The amount charged for impact fees is based on the estimated demand the development will place on City services and the estimated taxes the new development will generate to pay for new infrastructure. In rapidly growing communities, impact fees make new residences and businesses pay their fair share of new infrastructure costs. Impact fees also help make growth acceptable to existing residents. By collecting impact fees that take into account the future tax-generating capabilities of the new developments, the City of Phoenix can show its citizens that new growth is paying it fair share of infrastructure costs.

7.2 Project Implementation Schedule

7.2.1 Schedule

The City will determine a project implementation schedule at a later date.

7.2.2 Cost Estimate

The cost estimate included in this report is very generalized due to the high amount of dollars needed for all recommended improvements including the addition of a new freeway. Because of the many unknown cost variables, it is recommended that further cost analysis be done for each future project. It should be noted that although the potential realignment of US 60 is not yet built, KM has assumed that the bypass will be designed as a 4-lane freeway and constructed by Pinal County and ADOT before these improvements are needed.

TABLE 7.2.1: Estimated Improvement Costs

Functional Classification	***Length in Miles***	***Cost ($ in Millions)***
New Freeway (6 lane)	5	$250
Freeway Widening (from 4 Lane to 6 Lane)	11	$220
Freeway Interchange		$100
4 New Freeway Ramps		$10
Freeway Ramp Widening (15 ramps)		$15
Freeway Subtotal		***$595***
New 6 Lane Arterial	31	$120
New 4 Lane Arterial	3	$9
New Roadway Subtotal		***$129***
Widen 4 Lane to 6 Lane	34	$51
Widen 2 Lane to 6 Lane	21	$63
Widening Subtotal		***$114***
4 (1/4 mile long) Flood Control Bridge Structures	1	***$10***
Total ($ in Millions)		***$848***

8.0 POLICIES AND GUIDELINES

8.1 Traffic Impact Analysis Guidelines

All new development and any existing development that is being altered within the City of Apache Junction will complete a Traffic Impact Analysis (TIA) and will follow the Traffic Impact Guidelines provided by MCDOT. The MCDOT guidelines are located in Appendix E. Below is a summary of the guidelines to be used, taken from the 2003 MCDOT Traffic Impact Procedures, that will be used for existing and future City of Apache Junction developments.

8.1.1 Traffic Impact Analysis Key Issues

A key objective for the City of Apache Junction is to continue the operating, safety and efficiency of its roadway system. The Traffic Impact Analysis Guidelines as outlined in this document have been established to meet this objective

A Traffic Impact Analysis Study identifies existing traffic volumes and conditions, development traffic volumes and conditions and their combined impacts on the existing and future roadway system. The TIA is a useful took for identification of potential traffic problems and can play an important part in the success of a development. The performance of a TIA provides an opportunity for the City and the developer to share information and jointly address traffic related problems. It provides a means of balancing development needs with the functional integrity of the roadways that serve both the development and the region. The need for a Traffic Impact Analysis should be assessed as early as possible in the development process when there is a maximum flexibility for eliminating traffic-related problems.

A TIA will be required of all developments or additions to existing developments generating 100 or more trips during the morning or afternoon peak hour. A TIA will be required for any commercial/industrial structure or combination of structures totaling fifty thousand (50,000) square feet or greater in size. A TIA may also be required for developments generating lower peak hour volumes where; current traffic problems or concerns exist, the public may perceive an adverse impact on the adjacent neighborhoods or other areas, the proximity of site drives to other drives or intersections could create traffic concerns, or other specific problems or concerns may be aggravated by the proposed development. Should such conditions arise, the City Traffic Engineer will evaluate the need for the study based on technical merit.

A TIA may be prepared by an engineering firm selected by the developer or, if requested, by an on-call consultant under contract to the City of Apache Junction.

A draft report will be submitted to both the developer and the City for review. Review comments are to be provided within two weeks of submittal. If it is determined that the proposed development falls within two or more governmental jurisdictions, an agreement will be made by the City of Apache Junction, the developer and involved agencies and an additional two weeks will be added for a maximum review period of four weeks.

8.1.2 TIA Evaluation

Developments are classified into categories in order to determine their specific analysis requirements and the level of detail needed in the report.

- *Category I*
  Developments that generate 100 or more peak hour trips but fewer than 500 trips during the morning or afternoon peak hour. A Category I TIA may also be required for sites generating less than 100 trips in the morning or afternoon peak hour for any of the following reasons
  - The existence of any current traffic problems or concerns in the local area such as an offset intersection, a high number of traffic accidents, etc.
  - The sensitivity of the adjacent neighborhoods or other areas where the public may perceive an adverse impact
  - The proximity of site drives or other drives or intersections
  - Other specific problems or concerns that may be aggravated by the proposed development

  Should such conditions arise, the City Traffic Engineer will evaluate the need for the study based on technical merit.

- *Category II*
  Developments that generate 500 or more peak hour trips but fewer than 1,000 trips during the morning or afternoon peak hour.

- *Category III*
  Developments that generate 1,000 or more peak hour trips but fewer than 1,500 trips during the morning or afternoon peak hour.

- *Category IV*
  Developments that generate more than 1,500 trips during the morning or afternoon peak hour.

8.1.3 Analysis Approach and Methods

Traffic analysis approach and methods are as follows:

TABLE 8.1.1: Traffic Impact Analysis Approach

Analysis Category	***Development Characteristic***	***Study Horizons (a)***	***Minimum Study area (b)***
I	Small Development 100-499 Peak Hour Trips	1. Opening Year	1. Site access drives 2. Adjacent signal controlled intersections within ¼ mile and/or major street intersections without signal control and driveways within 500 feet.
II	Moderate Development 500-999 Peak Hour Trips	1. Opening Year 2. 5 Years after opening	1. Site access drives 2. All signal controlled intersections within ½ mile and/or major street intersections without signal control and major driveways within ½ mile
III	Large Development 1,000-1,500 Peak Hour Trips	1. Opening Year 2. 20 Years after opening	1. Site access drives 2. All signal controlled intersections within 1 mile and/or major street intersections without signal control and driveways within 1 mile.
IV	Regional Development >1,500 Peak Hour Trips	1. Opening Year 2. 20 Years after opening	1. Site access drives 2. Key signal controlled intersections and major street intersections without signal control within 3 miles

a. Assume full occupancy and build-out for single-phase developments. Multi-phase developments may require assessment of up to three (3) horizon years corresponding to key phases as directed by the City Engineer.

b. An enlarged study area may be required when the minimum study areas identified in Table 8.1.1 do not provide sufficient information to meet the intent of the Traffic Impact Analysis Guidelines.

- *Study Area*

  The minimum study area will be determined by project type and size in accordance with the criteria in Table 8.1.1. The study area for the proposed development includes traffic signal controlled intersection; intersections without signal control and driveways to ensure their operation and level of service are adequately assessed. The City Traffic Engineer may require expansion of the study area when the minimum study areas identified in Table 8.1.1 do not provide sufficient information to meet the intent of the TIA guidelines.

- *Study Horizon Years*

  To be determined by project type and size in accordance with the criteria in Table 8.1.1.

- *Analysis Time Period*
  - Both the morning and afternoon weekday peak hours are to be analyzed. If the proposed project is expected to generate no trips or a very low number of trips during either the morning or evening peak periods, the requirement to analyze one or both of these periods may be waived by the City Traffic Engineer.
  - Where the peak traffic hour in the study area occurs during a time period other than the normal morning or afternoon peak travel periods (for example: midday), or occurs on a weekend, or of the proposed project has unusual peaking characteristics, these peak hours must also be analyzed.

- *Seasonal Adjustments*

  The traffic volumes for the analysis hours should be adjusted for the peak season, if appropriate. Use of seasonal adjustment factors should be approved by the City Traffic Engineer. The intent is not to assess maximum peak hourly volumes, such as the day after Christmas for a retail development, but to address peak seasonal volumes. If traffic counts were collected in a retirement community in July, and the peak traffic period occurs during the winter months, the counts should be adjusted to winter months.

- *Data Collection Requirements*

  All data is to be collected in accordance with the latest edition of the ITE Manual of Transportation Engineering Studies or as directed by the City Traffic Engineer if not specifically covered in the ITE manual.

- *Trip Generation*
  - The latest edition of the ITE's *Trip Generation Manual* shall be used for selecting trip generation rates. The guidelines contained in the *Trip Generation* shall be used to determine whether the average trip generation rate or equation should be used.
  - Other rates may be used with the approval of the City Traffic Engineer in cases where *Trip Generation* does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been shown to differ from the ITE rates.

- *Trip Distribution and Assignment*
  - Projected trips shall be distributed and added to the projected non-site traffic on the roadway network.
  - Projected trips shall be distributed based upon the market area. The market area is the area surrounding the site from which the project is likely to draw a high percentage (80 percent or more) of its trips. The market area shall be established based upon a travel distance derived from the travel time and travel speed. The market area will be determined with the

criteria in Table 2 of the MCDOT Traffic Impact Procedures, 2003 located in Appendix E. For development types not shown in Table 2, the market area will be determined based on the distance to similar competing developments. Peak hour speed limits shall reflect actual roadway conditions. The market area may be modified to account for similar commercial developments with concurrence of the City Traffic Engineer.

- ✧ Specific assumptions and data sources used in deriving trip distribution and assignment shall be documented in the report.

- ⌑ *Capacity Analysis*
  - ✧ Level of service shall be computed for signal controlled and non-signal controlled intersections as identified in the Study Area in Table 8.1.1, in accordance with the latest edition of the *Highway Capacity Manual*.
  - ✧ For signal controlled intersections, operational analyses shall be performed for time horizons up to 5 years. Operational analyses shall also be performed for street sizing. The planning method will be acceptable for time horizons beyond 5 years and is also acceptable for Traffic Impact Analysis Studies prepared at the Development Master Plan level, unless used for street sizing.
  - ✧ For urban roadways, and rural highways where signal controlled intersections are at or less than 1 mile apart, the capacity of the roadway is generally dominated by the capacity of the adjacent signal controlled intersections. Roadway levels of service need not be computed for these facilities.
  - ✧ For rural highways where the signal controlled intersections are more than 1 mile apart, the level of service on the highway shall be estimated in accordance with the latest edition of the *Highway Capacity Manual*.

- ⌑ *Traffic Signal Needs*
  - ✧ A traffic signal needs study shall be conducted for all arterial/arterial, arterial/collector and collector/collector intersections within the Study Area for the opening year. If the warrants are not met for the opening year, they should be evaluated for a 5 year horizon for Categories II, III and IV.
  - ✧ Traffic signal needs studies shall be conducted per ADOT PGP-4C-2-X "Traffic Signal Needs Study".

- ⌑ *Queuing Analysis*

  A queuing analysis shall be conducted for all turn lanes under stop or signal control within the Study Area. Various methods for computing queue lengths may be used. Examples of approximate methods for estimating queue lengths for signal controlled and non-signal controlled intersections are given below.
  - ✧ For signal controlled intersections – find the number of vehicles arriving at the intersection (ADOT Traffic Impact Analysis for Proposed Development, p25). An example can be found on page 11 of the MCDOT Traffic Impact Procedures, 2003, located in Appendix E.

Vehicles/cycle (for random arrivals) = 2 x (vehicles/hour)/(cycles/hour)
Storage length = vehicles/cycles x 25feet

- For non-signal controlled intersections – find the number of vehicles per average 2 minute period (AASHTO Green Book, p829). An example can be found on page 12 of the MCDOT Traffic Impact Procedures, 2003, located in Appendix E.

Vehicles/2 min period = (vehicles/hour)/(30 periods/hour)
Storage length = vehicles/2 min period x 25feet

8.1.4 Report Formats and Approvals

- *Report Format*

  The report format can be found on page 13 of the MCDOT Traffic Impact Procedures, 2003, located in Appendix E.

- *Certification*

  The Traffic Impact Analysis shall be prepared under the supervision of a Professional Engineer (Civil) registered in the State of Arizona.

- *Approvals*

  Approvals are as follows:
  - Submit traffic impact analysis to the City Traffic Engineer and/or developer.
  - A two week review will be provided. If another jurisdiction is involved, an inter-jurisdictional agreement will be made between the City, developer and agencies involved. The review period will be extended an additional two weeks for a maximum review time of four weeks.
  - The City Traffic Engineer or designated representative shall review and approve the TIA.
  - Should the developer be unable to meet the approval of the City Traffic Engineer, the developer may make an appeal to the Director of Transportation at the City of Apache Junction.

8.2 Functional Classification within the Roadway Design Guidelines

The City of Apache Junction except through the use of typical sections in the City of Apache Junction Engineering Guidelines, 1995, has not yet addressed functional Classifications. In this report, we are introducing the definitions of the different functional classifications and new naming structures for future use as a guide for future transportation planning.

8.2.1 Residential

Residential streets provide short distance traffic movement between collectors and adjacent lands. Residential streets are normally two lane undivided roadways utilizing stop signs as traffic control. The City of Apache Junction allows for 50 feet of right-of-way and 5 foot sidewalk. A traffic volume of 700 vehicles per day or less is acceptable for residential roads. The residential typical section is illustrated in Exhibit 13.

8.2.2 Collector

Collector streets provide short distance traffic movement between various local traffic generators. Traffic generators can include cities, counties, businesses or commercial developments. Signal spacing is usually 2 miles or greater and development is allowed to front the roadway. Access is normally not controlled, as typical major collector roadways are two lane roads. Collector roads can be 2 lane undivided roadways or 4 lane divided roadways depending on the amount of traffic from local generators. The City of Apache Junction allows for 60 feet of right-of-way, 6' bicycle lanes on each side of the travel way and 5' sidewalk. Collectors can typically handle traffic volumes between 5,000 to 7,100 vehicles per day before needing to be improved. The collector typical section is illustrated in Exhibit 13.

8.2.3 Major/Minor Arterial (previously known as: Section Line & Mid-Section Line)

Major and minor arterial streets provide moderately long distance traffic movement where service to abutting land is more moderate and accepted. Access is typically controlled through frontage roads, raised medians or spacing and location of driveways and intersections. Raised median or a continuous two-way left turn lane usually separates opposing traffic flows. Major and minor arterials can typically handle traffic volumes between 19,000 to 27,500 vehicles per day before needing to be improved. Major and Minor arterials are typically four lanes in width including bicycle lanes. The City of Apache Junction will maintain 80 feet of right-of-way, 6' bike lanes on both sides of the travel way and 5' sidewalk for Minor Arterials and 100 feet of right-of-way, 6' bike lanes, a two-way left turn lane and 5' sidewalks for Major Arterials. The Major and Minor Arterial typical sections are illustrated in Exhibit 14.

8.2.4 Principal Arterial

Principal arterial streets provide for long distance traffic movement where service to abutting land is somewhat limited. Access is normally controlled through frontage roads and raised medians. Principal arterials are typically four to six lanes in width with adjacent bicycle lanes and sidewalk depending on the amount of right-of-way. The City of Apache Junction's definition of Principal Arterial includes 150 feet of right-of-way, 6' bike lanes on both sides of the travel way, raised median, landscaping area and 5' sidewalk. Principal Arterial roadways can typically handle a

traffic volume of 19,000 to 50,000 depending on the number of lanes provided. The 4-lane and 6-lane Principal Arterial typical sections are illustrated in Exhibit 15.

8.2.5 Parkway

Parkways are defined per the City of Scottsdale Design Standards & Policy Manual as high volume, high capacity facilities where direct access is limited. A parkway provides for regional mobility rather than local traffic movements. Parkways can typically handle a traffic volume of 35,000 to 50,000 depending on the number of lanes provided. Parkways also include scenic easements near the edge of right-of-way that give the added attraction of desert landscaping along the regional routes. The City of Apache Junction is using the City of Scottsdale's Typical Section for a Parkway as a resource to implement the City of Apache Junction's version of a 6-lane parkway typical section. The City of Apache Junction's 6-lane Parkway includes 150 feet of right-of-way, 6' bike lanes on both sides of the travel way, raised median, landscaping area, 5' sidewalks and 50' scenic easements. The Parkway typical section is illustrated in Exhibit 16.

8.2.6 Freeway

Freeways are defined by providing an expeditious movement of large volumes of through traffic. Typically, a freeway is a high speed divided four to 10 lane roadway with a generous amount of median, grade separated ingress and egress ramps and at least 300 feet of right-of-way. As a minimum requirement, ingress and egress ramps are spaced a mile apart. A freeway is not intended to provide access to abutting land. Freeways typically have a traffic volume range of 52,900 to 126,900 vehicles per day. The Freeway typical section is illustrated in Exhibit 16.

The following major study area roadways and their functional classifications are listed below.

8.3 Bicycle and Pedestrian Guidelines

Guidelines for the planning and design of bikeway facilities in the Apache Junction area should be based on the 1999 AASHTO Guide for the Development of Bicycle Facilities. Bicycle facilities include separated bike paths, striped bike lanes, signed bike routes, and other shared roadways such as multi-purpose trails. Multi-purpose trails generally consist of a 10-foot bike/pedestrian path that is separated from the roadway.

8.4 Landscape and Hardscape Guidelines

All new or improved roadways within the City of Apache Junction will be required to follow landscape and hardscape guidelines. City of Apache Junction Parks, Open Space , and Right of Way Landscape Standards along with Ordinances 940, 1095, 1151, and the MCDOT Roadway Design Manual, 1993 assisted in establishing guidelines for future landscape and hardscape plans. A copy of the MCDOT Landscape Guidelines is located

in Appendix F. Below is a summary of the guidelines to be used, taken from the MCDOT Landscape Guidelines in the MCDOT Roadway Design Manual that will be used for existing and future City of Apache Junction developments. These landscape and design standards have been written to serve as a guide to landscape architects and highway engineers for purpose of designing and reviewing roadway landscape plans.

8.4.1 Design Criteria

The design shall be respectful of existing natural features such as landforms and vegetations. When the roadway traverses urban developed areas, the landscape design shall reinforce the adjacent landscape theme or character. The principles of low maintenance and low water use shall be incorporated into all landscape designs.

Under any circumstances, the design shall not compromise on safety of all roadway users, including motorists, pedestrians, bicyclists, and construction and maintenance workers.

Many elements need to be considered during development of the landscape design. The landscape design process shall begin with a thorough inventory and analysis of existing conditions, including: the natural landscape elements, topographic and physical characteristics, ecological factors, recreational potentials, residential qualities, historical features and visual values.

Subsequent steps in the design process will be determined by the size and complexity of the project.

Early in the project the landscape architect shall consult with the City for guidance on the landscape design submittal requirements, including sheet size, order of drawings, standard notes and details, special provisions, etc., and shall determine the anticipated review process, including names of the landscape reviewers, expected review time frames, and procedures for revisions and re-submittal of documents, etc.

8.4.2 Design Considerations

Design considerations include:

- *Alignment & Profile – Visibility, sight distances and sight line/triangles*
  The purpose of plant material placement and height restriction is to maintain intersection visibility for the driver to turn safety. Sight distance is a function of design speed and street width.

  A required minimum sightline must be maintained for all intersections whether driveway or street. An open view must be maintained between 30 inches (2.5 feet) and 48 inches above grade for proper visibility within the sightline triangle.

The sight distance triangle for an intersection is formed by the street right-of-way lines and a line connecting them at points thirty-three (33) feet from the point of intersection of the right-of-way lines. The sight distance triangle for a driveway is formed by the intersection of the driveway and the public right-of-way (on each side of the driveway), and a line connecting them at points twenty (20) feet from the point of intersection.

Groundcover, dwarf shrubs and other plants cannot be planted within the sight triangle area if they have a potential to reach a mature height greater than 30 inches above the roadway pavement. Trees shall be 36 inch to 42 inch box specimens with a canopy that can be maintained 8 feet above the sidewalk elevation without extensive pruning. Walls and other structures must not be higher than 2 feet. Vegetation shall not block sight lines to signs. The designer shall evaluate the plant choice for compliance with the sight line criteria. The City of Apache Junction may consider other plants for use on a project-by-project basis.

Sight distance lines must be shown, dimensioned & labeled on all landscape plans. Refer to Detail 111 of the City of Apache Junction Standard Details for layout and sight distance chart.

- *Alignment & Profile – Street frontage*

  Landscaping shall be provided along the street frontage between the street or sidewalk and any structures, parking areas, loading or storage areas in accordance with the following standards:
  - The intersections of arterial, section- or mid-section-line streets are a dominant feature for the urban landscape and serve as major focal points for activity in the community. Due to the visual importance of these intersections, the City may impose additional landscaped setbacks and design features, beyond the required minimum standards, on properties at these intersections at the time of rezoning and/or site plan approval. Such additional features may involve:
    - Wider and deeper setbacks
    - Unique building orientations and design
    - Special landscape features such as fountains, walls or screening devices
    - Unique building architecture
  - Where existing structures or adjacent parcels are built to the street property line, landscaping may be modified or located elsewhere on approval of the City of Apache Junction Development Services Director.

- *Roadside Development – offsite distances for trees*

  Trees, large shrubs and cacti whose trunk diameter at maturity will exceed 6 inches shall not be planted within the clear zone except in special circumstances. The diameter measurement shall be taken at 12 inches above grade. The clear zone width is not to be considered a fixed single control dimension. Variations in cross section design and traffic speed may increase or decrease this distance. Shrubs and ground covers may be planted or retained within the clear zone for safety and aesthetic purposes as approve by the City. Existing trees may be retained under the following circumstances:

  - If they are on the high or cut side of the roadway beyond the clear zone distance, or
  - If they are on the low or fill side, if protected by guardrail or beyond the clear zone distance.

  For 50 mph or greater design speed, minimum clearances for newly planted trees, shrubs and cacti with an ultimate trunk diameter of more than 6 inches shall be 30 feet unless one of the following reasons will allow for a lesser distance:

  - Where cut slopes are 3:1 or steeper; 10 feet behind the point of vertical intersection (PVI) at the toe of slope
  - Where concrete barriers, walls, abutments, or other rigid obstructions are used, 4 feet behind the obstruction.
  - Where a flexible guardrail is used (w-beam), 4 feet behind the rail
  - Where there are barrier curbs near a traveled lane, 10 feet behind the face of the curb (except medians)
  - Where limited right-of-way or the necessity for planting would result in less clearance; all factors in the particular problem area shall be weighed to decide if a special exception is warranted.
  - The offset where there is bicycle traffic shall be a minimum of 7 feet from the edge of the bicycle facility, and have a minimum 10 feet of clearance to the canopy.

  On curves, adequate sight distance for the design speed of the highway must be maintained. Modification of the minimum clearance may be required by special considerations. Plantings in the reduced clear zone shall consist of low-growing shrubs and groundcovers under 2 feet in height.

- *Landscaping in Medians*

  Apart from improving the roadway aesthetically, landscaping also assists in mitigating headlight glare and reducing potential for driver monotony.

  The minimum clearance for trees in the median is six feet behind the face of a curb, provided that the location meets the sight line criteria. Trees, shrubs or cacti that will exceed 6 inches in diameter at maturity shall not be planted in

median without curb. Mature tree growth shall be maintained 2 feet behind the face of curb.

- *Grading, Drainage, and Irrigation*

  On projects determined by the City of Apache Junction, topsoil shall be salvaged prior to construction. Before grading work begins, acceptable topsoil within the excavation and embankment areas shall be removed to a depth of not less than 4 inches below the existing ground surface. Stripped material shall be stockpiled and used as required as shown on the landscaping plans or stockpiled for future use at an acceptable location.

  The proper shaping of slopes can benefit drainage, erosion control, aesthetics, and future maintenance. Grading plans shall be used wherever feasible. The grading shall always be smooth enough to meet safety requirements, permit easy maintenance, and adequately serve the needs of surface drainage. Grading shall integrate the hydrology, aesthetics and earthwork needs for the site and maximize use of stormwater runoff to support the landscape development. If extensive grading is to be required, contact the City for requirements.

  In planting design, the following parameters shall be considered for erosion control:
  - Slopes with ratios of 3:1 and flatter favor the establishment of natural vegetation as protection against erosion. Slopes with ratios of 4:1 and flatter add to highway safety.
  - Plant along the contour of the slope. Avoid planting arrangements that would encourage erosion
  - Stabilize soils at dip sections in both the right-of-way and the median where applicable. The use of decomposed granite in dip sections is prohibited.

  The use of plants, which, once established, can survive on minimal supplemental water or natural rainfall, is recommended for areas to be maintained by the City. In urban areas or in special cases as determined by the City, underground irrigation will be necessary to establish and maintain new plantings. Such underground systems will improve the health of the plants and improve the overall appearance of the highway. Adjacent property owners who desire landscape improvements that will require periodic or full-time irrigation can enter into an agreement with the City to provide funding for all or portions of the landscaping, irrigation system and associated long-term maintenance of the improvements within City right-of-way.

8.4.3 Use of Plant Materials

In some cases, it may be necessary to maintain existing right-of-way plants in their present location and incorporate them into the final design. Plants to be protected in

place will be determined by the City after inventory and analysis has been completed. Plants to remain shall meet the clear zone requirements of this section.

Many native plants in Arizona are protected by law and can only be removed after a permit has been obtained from the Arizona Department of Agriculture, Plant Services Division. The Protected Plant List changes occasionally. Contact Arizona Department of Agriculture (602-543-4373) for the latest Listing.

On occasion, selected materials (including State-protected plants) will be analyzed for potential salvage and reuse on the project. The analysis will be accomplished using the results of Plant Inventory as directed by the City of Apache Junction during the course of this project. The species to be considered will depend on the project setting. Within urban areas, existing street trees important to the adjacent neighborhood could be candidates for salvage and reuse. The City of Apache Junction will make the final decision based on several factors that must be evaluated when plant salvaging is considered. They include:

- ✧ Age
- ✧ Health
- ✧ Overall condition
- ✧ Transplanting survivability
- ✧ Cost
- ✧ Scheduling impacts
- ✧ Storage opportunities

The bid documents shall state that prior to destroying State-protected plants, the contractor shall file a formal Notice of Intent to Clear Land (NICL) with the Arizona Department of Agriculture, if this Notice has not been completed during the design phase. The contractor shall obtain State permits prior to moving protected plants.

8.4.4 Recommended Plant List

In an effort to reduce consumption of water by landscaping, the State of Arizona issues a list of plant materials that can be used in the public right-of-way. Projects with landscaping in the right-of-way must use only those plants that are on the list as provided by the Phoenix AMA (Active Management Area). It should be noted that this list changes on an occasional basis. Turf grass is not allowed within the right-of-way. A copy of the AMA Plant List may be obtained from the Arizona Department of Water Resources.

8.4.5 Planting Recommendations and Considerations

Water must be minimized by using water conserving plant materials. Low maintenance and drought tolerant plants are highly recommended. Native desert and xeriscape trees and shrubs must be used whenever possible. Exotic plants shall be limited, if used at all.

Existing plant materials in the project area must be taken into consideration to provide design continuity. Impact on adjacent development must be mitigated. The existing landscape character must be evaluated, and landscape expectations obtained from citizen groups and the community. Community identities also shall be enhanced and regional character reinforced through the landscape design. Plant material must be appropriately selected and spaced to maximize visual continuity. Plants shall be used to buffer pedestrians from traffic. The climate for pedestrian comfort can be moderated with shade trees. Trees and shrubs shall be used predominantly, because of their longer life span as compared to groundcovers and herbaceous perennials.

There are specific plant types in and adjacent to the public right-of-way that are not allowed or whose use is not recommended. Trees shrubs with thorns are to be carefully placed to avoid injury to pedestrians and others using the public right-of-way. Thorny plants must maintain a minimum setback of 4 feet from roadways and sidewalks, and a minimum setback of 7 feet from the edge of a bicycle facility. Such plants will be allowed in a median island with vertical curb, provided a minimum of 4 feet is maintained from back of curb as a clear zone (measured from the nearest part of the plant). Whenever possible, thornless varieties shall be used.

Plantings shall be kept a minimum of 6 feet back from the edge of roadway when no vertical curb is present. Plantings shall be kept away from walls and fences to allow for maintenance of those structures. Trees and shrubs shall be planted so that at maturity they do not interfere with service lines and the property rights of adjacent property owners. The designer shall contact the appropriate utility company to obtain a list of trees acceptable for use over or under their utility lines.

Due to the risks of falling over and/or dropping large limbs, trees having shallow root systems or a weak branch structure shall not be used within 20 feet of the right-of-way limit or traveled way.

The use of plants producing large volumes of wind-blown pollen shall be kept to a minimum.

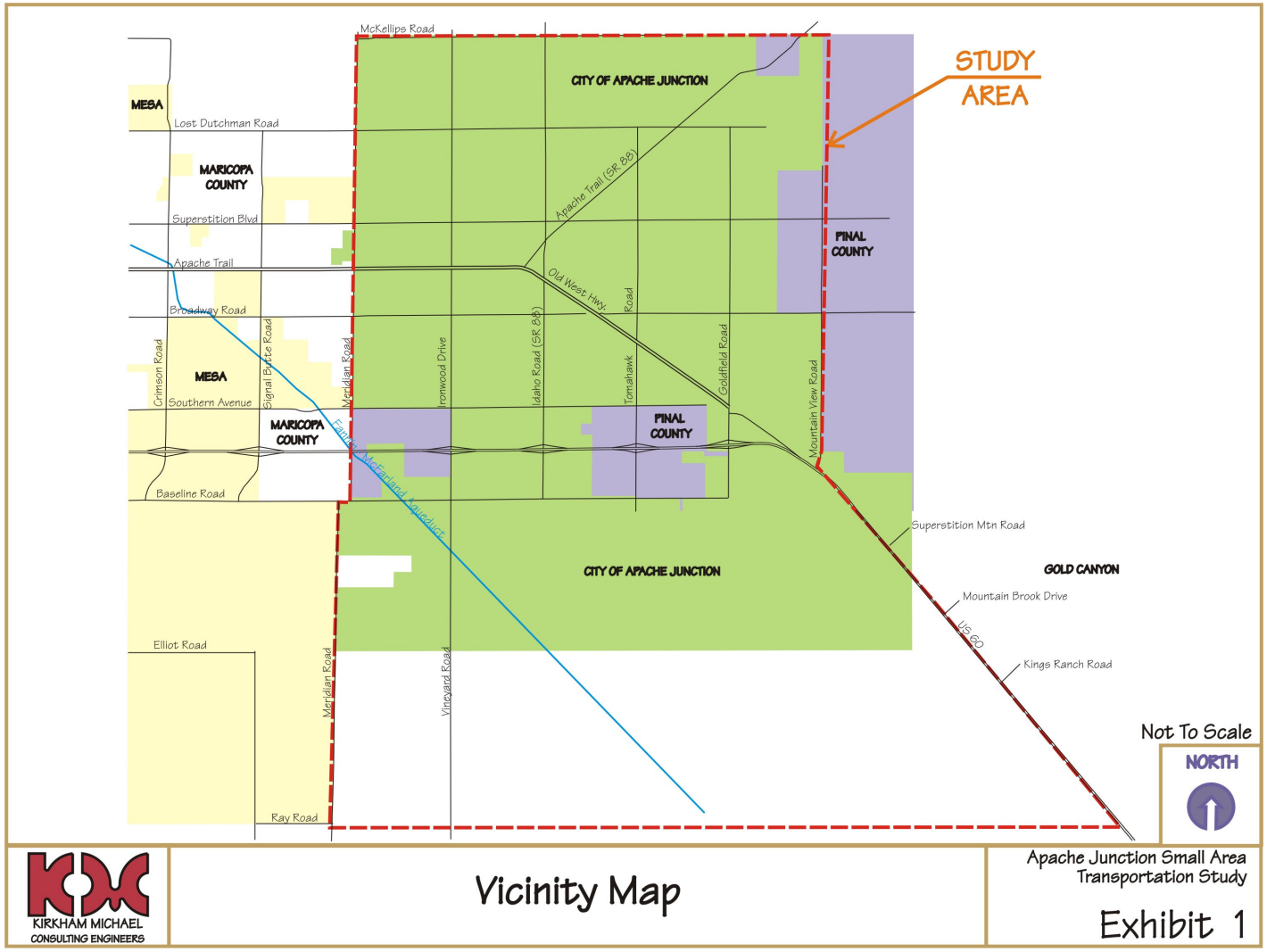
8.4.6 Landscape Plans

Planting plans shall be clear and concise and the processes of achieving aesthetic objectives clearly understood. Specifications for nursery stock, planting, seeding, and other types of landscape construction shall be clear, concise and embody the practice and quality of work best suited for the area. The landscape contractor shall be responsible for the condition of all plants during a specified establishment period. The bid documents shall be set up so that final acceptance and termination of the contract will not occur until expiration of the establishment period. Landscape plans shall include planting and staking details and a header detail, as well as the necessary irrigation details, if irrigation has been provided.

APPENDIX A

EXHIBITS

Exhibit 1: Vicinity Map



KIRKHAM MICHAEL
CONSULTING ENGINEERS

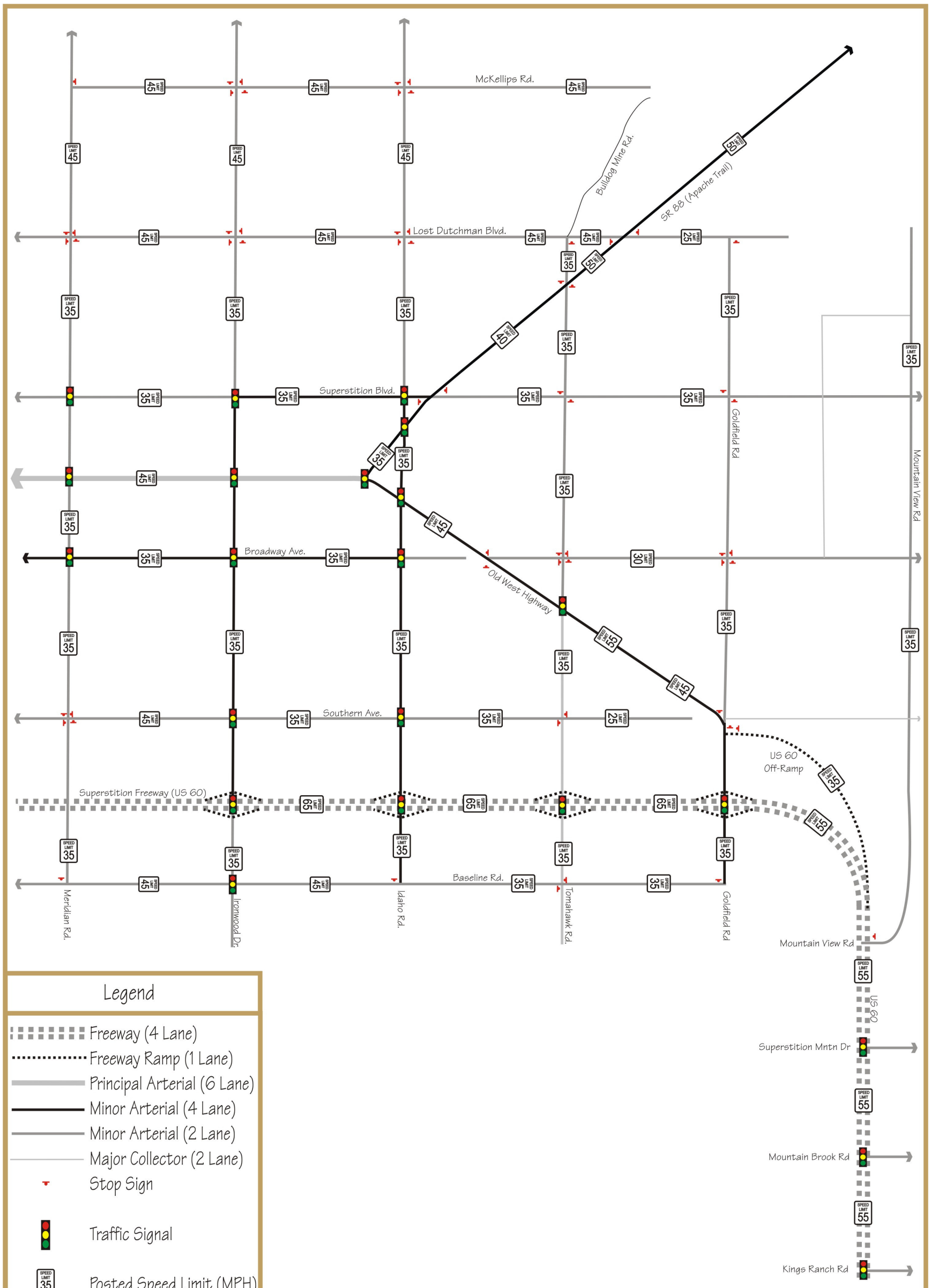
Vicinity Map

Apache Junction Small Area Transportation Study

Exhibit 1

K:\02\0207970\Figures\Ex1 - Vicinity Map.cdr

Exhibit 2: 2003 Roadway Conditions



KIRKHAM MICHAEL
CONSULTING ENGINEERS

2003
Roadway Conditions

Apache Junction
Small Area
Transportation Study

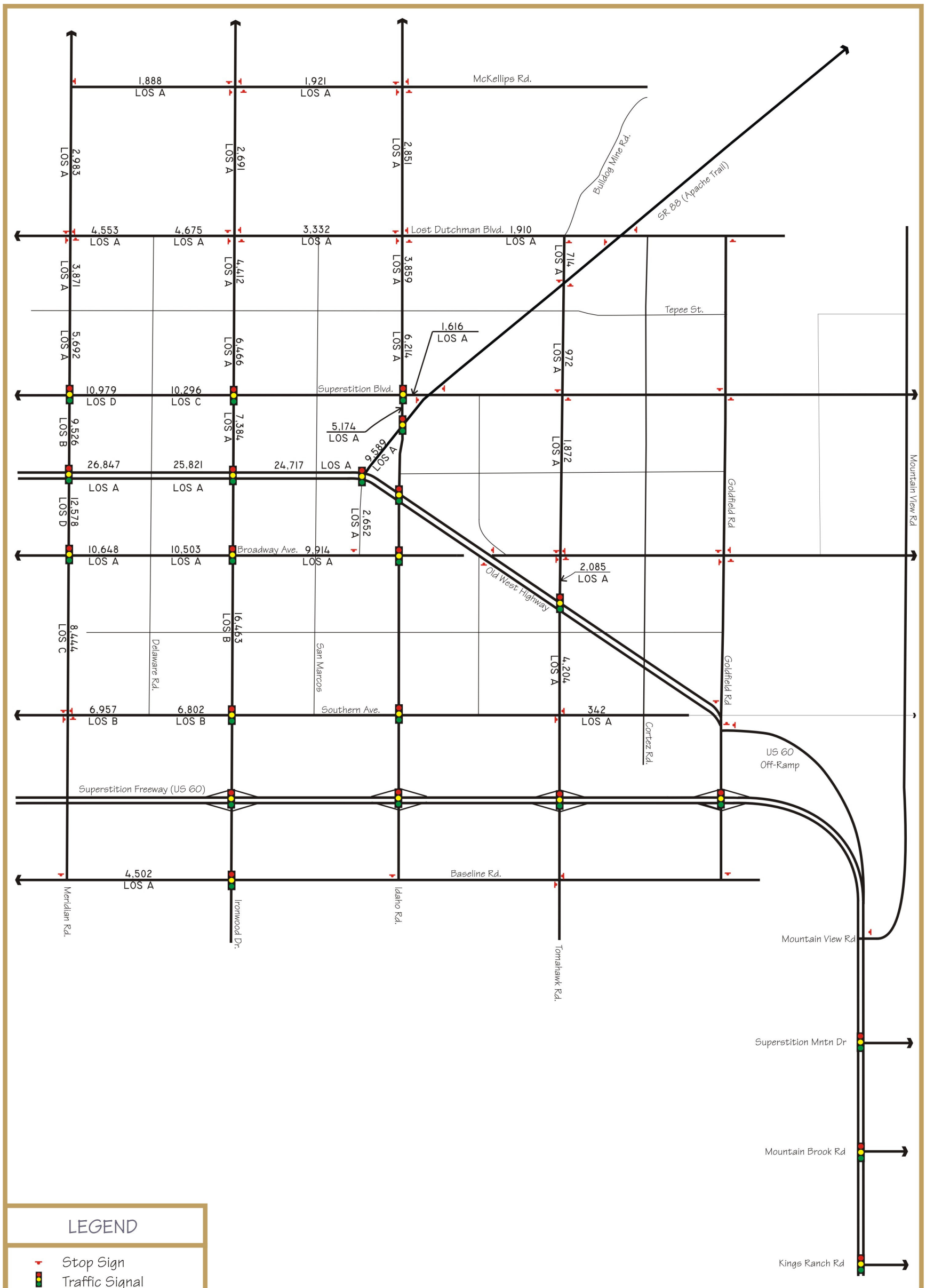
Not to Scale

NORTH

Exhibit 2

K:\0207970\Figures_Exhibit XX - Existing Conditions.cdr 03/28/03 KMT

Exhibit 3: 2003 Average Daily Traffic (ADT)



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CONSULTING ENGINEERS

2003
Average Daily Traffic
(ADT)

Apache Junction
Small Area
Transportation Study

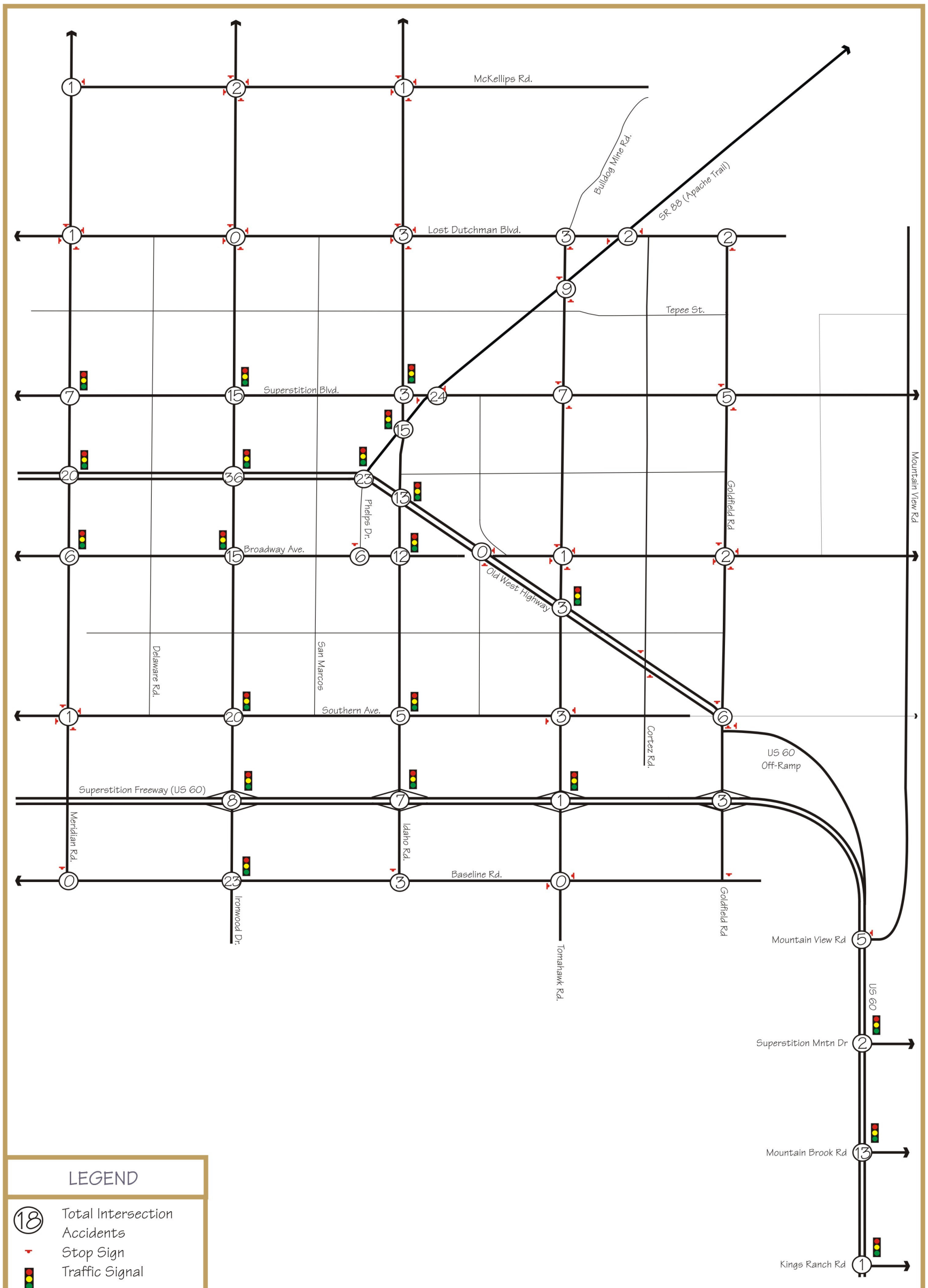
Not to Scale

NORTH

Exhibit 3

K:\0207970\Figures_Exhibit XX - Existing ADT.cdr 03/05/03 KMT

Exhibit 4: 3 Year Intersection Accident History



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3 Year
Intersection Accident History
(From Year 2000 to Year 2002)

Apache Junction
Small Area
Transportation Study

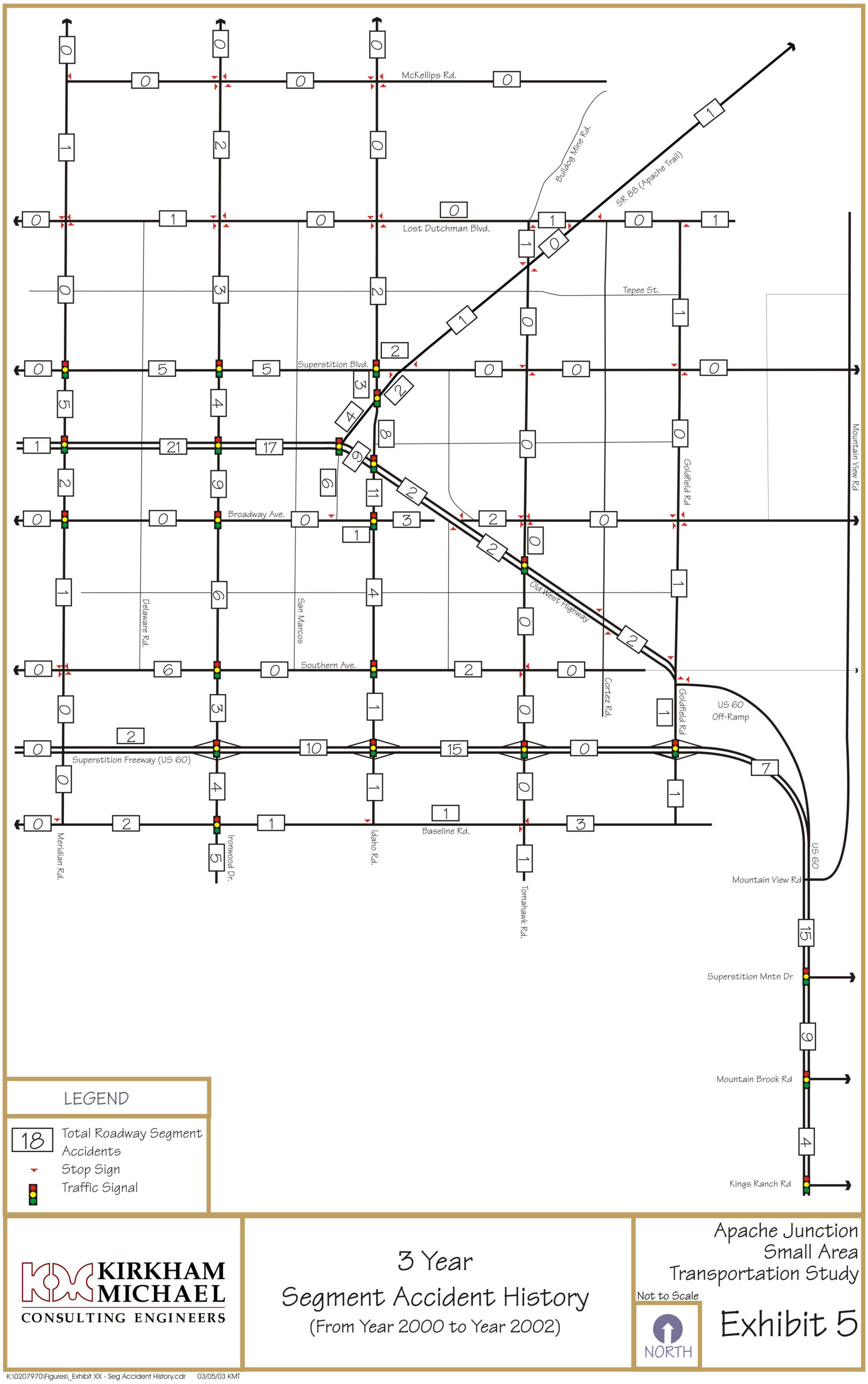
Not to Scale

NORTH

Exhibit 4

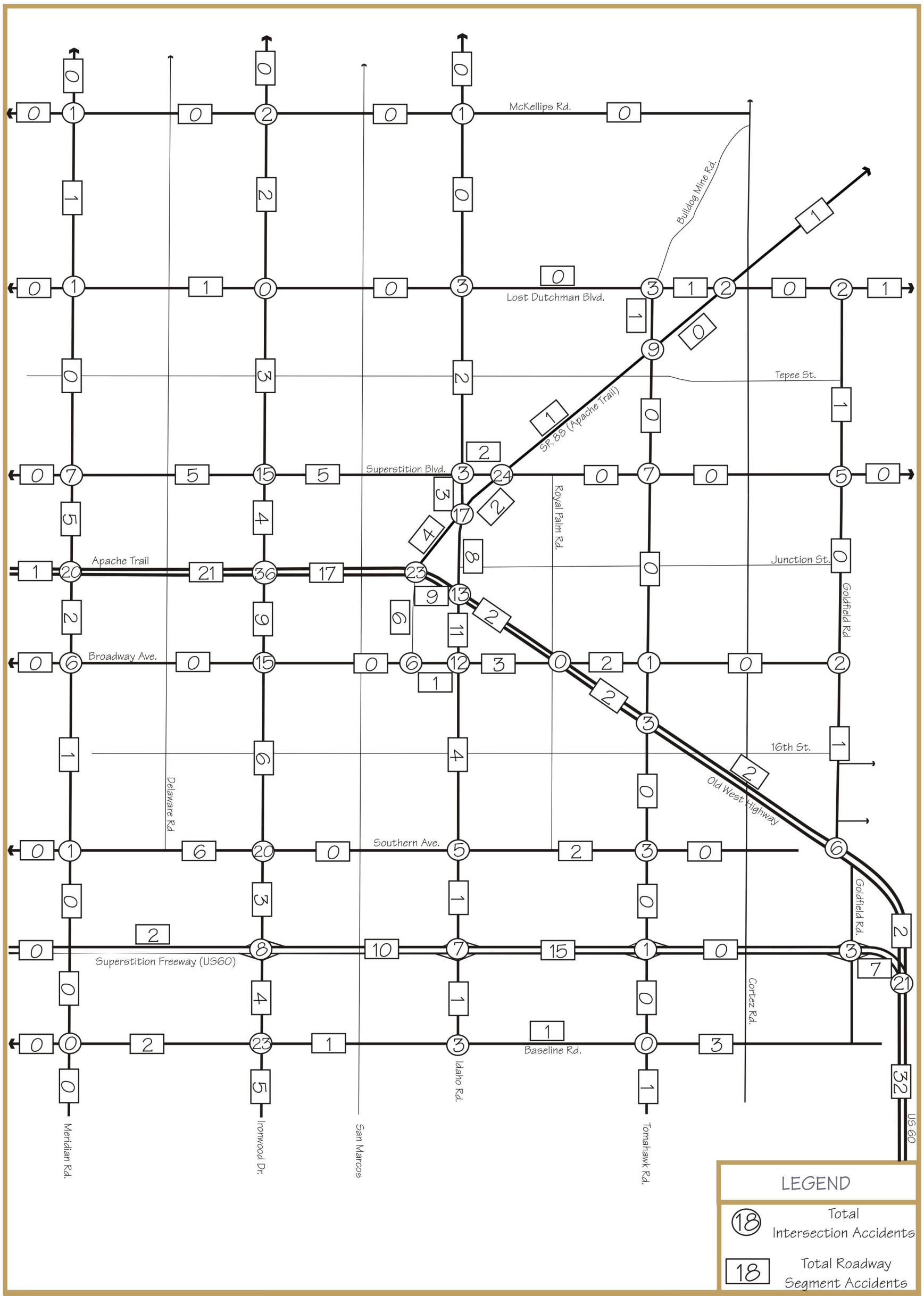
K:\0207970\Figures_Exhibit XX - Int Accident History.cdr 03/05/03 KMT

Exhibit 5: 3 Year Segment Accident History



K:\0207970\Figures_Exhibit XX - Seg Accident History.cdr 03/05/03 KMT

Exhibit 6: 3 Year Accident History (Intersections & Segments)



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3 Year
Accident History
Including Intersections & Segments
(from Year 2000 to Year 2002)

Apache Junction
Small Area
Transportation Study

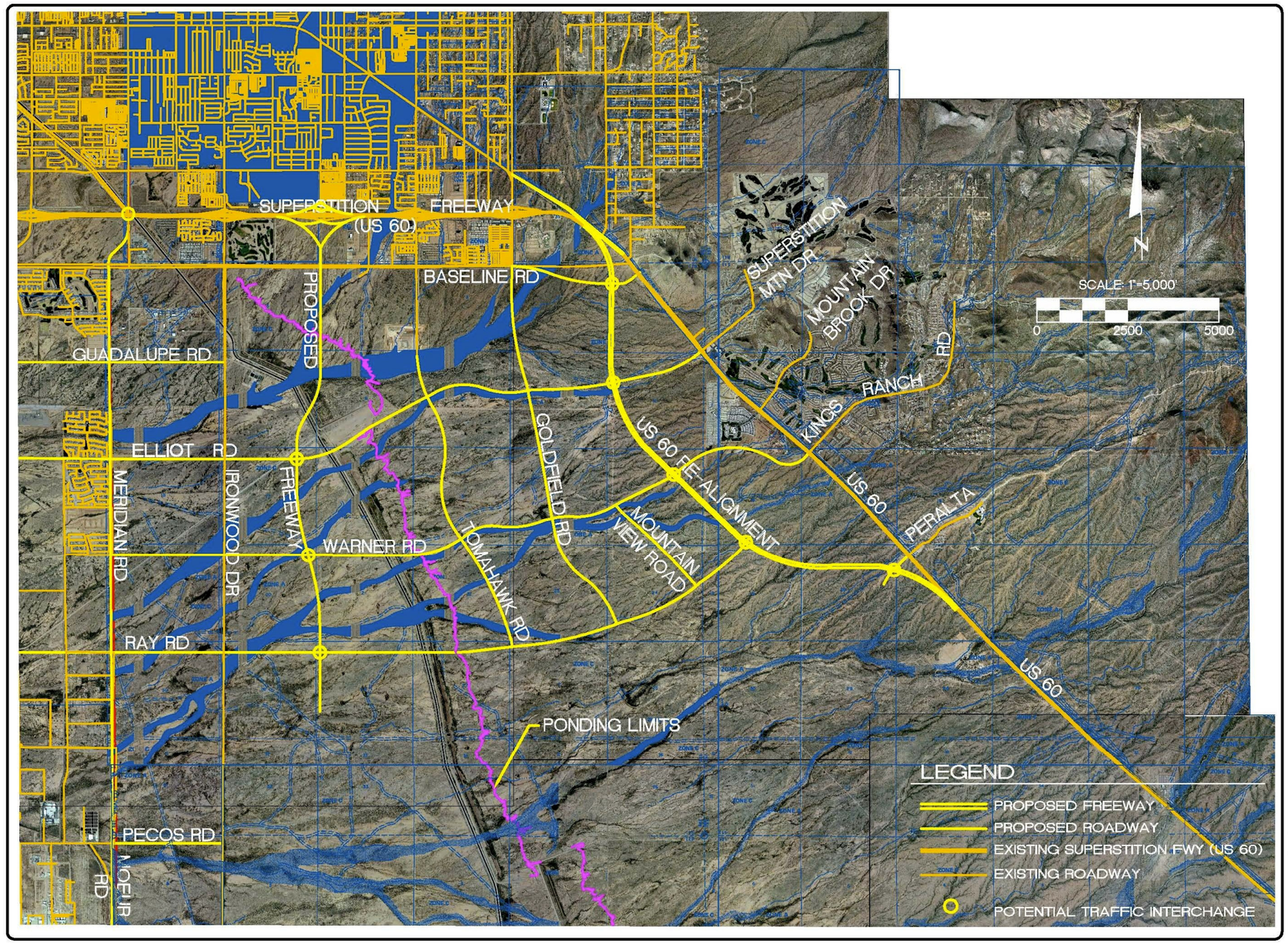
Not to Scale

NORTH

Exhibit 6

K:\0207970\Figures_Exhibit XX - Int Accident History.cdr 03/05/03 KMT

Exhibit 7: Future Roadway Network



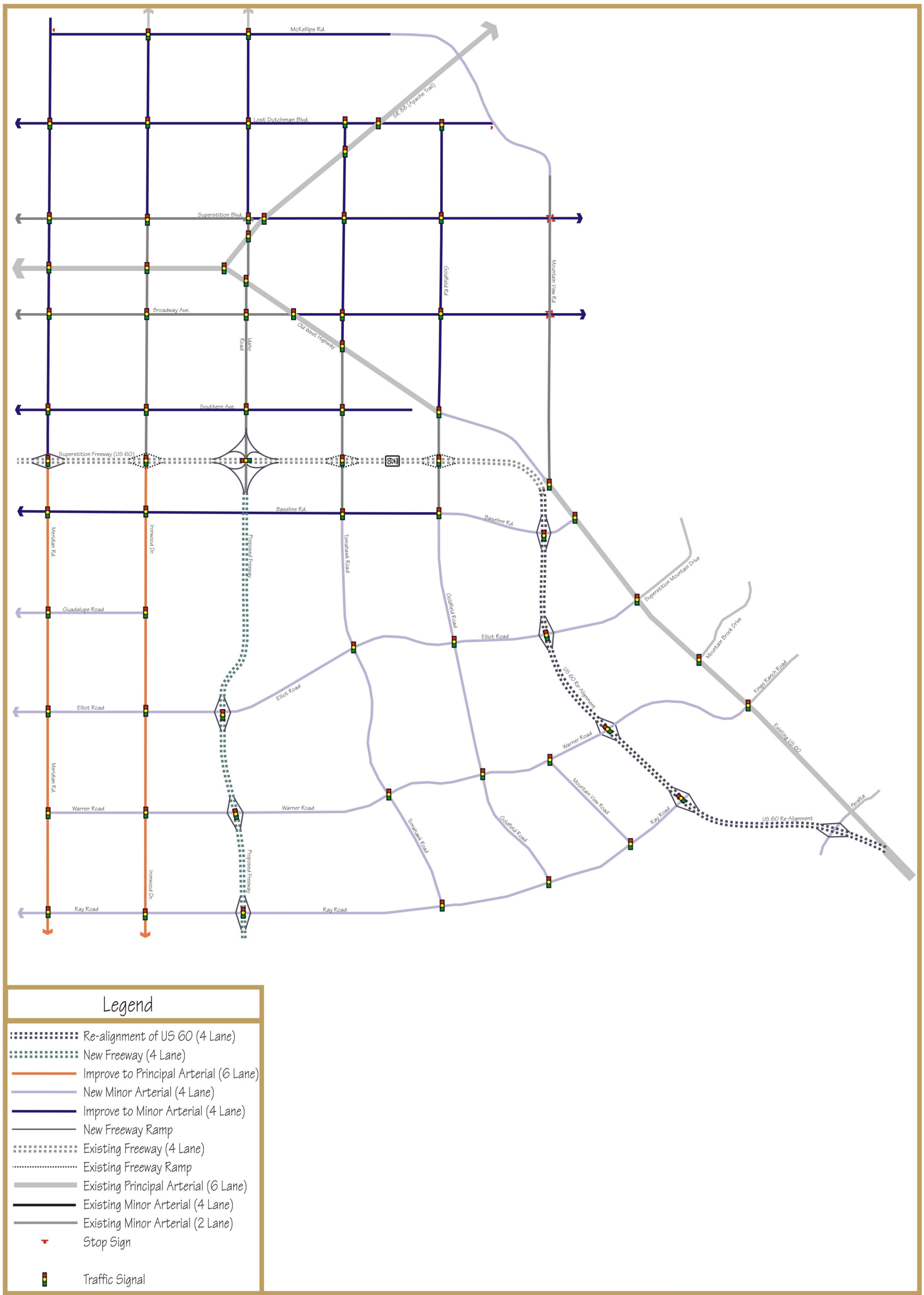
KM KIRKHAM MICHAEL
CONSULTING ENGINEERS
9201 NORTH 25TH AVENUE STE. 150 PHOENIX, ARIZONA 85021
(602) 944-6564 FAX (602) 944-6992

PRELIMINARY FUTURE ROADWAY NETWORK
CITY OF APACHE JUNCTION
SMALL AREA TRANSPORTATION STUDY
KM Project #0207970

01/08/04

EXHIBIT 7

Exhibit 8: Future Lane Configuration



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Future
Lane Configuration

Apache Junction
Small Area
Transportation Study

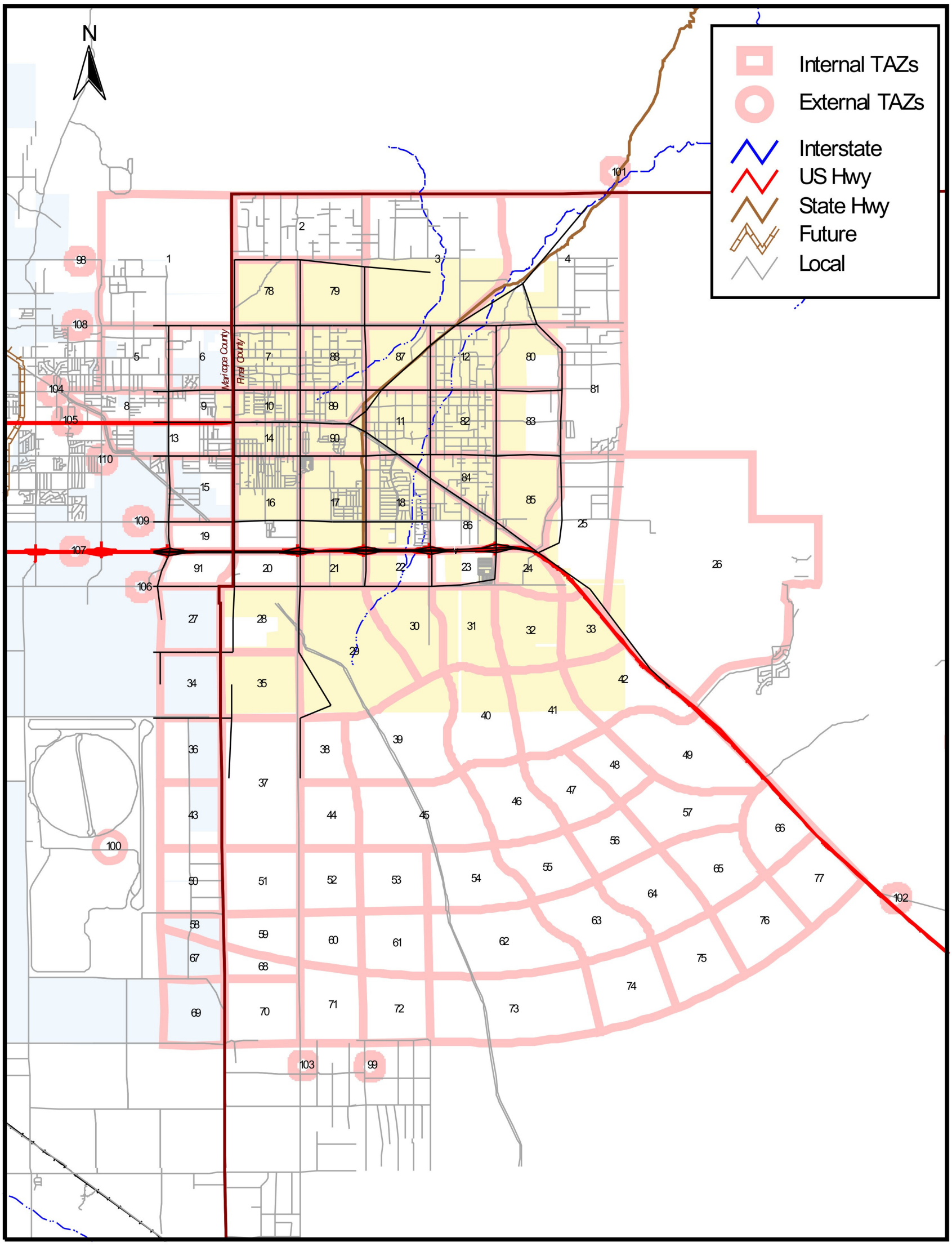
Not to Scale

NORTH

Exhibit 8

K:\0207970\Figures_Exhibit 8 - 2030 Roadway Configuration_11x17.cdr

Exhibit 9: Traffic Analysis Zones



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Traffic Analysis Zones
Provided by Lima & Associates

Apache Junction
Small Area
Transportation Study

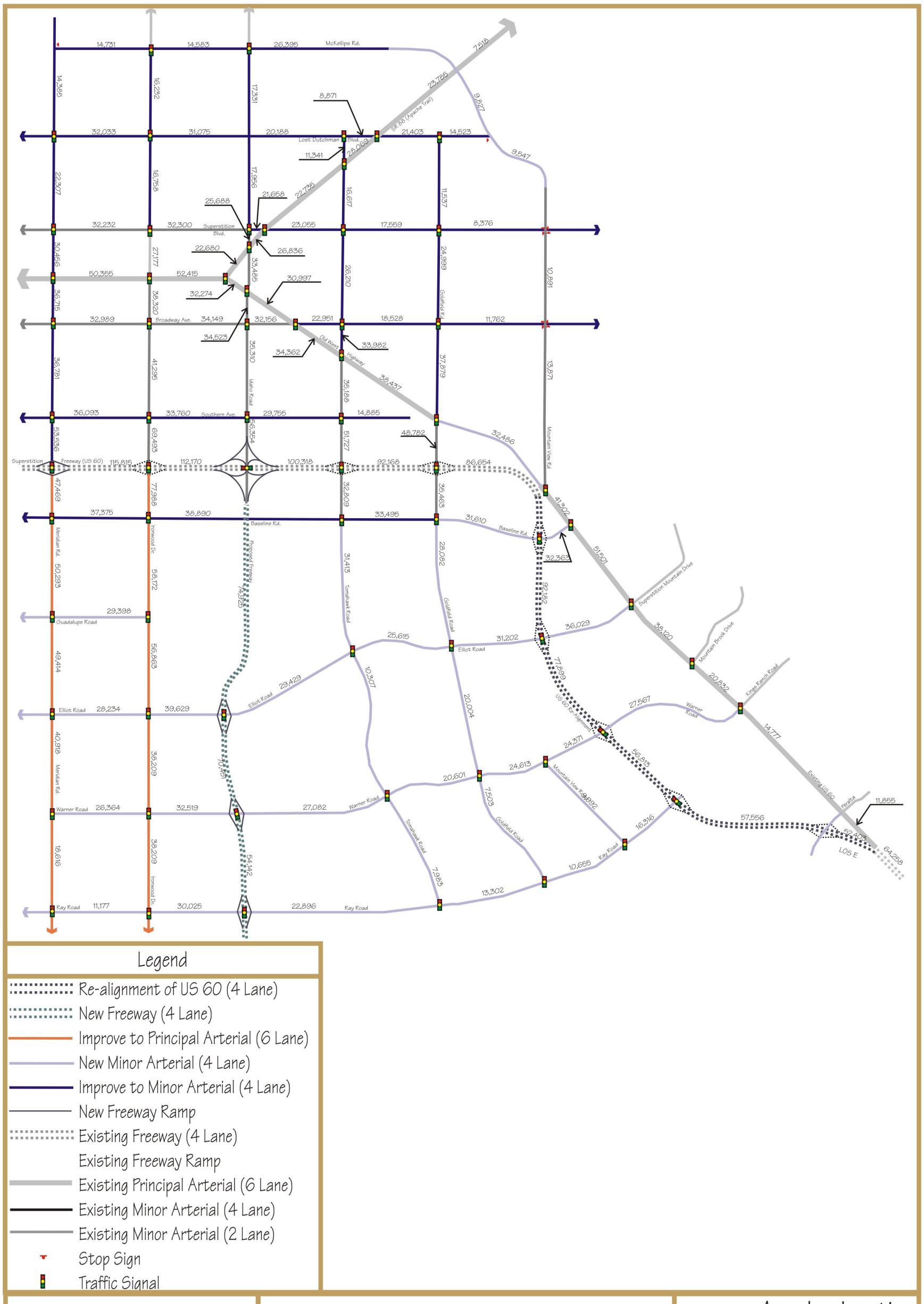
Not to Scale

NORTH

Exhibit 9

K:\0207970\Figures_Exhibit 9 - Traffic Analysis Zones

Exhibit 10: 2030 Traffic Volumes (Base Configuration)



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2030 Traffic Volumes
(with original future lane configurations)

Apache Junction
Small Area
Transportation Study

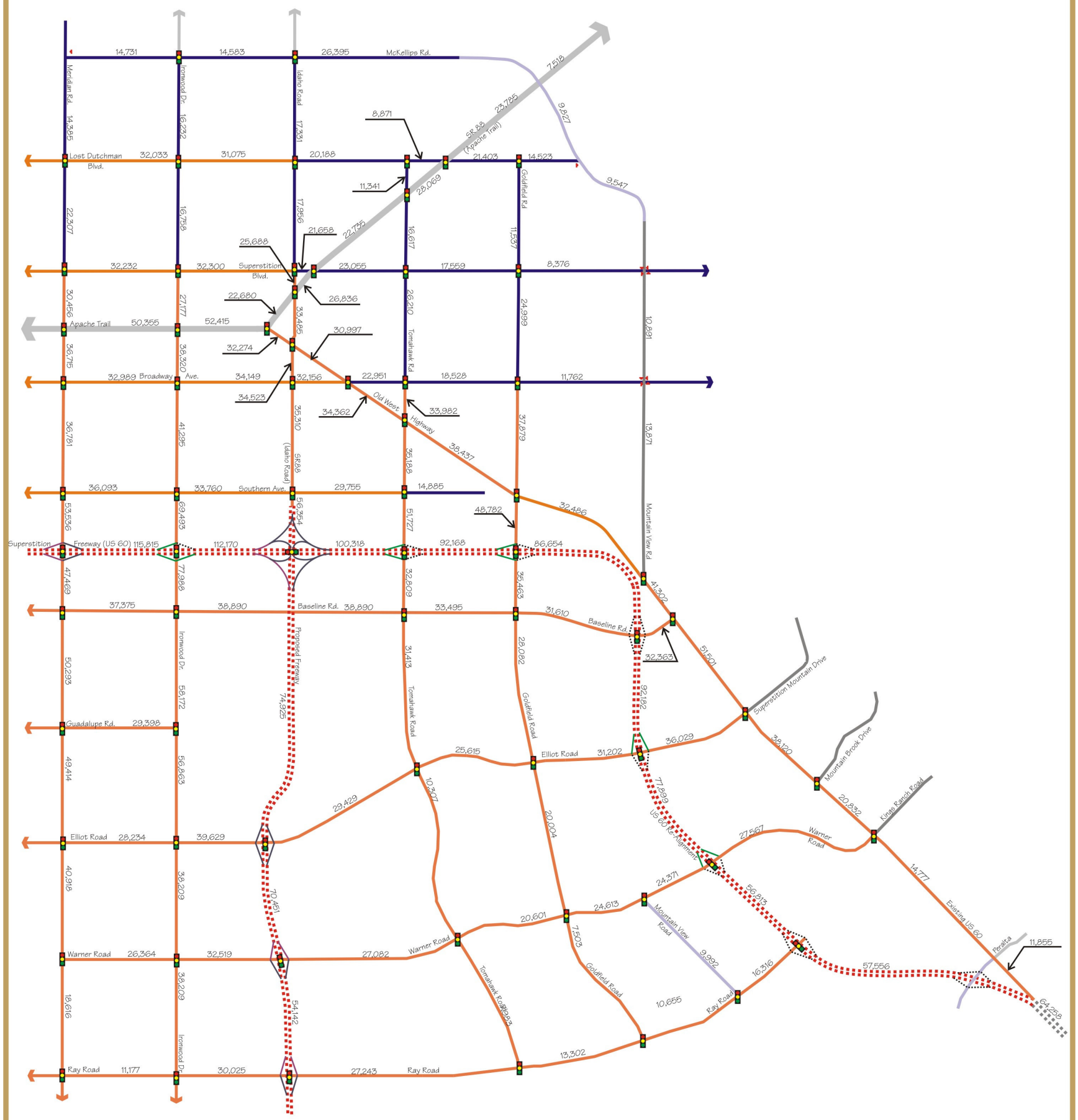
Not to Scale

NORTH

Exhibit 10

K:\0207970\Figures_Exhibit 9 - 2030 volumes-orig lanes_11x17.cdr

Exhibit 11: 2030 Traffic Volumes (Recommended Roadway Improvements)



Legend

- Improve to 6-Lane Principal Arterial
- New 4-Lane Principal Arterial
- Improve to 4-Lane Principal Arterial
- Improve Freeway to 6 lanes
- New Freeway Ramp
- Existing Freeway Ramp
- Existing Principal Arterial
- Existing 4-Lane Minor Arterial
- Existing 2-Lane Minor Arterial
- Stop Sign
- Traffic Signal

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2030 Traffic Volumes
(with improved lane configuration)

Apache Junction
Small Area
Transportation Study

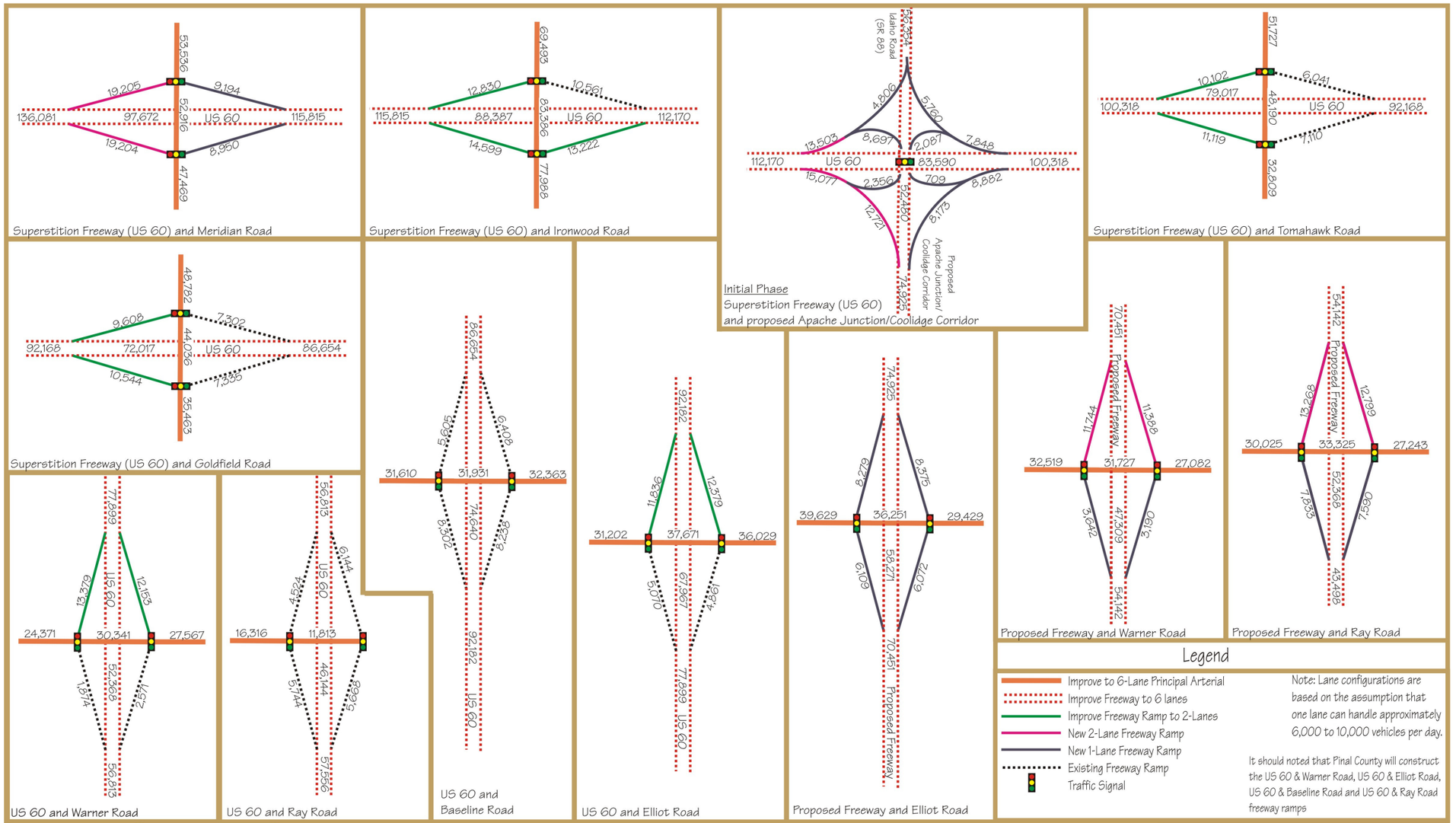
Not to Scale

NORTH

Exhibit 11

K:\0207970\Figures_Exhibit 10 - 2030 volumes_updated lanes_11x17.cdr

Exhibit 12: 2030 Freeway Ramp Volumes & Lane Configurations



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CONSULTING ENGINEERS

CITY OF APACHE JUNCTION ARIZONA

2030 Freeway Ramp Volumes & Lane Configurations

City of Apache Junction Small Area Transportation Study

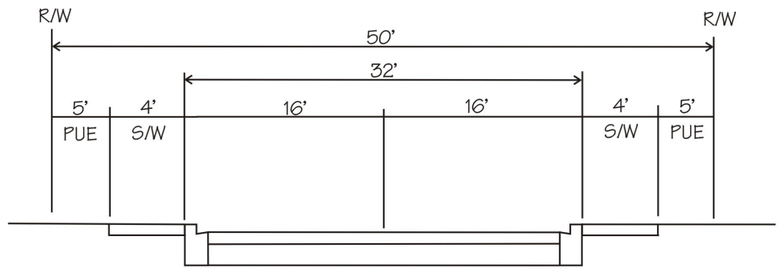
Apache Junction, Arizona

Apache Junction
Small Area Transportation Study

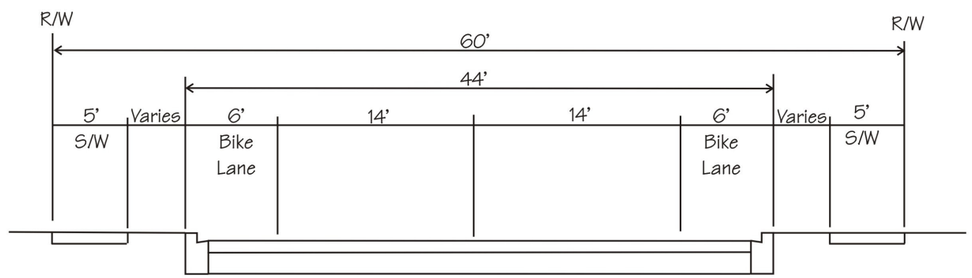
Exhibit 12

K:\02\0207970\Figures\Exhibit 11 - 2030 ramps_11x17.cdr

Exhibit 13: Typical Cross Sections (Residential & Collector)



Residential Cross Section



Collector Cross Section

Auxillary turn lanes may be required
at intersections with additional
right-of-way requirements
ADT: 5,000-7,100 vpd
Design Speed: 40mph

Legend	
S/W	Sidewalk
R/W	Right-of-Way

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CONSULTING ENGINEERS

CITY OF APACHE JUNCTION
ARIZONA

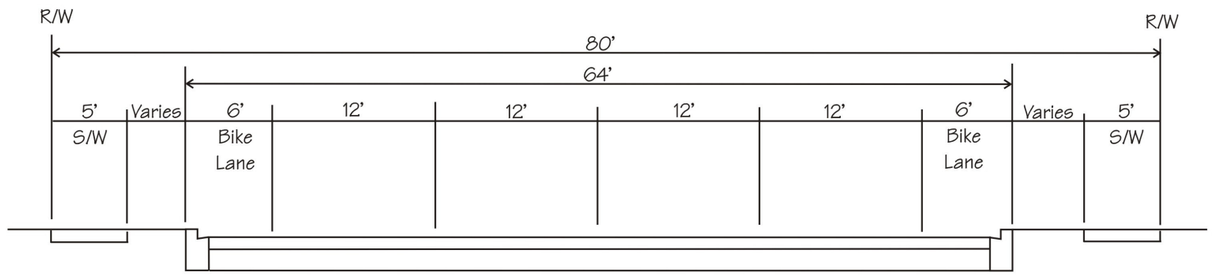
Typical Cross Sections
City of Apache Junction Small Area Transportation Study
Apache Junction, Arizona

Apache Junction
Small Area Transportation Study

Exhibit 13

K:\02\0207970\Figures\FCS1.cdr

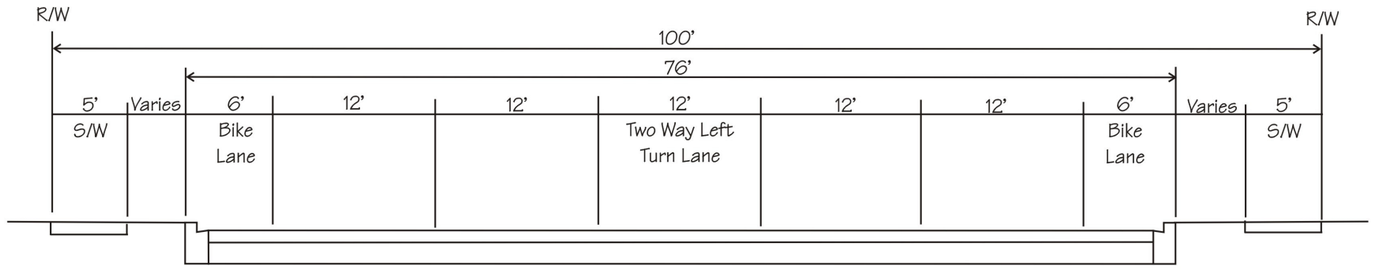
Exhibit 14: Typical Cross Sections (Major & Minor Arterial)



Auxillary turn lanes may be required
at intersections with additional
right-of-way requirements
ADT: 19,000-27,500 vpd
Design Speed: 45mph

Minor Arterial Cross Section

Formerly known as a "Mid-Section Line" Cross Section



Auxillary turn lanes may be required
at intersections with additional
right-of-way requirements
ADT: 19,000-27,500 vpd
Design Speed: 45mph

Major Arterial Cross Section

Formerly known as a "Section Line" Cross Section

Legend	
S/W	Sidewalk
R/W	Right-of-Way

KIRKHAM MICHAEL
CONSULTING ENGINEERS

CITY OF APACHE JUNCTION ARIZONA

Typical Cross Sections
City of Apache Junction Small Area Transportation Study
Apache Junction, Arizona

Apache Junction
Small Area Transportation Study

Exhibit 14

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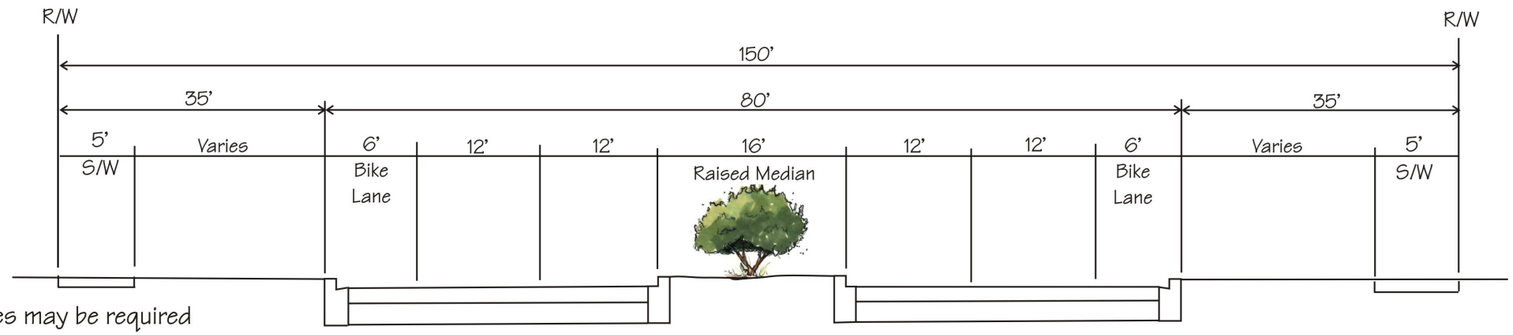
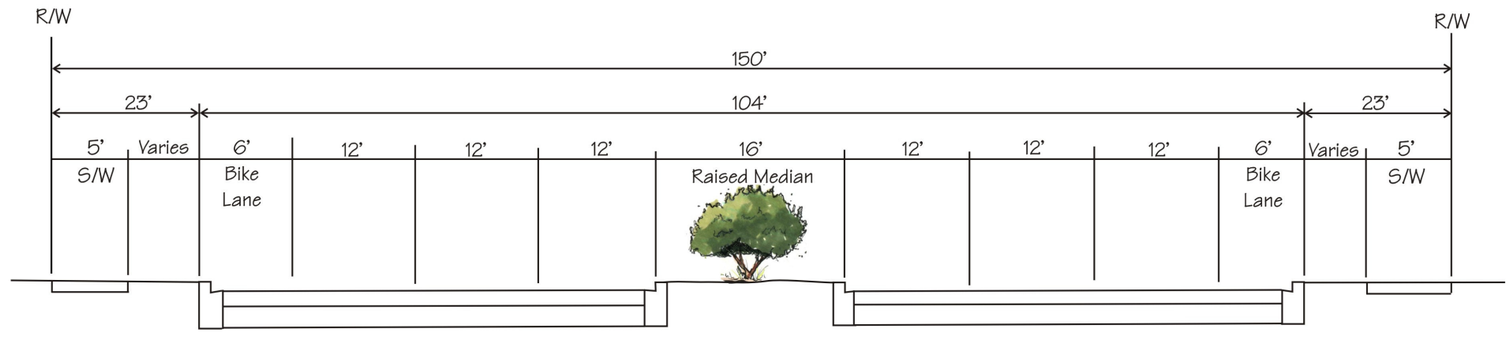
Exhibit 15: Typical Cross Sections (4 Lane & 6 Lane Principal Arterials)



Auxillary turn lanes may be required
at intersections with additional
right-of-way requirements
ADT: 19,000-27,500 vpd
Design Speed: 55mph

4-Lane Principal Arterial Cross Section



Auxillary turn lanes may be required
at intersections with additional
right-of-way requirements
ADT: 35,000-50,000 vpd
Design Speed: 55mph

6-Lane Principal Arterial Cross Section

Legend	
S/W	Sidewalk
R/W	Right-of-Way

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CONSULTING ENGINEERS

CITY OF APACHE JUNCTION
ARIZONA

Typical Cross Sections
City of Apache Junction Small Area Transportation Study
Apache Junction, Arizona

Apache Junction
Small Area Transportation Study

Exhibit 15

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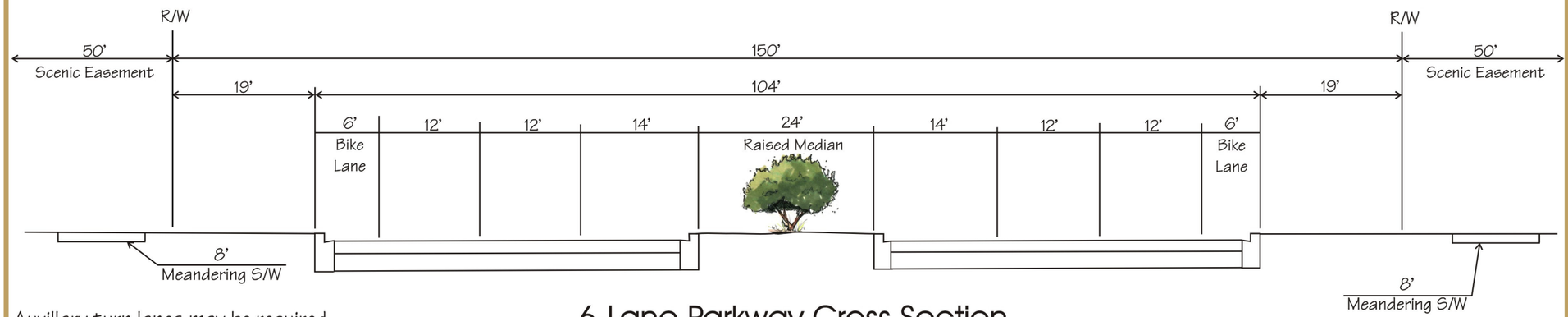
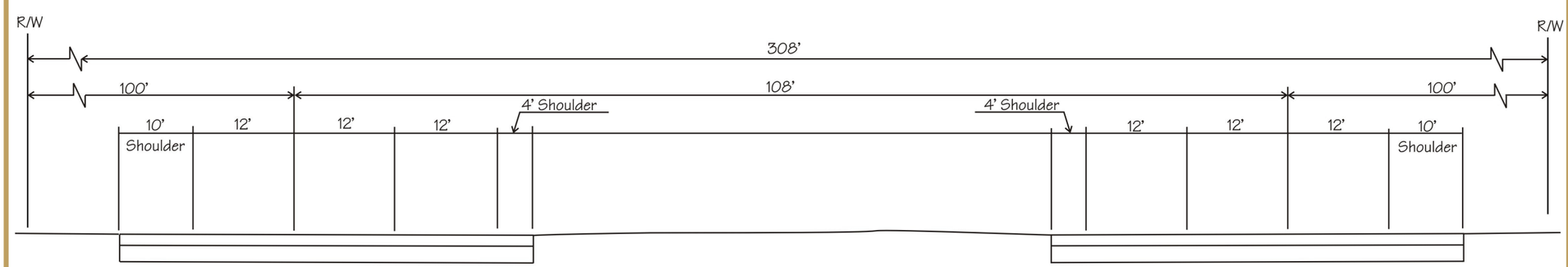
Exhibit 16: Typical Cross Sections (Parkway & Freeway)



6-Lane Parkway Cross Section

Source: City of Scottsdale Design Guidelines

Auxillary turn lanes may be required at intersections with additional right-of-way requirements
ADT: 35,000-50,000 vpd
Design Speed: 55mph



6-Lane Freeway Cross Section

Source: US 60 DCR

ADT: 52,900-126,900 vpd
Design Speed: 75mph

Legend	
S/W	Sidewalk
R/W	Right-of-Way

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CONSULTING ENGINEERS

CITY OF APACHE JUNCTION ARIZONA

Typical Cross Sections

City of Apache Junction Small Area Transportation Study
Apache Junction, Arizona

Apache Junction
Small Area Transportation Study

Exhibit 16

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APPENDIX B

TRANSCAD MODEL DOCUMENTATION

PROVIDED BY LIMA & ASSOCIATES

APPENDIX C

TAC MEETING MINUTES

APPENDIX D

COMMUNITY INVOLVEMENT

APPENDIX E

MCDOT TRAFFIC IMPACT ANALYSIS GUIDELINES

APPENDIX F

MCDOT LANDSCAPE GUIDELINES