City of Kingman

Stockton Hill Road Corridor Study Final Report

May 2014

ADOT

PARSONS BRINCKERHOFF

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EXECUTIVE SUMMARY

The City of Kingman conducted the Kingman Stockton Hill Road Corridor Study in cooperation with the Arizona Department of Transportation (ADOT) Planning Assistance for Rural Areas (PARA) program. The PARA program is supported through the Federal Highway Administration (FHWA) State Planning and Research program to non-metropolitan communities for the purpose of conducting transportation planning studies. The City of Kingman, with support from ADOT, has worked throughout this study to assess the transportation and development framework needs of the Stockton Hill Road corridor, and to recommend solutions to improve multi modal mobility and the built environment.

The Stockton Hill Road corridor study area is centered along a 2.8 mile section of Stockton Hill Road between Northern Avenue and Detroit Avenue, located in the north-central region of the City of Kingman. The heavily trafficked segment is currently one of the largest and most congested commercial corridors within the City of Kingman, and also serves as the major employment concentration, retail center, and medical facility destination for the region. This study addresses the critical transportation and development policy needs that have resulted from the growth of population, employment, and corresponding traffic volumes throughout the corridor.

ADOT retained Parsons Brinckerhoff to perform this corridor study. The study process involved reviewing relevant transportation studies and land use plans, analyzing current and future corridor conditions in order to identify deficiencies, developing and evaluating potential improvements, and recommending solutions to improve mobility conditions and the built environment along Stockton Hill Road.

The study process was conducted with participation, guidance, and oversight from the project Technical Advisory Committee (TAC), to ensure that local needs and input were accounted for throughout the study process. The TAC is composed of members representing the following agencies throughout the region:

- City of Kingman
- Mohave County
- Western Arizona Council of Governments (WACOG)
- ADOT – Kingman District Office
- ADOT - Multimodal Planning Division

The main phases of the study were documented throughout the process in two working papers. The analysis of existing and future corridor conditions was compiled in the *Current and Future Conditions Report,* while the development, evaluation, and implementation of recommended improvements were documented in the *Evaluation Criteria and Plan for Improvements Report*. Both working papers were reviewed by the TAC, and the major elements of each effort were presented to the public in two open houses. Input received from TAC leadership and the public has been used to shape the study process, and individual comments have been addressed where possible.

Current and Future Conditions

This section documents existing conditions within the Stockton Hill Road study area in terms of topographic features, socioeconomic conditions, activity centers, transportation network, traffic conditions, and current development framework. The major element of the section is a technical review of corridor traffic characteristics such as levels of congestion throughout the day, intersection functionality, and safety conditions. Other major elements are reviews of access control conditions, the non-motorized transportation network, and land use and development policies.

The future conditions assessment reviews the future conditions that are forecasted for the Stockton Hill Road corridor, including future socioeconomic conditions, transportation network, changes in traffic conditions, and anticipated developments and land use changes.

The review of current and future conditions provided a baseline of existing and anticipated transportation and land use characteristics. The review also made apparent a number of corridor deficiencies in terms of traffic, safety, development practices, and access management that are expected to worsen in the future without transportation improvements and development policy changes.

Evaluation Criteria and Plan for Improvements

This section presents the corridor deficiencies gleaned from the analysis of current and future conditions, which include recurring traffic congestion, limited non-motorized facilities, lack of access management, single-use land use designations, limited development policies, unattractive character and urban form, and the poorly functioning intersections of Stockton Hill Road with Airway Avenue and Beverly Avenue.

Corridor improvement approaches were developed in order to address the corridor deficiencies, based on the study's goals and objectives, stakeholder and TAC input, and technical expertise. The two types of approaches include (1) mobility approaches and (2) development framework approaches.

Mobility approaches are more technical design solutions whose goal is to improve mobility and, safety, and relieve congestion. Development framework approaches are longer term policy changes that affect the development of the built environment. Both approaches aim to meet the study goals of improving traffic operations, refining and improving access control, linking development policies to transportation goals, and improving mobility and safety for all travel modes. Each potential improvement was evaluated based on the following factors developed with guidance from the TAC:

- Improvement Cost
- Right-of-way Impact
- Funding Availability
- Safety Improvement
- Automobile Mobility

- Pedestrian Mobility
- Bicycle Mobility
- Environmental Impact
- Visual Quality
- Public Acceptance
- City Support

The implementation section identifies and prioritizes corridor recommendations. Each specific recommendation has been grouped by category, including technical transportation improvements related to traffic operations, access control, and non-motorized improvements. Development framework recommendations were made, including changes to development policy, street network policy, and multimodal policy.

Each recommendation is also grouped into near term, mid term, and long term actions, representing time frames of 5, 10, and 15 years. Location specific recommendations are displayed where possible in Figure 1 and Figure 2.

Figure 1: Near Term Improvements

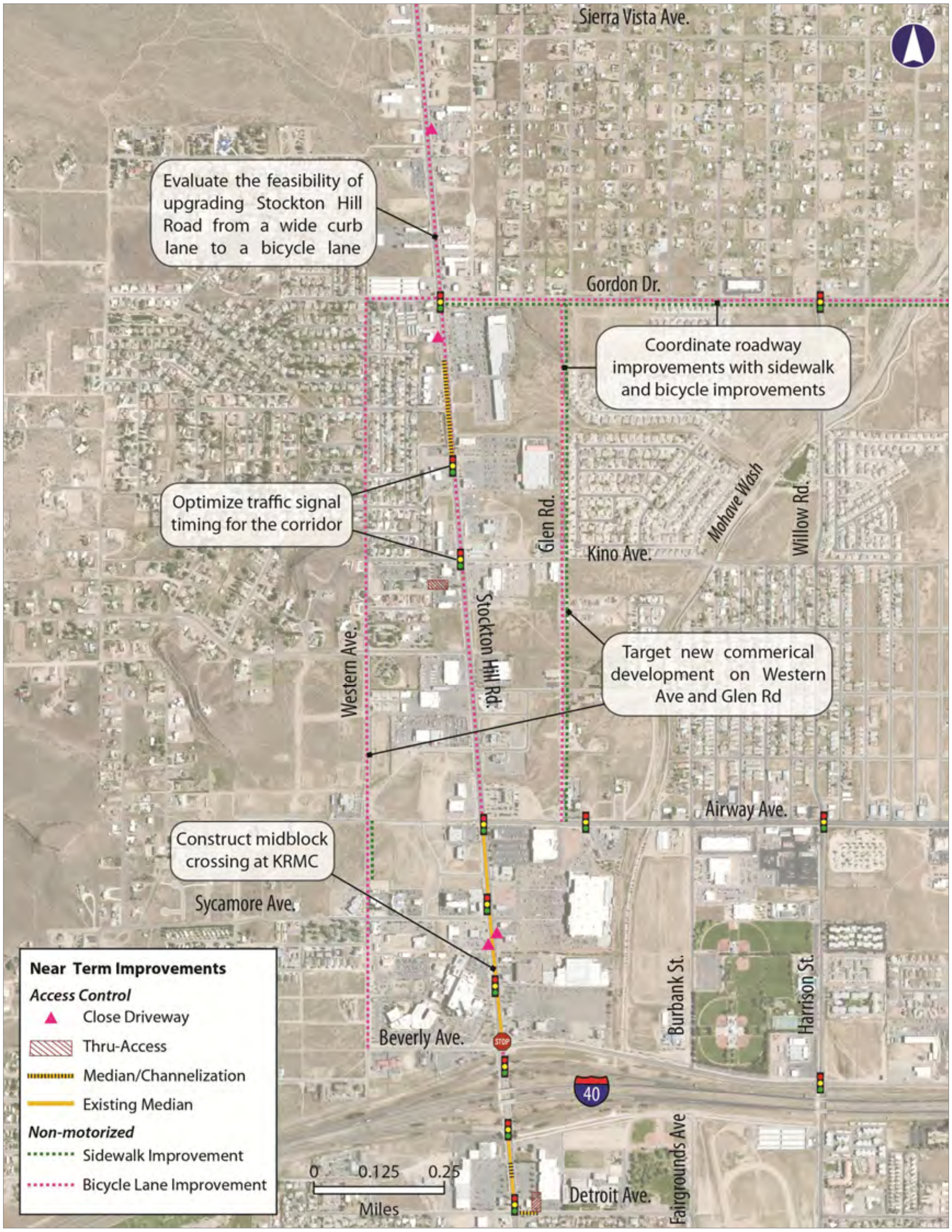


Figure 2: Mid Term Improvements

1.0 INTRODUCTION

Through the Arizona Department of Transportation (ADOT) Planning Assistance for Rural Areas (PARA) program, ADOT and the City of Kingman conducted a long-range study of the Stockton Hill Road corridor between Detroit Avenue and Northern Avenue to improve the overall mobility and development character of the area.

Stockton Hill Road is currently one of the largest and most congested commercial corridors within the City of Kingman. This north-south arterial serves as a gateway corridor for Kingman and adjacent unincorporated areas, providing an important linkage between residents of northern Mohave County and Interstate 40 (I-40). The Stockton Hill Road corridor serves as a central location for the region's employment, health services, commercial, and retail activities. Existing and planned developments along the corridor generate large traffic volumes in a relatively small area. The high volumes frequently create congestion, significant delay at traffic lights, dangerous conditions for pedestrians, and a high number of collisions.

This study evaluates the corridor's development framework and transportation network to determine if the corridor would support future travel demand and commercial growth. Deficiencies are identified with respect to the overall safety and circulation of the corridor. Based on these deficiencies, the study team developed mobility and development framework alternatives that were viable and would improve the corridor's access and character. The corridor improvement approaches were evaluated based on criteria approved by the project Technical Advisory Committee (TAC) members.

This study documents the identified deficiencies within the corridor, develops improvement alternatives, and develops an implementation strategy for recommended improvements. This study continues to focus on maintaining the economic benefits and public expectations for an efficient infrastructure system, serving as a guide to address the existing and future multimodal travel needs.

1.1 Study Objectives

The objective of this study is to analyze the multimodal transportation and development policy needs of the Stockton Hill Road corridor, resulting in a plan to create a vibrant and safe multimodal commercial corridor. Specific considerations include an analysis of existing and future transportation conditions including traffic volumes, collisions, bicycle, pedestrian and transit activity, and programmed improvements, as well as an assessment of the current development and land-use framework. Findings were utilized to evaluate alternatives to address transportation and development policy needs within the corridor, and develop recommendations that offer solutions over near term, mid term, and long term planning horizons (within 5, 10, and 15 year timeframes). This includes signal timing adjustments, lane expansion and reconfiguration, and changes to development and access policies.

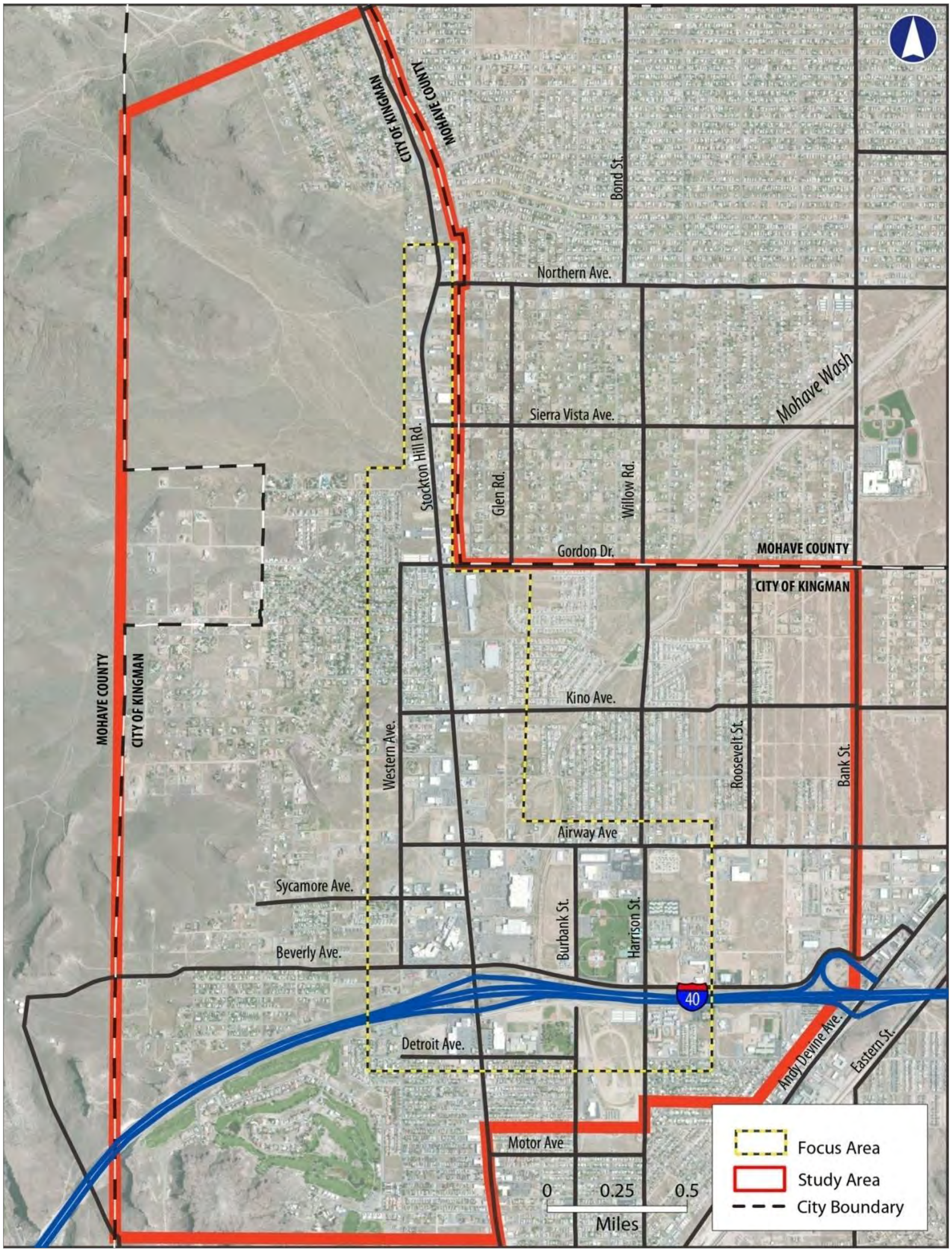
The Stockton Hill Road Corridor Study documents implementation strategies for the recommended improvements, and can be used by local agencies to budget and maintain the economic benefits and public expectations for an efficient corridor. It is anticipated that further planning and design will follow this study prior to the implementation of any recommended corridor improvements.

1.2 Study Area

The Stockton Hill Road corridor study area is located in the north-central area of the City of Kingman, and also includes a small portion of unincorporated Mohave County. The study area extends to Jagerson Street to the north, Bank Street to the east, Florence Avenue to the south, and the City of Kingman limits to the west.

Figure 3 depicts the focus area and wider study area for this corridor study. The study area represents the traffic analysis zone (TAZ) boundaries that encompass the focus area. The study area was used to evaluate current and future socioeconomic conditions from the *Kingman Area Transportation Study (KATS) 2011* model. Recommendations, however, were concentrated entirely on the focus area where the identified deficiencies are concentrated. Specific consideration was placed on the 2.8-mile segment of Stockton Hill Road between Detroit Avenue and Northern Avenue, where the TAC identified preliminary corridor needs.

Figure 3: Study Area / Focus Area



1.3 Previous Studies and Reports

The following section summarizes relevant findings on current and future conditions in the Stockton Hill Road corridor, gleaned from recent transportation plans, land-use plans, and infrastructure reports within the Kingman region.

1.3.1 City of Kingman General Plan 2020

The City of Kingman General Plan 2020 (2003) presents the community's vision for future growth and development. The General Plan seeks to aid decision-making regarding future community growth issues.
Increased residential and commercial development is expected with the City's demonstrated and projected population growth. The plan identifies three primary growth areas, defined in Table 1, in which development is underway or likely to occur:

Table 1: Planned and Potential Development

Growth Areas	Type of Growth
Downtown Kingman	• Growing boutique-style shopping area • Opportunity for residential, commercial, and public infill development
North Stockton Hill Road corridor	• Primary commercial center of Kingman • Location of much of the recent commercial development • Opportunity for medium to high density residential development
Hualapai Mountain Road corridor	• Upcoming commercial and residential development • Opportunities for park development and open space preservation • Development may disrupt views, residential areas, and traffic patterns

Source: City of Kingman General Plan 2020 (2003)

The circulation element of the General Plan comprises the 2011 Kingman Area Transportation Study, which provides guidance to many of the city's traffic issues. The plan also references the Pedestrian and Bikeway Plan 2000 as part of the City's development plan.

1.3.2 Kingman Area Transportation Study (2011)

The Kingman Area Transportation Study (KATS) 2011 update outlines a transportation plan for 5-year (short-range), 10-year (mid-range), and 20-year (long-range) planning horizons. The study area encompasses the City of Kingman and portions of unincorporated Mohave County. The study reviews existing conditions, projects future conditions, identifies needs and deficiencies, and evaluates multimodal improvement options.

The study anticipates commercial development growth to continue to take place in the same areas as today, namely along Stockton Hill Road, Route 66, Airway Avenue, Northern Avenue, and in Downtown Kingman. Residential development is also expected to accompany employment growth in these areas. Future industrial growth is expected near the Kingman Airport.

The study addressed the area's needs and deficiencies by proposing various roadway, transit, bicycle and pedestrian facility improvements. The following committed improvements are within the focus area and have already secured funding:

- Gordon Drive (Stockton Hill Road to Bank Street): widening from 2 to 5 lanes, and
- Gordon Drive (Stockton Hill Road to Bank Street): new sidewalk and bicycle lanes.

Improvements that were recommended but unfunded at the time of the KATS Study are shown in Table 2 and Table 3.

Table 2: Recommended Roadway Improvements

Project Location	Improvement Description
Airway Avenue: Western Avenue to Stockton Hill Road	Widen to four-lane roadway
Beverly Avenue: Stockton Hill Road to Bank Street	Widen to four-lane roadway
Glen Road: Airway Avenue to Gordon Drive	New two-lane roadway
Gordon Drive: Stockton Hill Road to Bank Street	Widen to four-lane roadway
I-40 and Stockton Hill Road	Freeway Interchange Improvements
Stockton Hill Road and Airway Avenue	Intersection widening/ safety Improvements
Stockton Hill Road and Gordon Drive	Intersection widening/ safety improvements
Stockton Hill Road: Airway Avenue to Gordon Drive	Raised median to four-lane roadway
Stockton Hill Road: Detroit Avenue to Northern Avenue	Widen to six-lane roadway
Stockton Hill Road: Northern Avenue to Grace Neal Parkway	New four-lane roadway
Western Avenue: Beverly Avenue to Gordon Drive	Improved two-lane roadway
Source: 2011 KATS Study	

Table 3: Recommended Transit and Non-Motorized Improvements

Project Location	Improvement Description
Airway Avenue: Stockton Hill Road to Andy Devine Avenue	Add bike and pedestrian facilities
Beverly Avenue: Willow Road to Bank Street	Add bike and pedestrian facilities
Gordon Drive: Stockton Hill Road to Andy Devine Avenue	Add bike and pedestrian facilities
Gordon Drive: Stockton Hill to Castle Rock Road	New KART route
Willow Road: Andy Devine Avenue to Gordon Drive	Add bike and pedestrian facilities
KART bus routes	Provide 30-minute headways between buses during peak periods
KART bus routes	Add bus pull-outs and shelters
Kino Avenue: Stockton Hill Road to Bank Street	New KART route
Northern Avenue: Stockton Hill Road to Bank Street	Add bike and pedestrian facilities
Northern Avenue: Stockton Hill Road to Castle Rock Road	New KART Route
Transit transfer center	New facility

Source: 2011 KATS Study

1.3.3 I-40 Stockton Hill Road Traffic Interchange – Initial Design Concept Report (1999)

The I-40 Stockton Hill Road Traffic Interchange (TI) – Initial Design Concept Report (1999) evaluates the I-40/Stockton Hill Road TI and presents several alternatives to improve safety and traffic operations. The TI is a standard diamond interchange with I-40 crossing over Stockton Hill Road.

The study area consists of Stockton Hill Road from Airway Avenue to Detroit Avenue, and includes the following five signalized intersections:

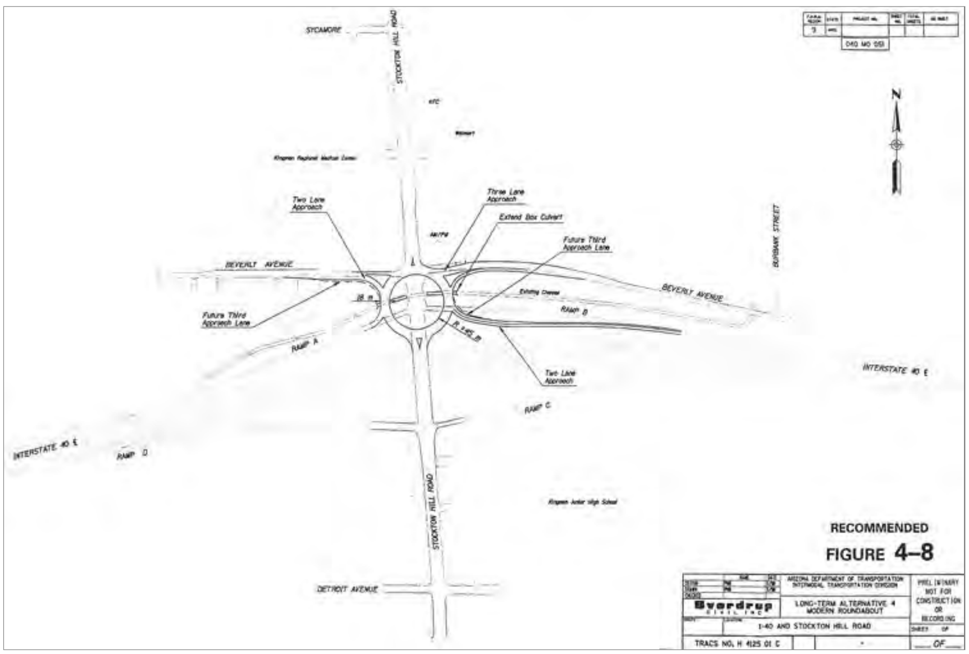
- Detroit Avenue,
- I-40 eastbound ramps,
- I-40 westbound ramps,
- Wal-Mart/KRMC entrance, and
- Airway Avenue.

The report only considers alternatives south of Beverly Avenue, due to right-of-way limitations of existing retail stores in the north. Significant increases in traffic on Stockton Hill Road are attributed to adjacent commercial development and uncoordinated traffic signalization at the five intersections. The proximity of the Beverly Avenue intersection to the I-40 westbound ramps causes further delay and collisions. Although Beverly Avenue, shown in Figure 4, was previously signalized, the signal was removed due to the lack of coordination with the I-40 westbound ramps. Consequently, traffic movements on Beverly Avenue, at Stockton Hill Road, are limited to right-turn only.

Figure 4: Beverly Avenue/Stockton Hill Road Intersection – Looking Eastbound

The recommended long term solution, shown in Figure 5, was a modern roundabout incorporating Stockton Hill Road, Beverly Avenue, and I-40 westbound ramps. However, a subsequent ADOT review revealed that a roundabout would result in a traffic volume imbalance between Stockton Hill Road and the I-40 westbound ramps.

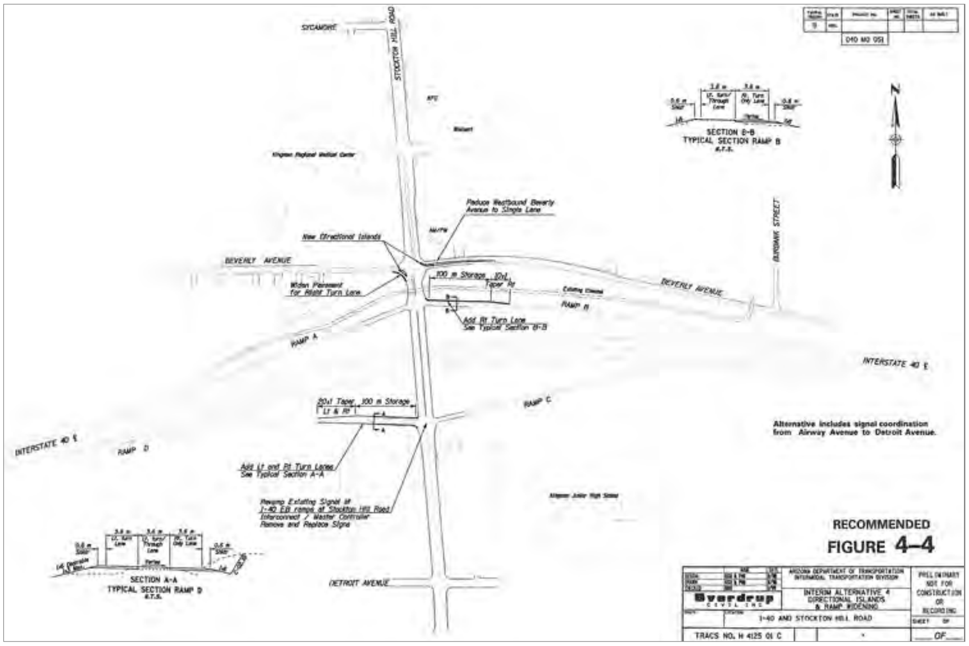
Figure 5: Long Term Roundabout Alternative



Source: I-40 Stockton Hill Road Traffic Interchange – Initial Design Concept Report (1999)

The interim alternative is shown in Figure 6 and has since been implemented, included a left-turn, right-turn, and optional left-turn/through lane at the I-40 eastbound exit ramp. However, congestion and uncoordinated traffic signalization persist.

Figure 6: Interim Alternative



Source: I-40 Stockton Hill Road Traffic Interchange – Initial Design Concept Report (1999)

1.3.4 City of Kingman Pedestrian and Bikeway Plan 2000

The City of Kingman Pedestrian and Bikeway Plan 2000 (2000) addresses the city's pedestrian and bikeway needs by prioritizing locations for pedestrian and bicycle facilities in three phases. Provided that funding is available, the first phase recommends linkages between schools and residential neighborhoods. The second phase supports pedestrian and bicycle links between parks, recreation areas, employment centers, shopping centers, medical and senior centers, government services, and cultural destinations. The last phase connects existing pedestrian and bicycle routes and residential neighborhoods.

Due to the clustering of services and increased population and employment densities, the Pedestrian and Bikeway Plan also recommends pedestrian and bicycle improvements in Downtown Kingman and the I-40/Stockton Hill Road Interchange. Specific improvements include installing handicap ramps, relocating of traffic signals, widening sidewalks, extending multi-use paths, and amending of parking regulations for landscaped walkways and parking orientation and layout.

1.3.5 Mohave County General Plan (2010 Update)

The Mohave County General Plan (2010) (the Plan) guides decision-makers about how development in Mohave County takes place. The Plan recognizes that the County's growth is heavily dependent on the growth of the gaming industry in Laughlin, Nevada. Continued population growth is expected, but growth rates are predicted to level off. The County seeks to address growth by anticipating new development and coordinating public facilities to support this growth.

The Plan's Transportation Element notes substantial increases of traffic along State Route 68 and US 95. The Plan also recognizes the 2011 KATS Study as an integral part of coordinating transportation planning and improvement programming.

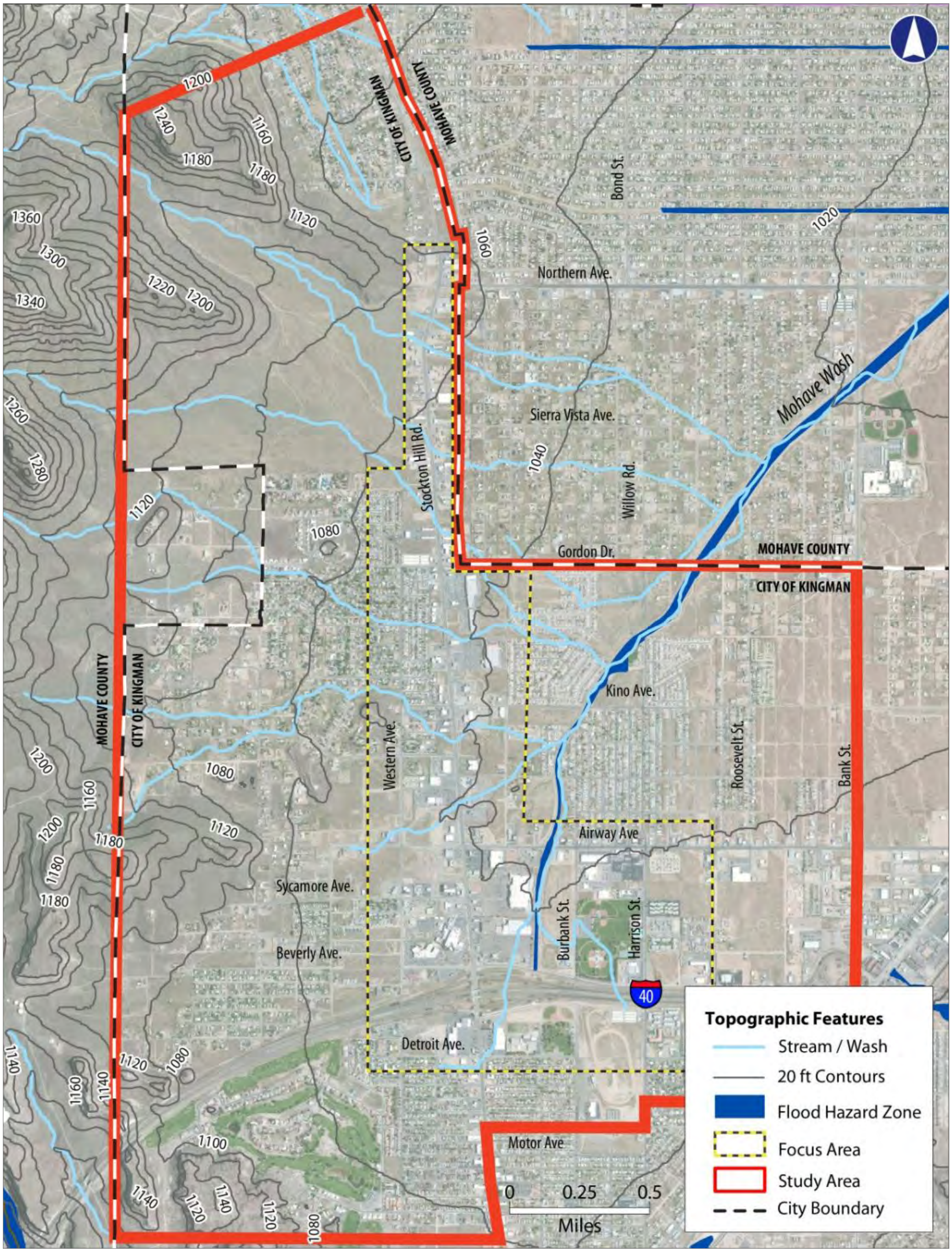
2.0 CURRENT CONDITIONS

This section documents the current conditions that exist within the Stockton Hill Road study area in terms of topographic features, socioeconomic conditions, activity centers, transportation network, traffic conditions, and current development framework.

2.1 Topographic Features

The Kingman Area's diverse topography comprises flat range land, mountains, and drainage features that require special considerations when determining future land uses and the alignment of transportation facilities. As shown in Figure 7, the study area itself is comprises predominantly flat land, with some elevation gain to the north and west. Mohave Wash runs through the northeast portion of the study area and is identified as a flood hazard zone. Floodplains drain from the west of the study area to Mohave Wash in the east. Future development along Mohave Wash should note this topographical limitation.

Figure 7: Topographic Features



2.2 Current Socioeconomic Conditions

Current socioeconomic conditions for the Kingman Area were evaluated by analyzing 2000 and 2010 US Census data, as well as modeled 2010 population and employment estimates from the 2011 KATS Study, which was the study's model base year. The following current conditions assessment is based on the most reliable data currently available.

2.2.1 Population

According to the 2010 US Census, the City of Kingman has a population of 28,068, a 39.9 percent increase from the 2000 Census. Similar to Mohave County and the State of Arizona, the City of Kingman has experienced rapid population growth over the past decade. As shown in Table 4, the City of Kingman population comprises 14 percent of the total Mohave County population.

Table 4: Regional Population Trends

Jurisdiction	Population				
	2000		2010		Percent Change
	Number	Share of County	Number	Share of County	
City of Kingman	20,069	12.9%	28,068	14.0%	+39.9%
Kingman Area (KATS)	-	-	52,049	26.0%	-
Mohave County	155,032	100.0%	200,186	100.0%	+29.1%
State of Arizona	5,130,632		6,392,017		+24.6%

Sources: 2000 US Census, 2010 US Census, 2011 KATS model

According to the 2011 KATS study, the greater Kingman Area has a population of 52,049, representing 26 percent of the Mohave County population. As shown in Table 5, the study area population is 11,964, comprising 23 percent of the total Kingman Area population.

Table 5: Existing Population

Jurisdiction	Population	
	2010	
	Number	Percent
Kingman Area (KATS)	52,049	100.0%
Study Area	11,964	23.0%

Sources: KATS model (2011)

Figure 8 shows that the existing Kingman Area population is most dense to the south and northeast of the study are. As shown in Figure 9, the population within the study area is densest east of Stockton Hill Road and south of Detroit Avenue with over 2,000 residents per square mile.

Figure 8: 2010 Kingman Area Population Density

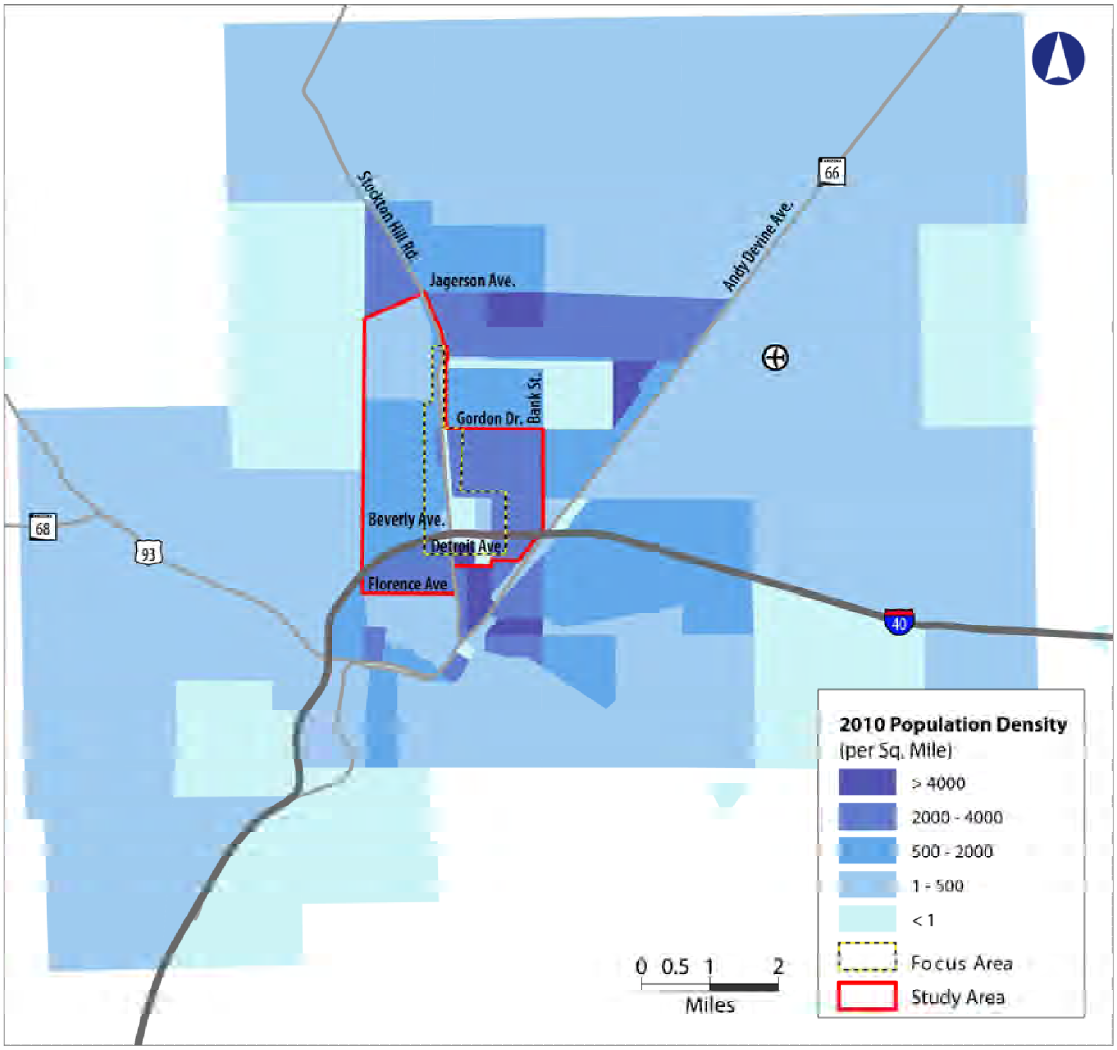
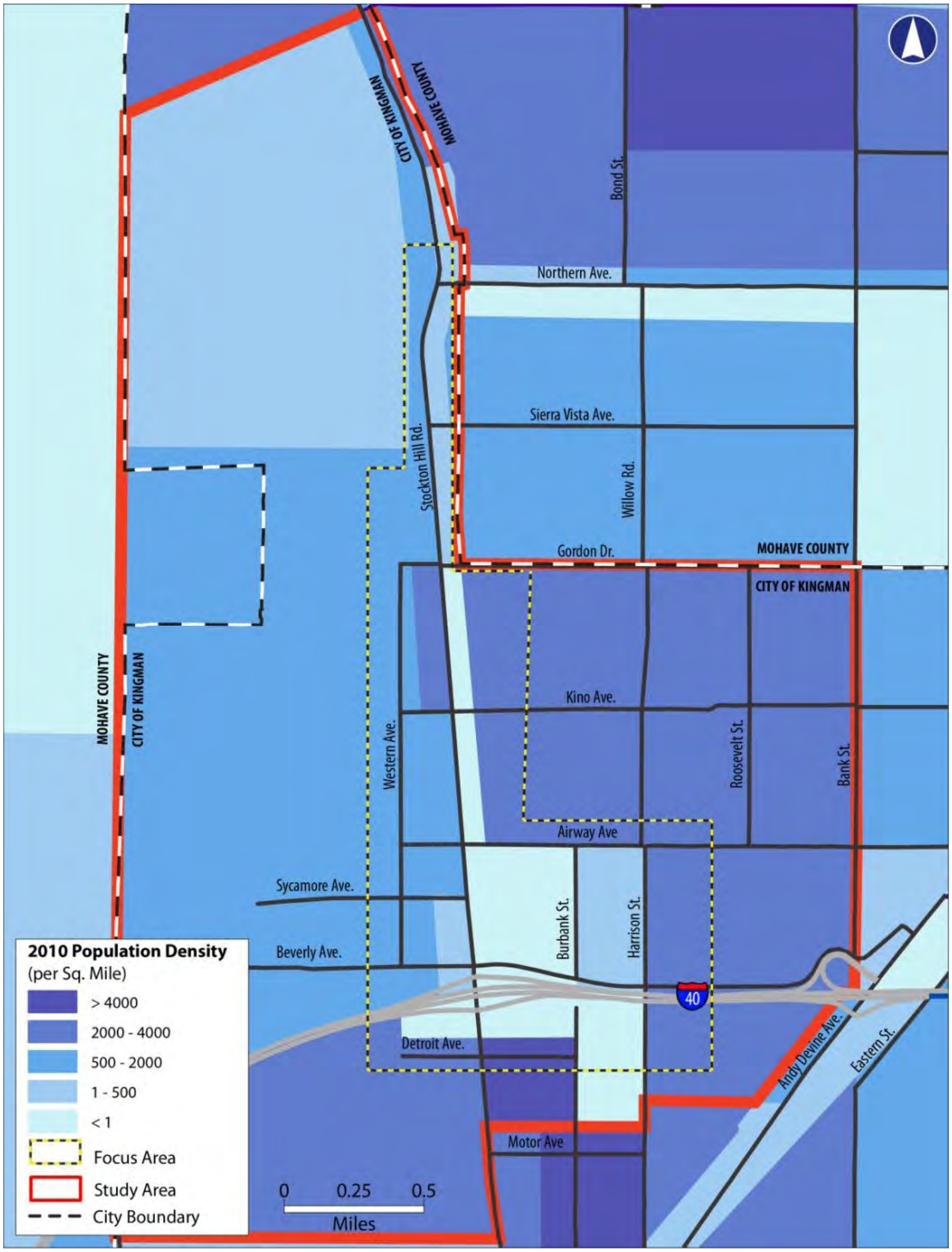


Figure 9: 2010 Study Area Population Density



2.2.2 Employment

As shown in Table 6, a rapid employment increase mirrors the rapid population increase. According to the 2010 US Census, 12,535 people are employed in the City of Kingman, 15.2 percent of the Mohave County total. Total employment in the City of Kingman increased by 42.9 percent between 2000 and 2010, outpacing the general trend in Arizona and Mohave County.

Table 6: Regional Employment Trends

Jurisdiction	Employment				
	2000		2010		Percent Change
	Number	Share of County	Number	Share of County	
City of Kingman	8,771	13.5%	12,535	15.2%	+42.9%
Kingman Area (KATS)	-	-	19,779	23.9%	-
Mohave County	65,081	100.0%	82,591	100.0%	+26.9%
State of Arizona	2,387,139		2,995,656		+25.5%

Sources: 2000 US Census, 2010 US Census, KATS model (2011)

According to the 2011 KATS study, the Kingman Area has 19,779 employees, and the study area is 6,050 employees, comprising 30.6 percent of the Kingman Area total. (See Table 7.)

Table 7: Existing Employment

Jurisdiction	Employment	
	2010	
	Number	Percent
Kingman Area (KATS)	19,779	100.0%
Study Area	6,050	30.6%

Sources: KATS model (2011)

As shown in Figure 10, the greatest concentration of employment in the Kingman Area exists along Stockton Hill Road, Northern Avenue, and Andy Devine Avenue. As shown in Figure 11, the largest concentration of employees within the study area of this project is in the vicinity of Kingman Regional Medical Center (KRMC).

Figure 10: 2010 Kingman Area Employment Density

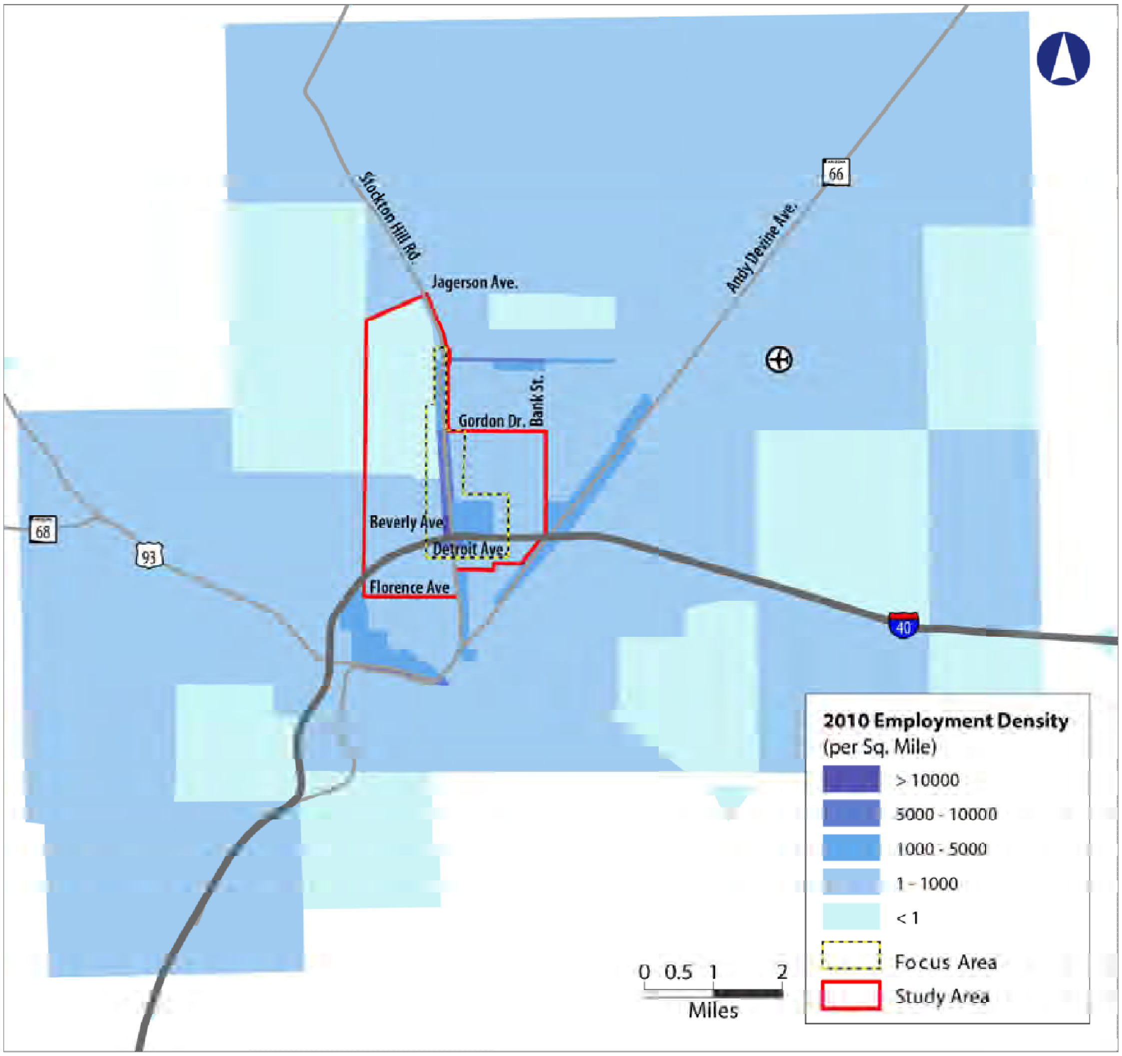
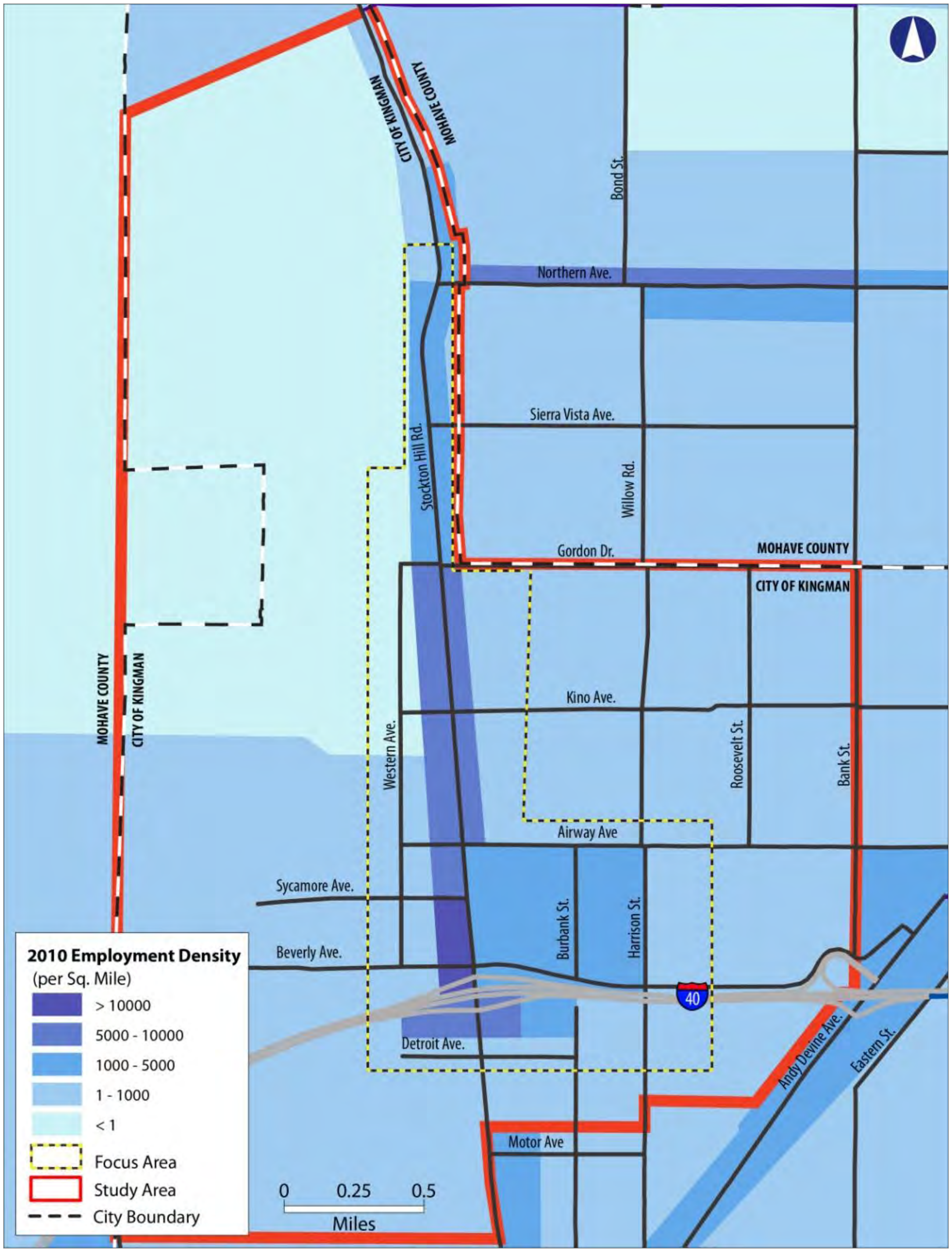


Figure 11: 2010 Study Area Employment Density



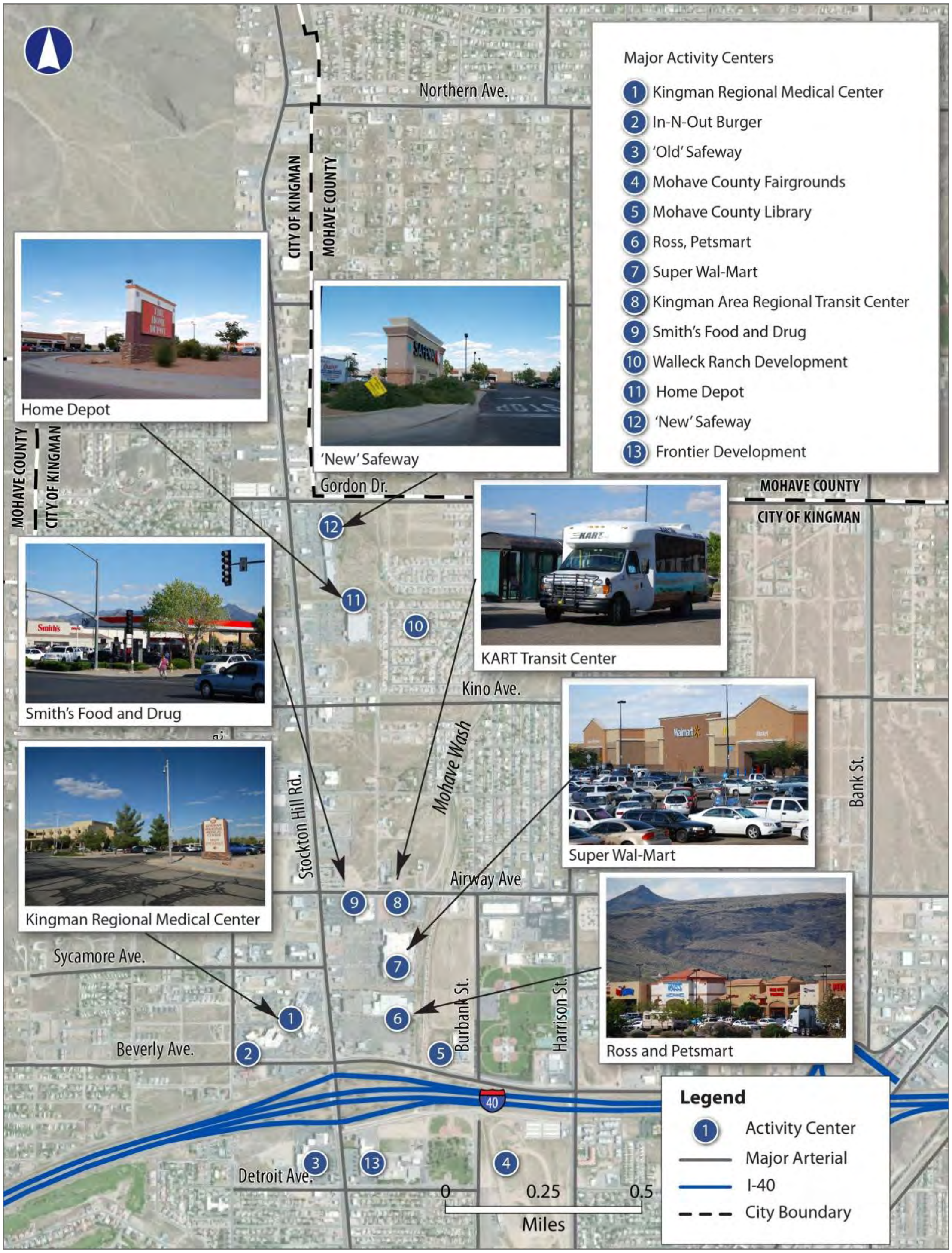
2.3 Activity Centers

As the commercial hub of the City of Kingman, the Stockton Hill Road corridor has many activity centers that generate high traffic volumes. The corridor attracts mostly retail, commercial and medical related uses.

Figure 12 details the major activity centers that are located within the study area. The majority are located along Stockton Hill Road and near the I-40 interchange. Major retail centers include Super Wal-Mart (7), Ross (6), Safeway (3) and (12), and Home Depot (11). Residential areas include Walleck Ranch (10), a single-family infill development located north of Kino Avenue with primary access located at Walleck Ranch Drive. In addition, the KART Transit Center (8), located off of Airway Avenue in the Super Wal-Mart parking lot, generates significant multimodal activity.

The KRMC (1) is of particular interest to the development of the Stockton Hill Road corridor. Located at the intersection of Stockton Hill Road and Beverly Avenue, KRMC is one of the city's largest employers. The facility serves Mohave County and is the largest healthcare and wellness provider in northwestern Arizona.

Figure 12: Major Activity Centers



2.4 Existing Transportation Network

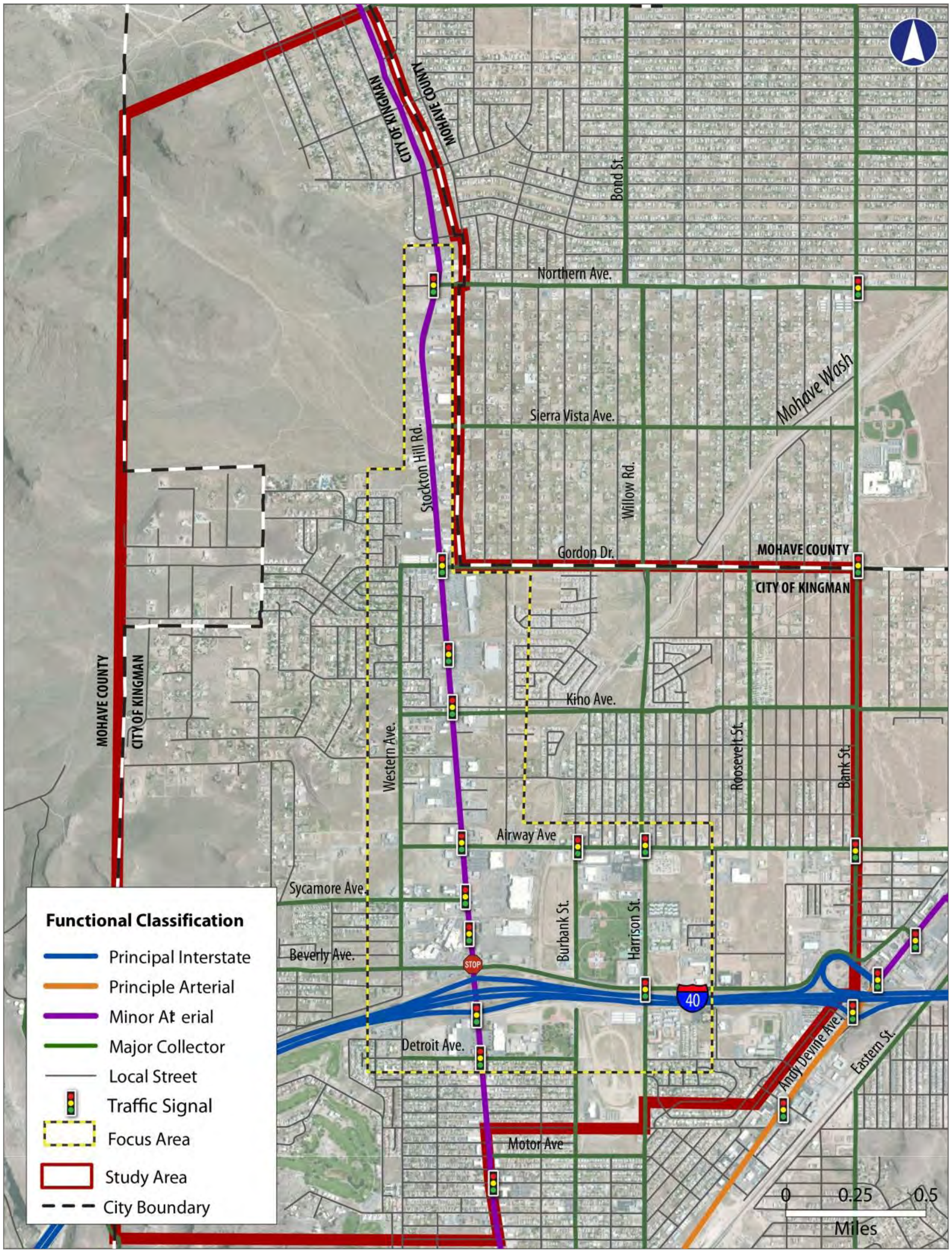
2.4.1 Roadway Network

The existing roadway network shown in Figure 13 comprises interstate highway, arterials, collectors, and local streets. There are a total of nine signals on Stockton Hill Road from Northern Avenue to Detroit Avenue, and one stop-controlled intersection at Beverley Avenue. An additional six signals are located off of Stockton Hill Road.

The following functional classifications are used in the study area:

- Principal interstate: I-40
- Principal arterials: Serve as main connectors within the region and carry large traffic volumes. They include Andy Devine Avenue, south of I-40.
- Minor Arterials: Carry the majority of trips entering or leaving the area. They include Stockton Hill Road and Andy Devine Avenue, north of I-40.
- Collectors: Carry traffic between local streets and arterials. They include Beverly Avenue, Airway Avenue, and Gordon Drive.
- Local streets: Provide circulation within and between neighborhoods.

Figure 13: Roadway Network

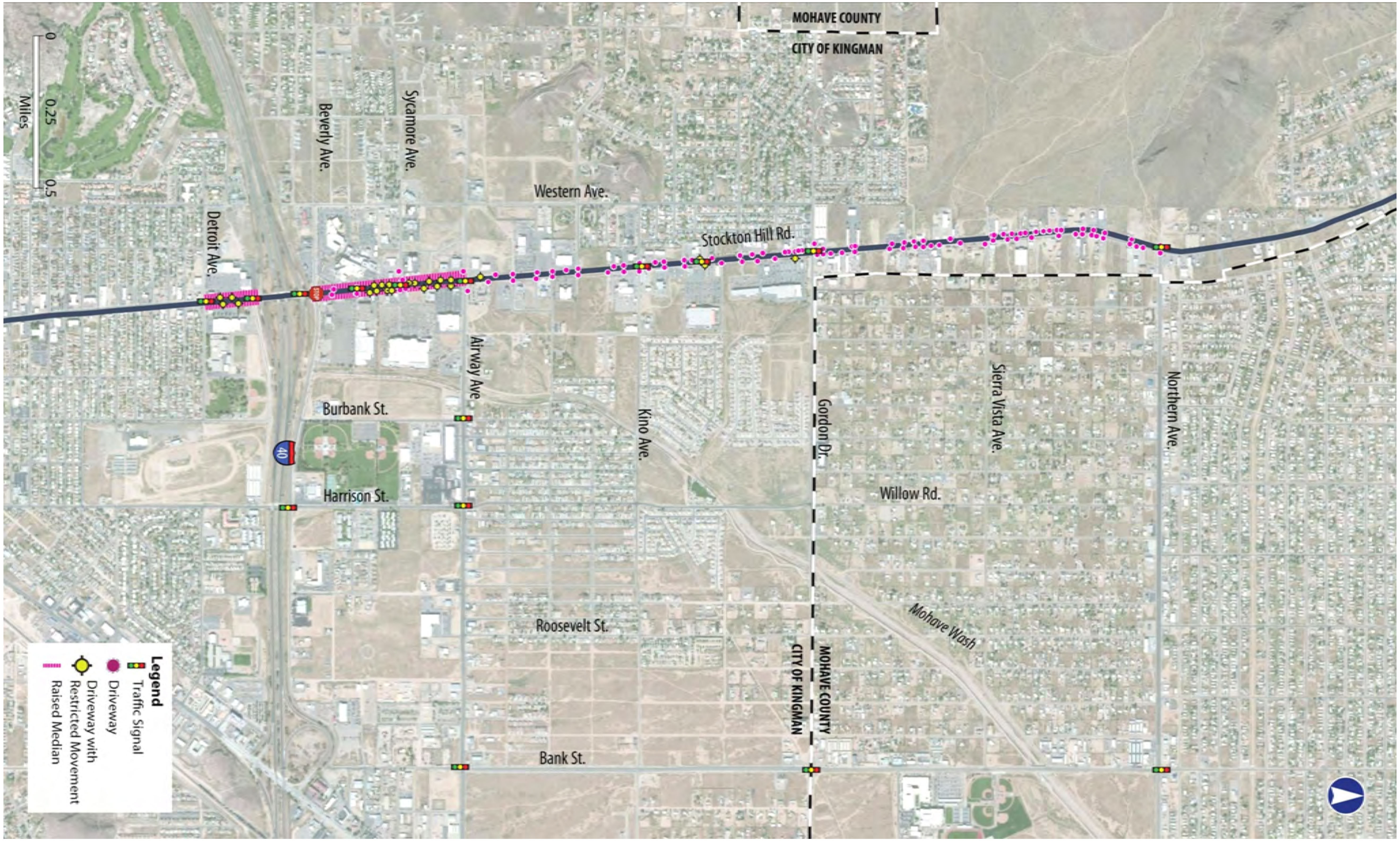


2.4.2 Access Control

Access control is used to manage roadway operations, improve traffic flow and efficiency, and promote safety. Policy elements that address access control include zoning, development standards, permits and procedures, and the acquisition of access rights. Access control strategies include traffic signal spacing, unsignalized access spacing, medians, restricted turn movements, and interchange spacing. The goal of access management is to balance roadway operational needs with the needs of adjacent developments. Access management can increase public safety, extend the life of major roadways, reduce traffic congestion, support alternative transportation modes, and improve the appearance and quality of the built environment.

Stockton Hill Road is a minor arterial and serves as the primary North-South connector for the city. Current access control strategies include raised medians from Detroit Avenue to Airway Avenue and restricted right and left-turn lanes located at several intersections and midblock locations. However, development in the area has come in phases, thus allowing for property and circulation inconsistencies between adjacent properties. As shown in Figure 14, there are approximately 116 driveways along Stockton Hill Road. In many cases, commercial properties have inadequate spacing and more than one dedicated access location. On Stockton Hill Road, this affects the utilization of the right travel lane and ultimately the free flow capabilities of the corridor. To account for the anticipated commercial growth in the corridor, additional access management for Stockton Hill Road is critical for safe turning paths, reduced conflict points with pedestrians and bicyclists, and minimum interference with traffic.

Figure 14: Access Control



2.4.3 Multimodal Transportation

2.4.3.1 Non-Motorized Facilities

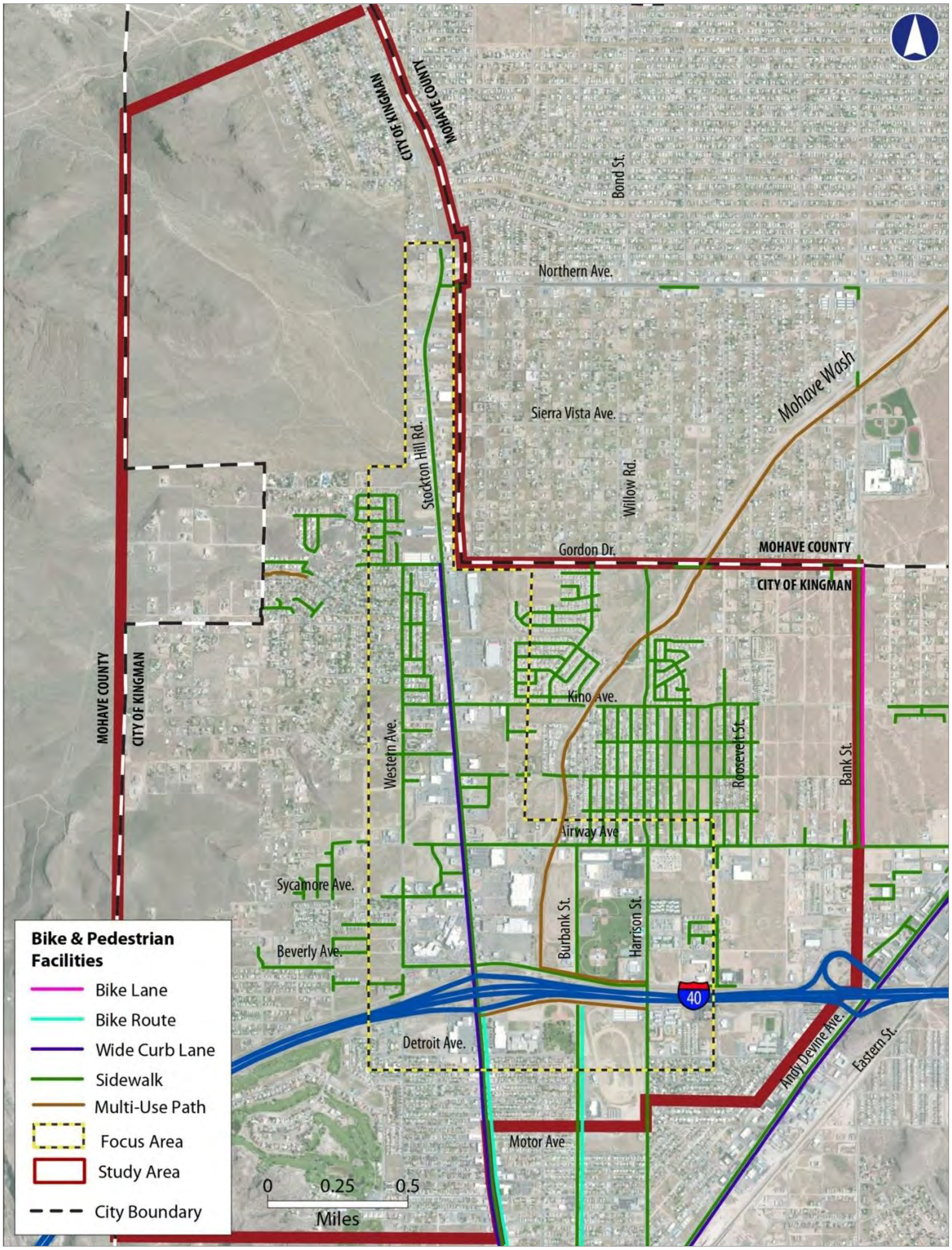
Figure 15 details the existing bicycle and pedestrian facilities in the study area. The bicycle network consists of two designated bike routes, one striped bike lane, paved shoulders along roadways, two wide curb lanes, the Mohave Wash Pathway, and sidewalks. The pedestrian network is comprises sidewalks and the Mohave Wash Pathway.

The following criteria are used to classify bicycle and pedestrian facilities:

- Bike Lanes: Striped, one-way travel lanes on the street
- Bike Routes: Not striped, but have identification signs. Typically located on secondary roads; on streets without curbs
- Wide Curb Lanes: Wider lanes on a street that provide more room for bicycle travel. Is not a designated bicycle area and can be used by vehicles
- Sidewalks: Typically used by pedestrians, but can be used by inexperienced bicyclists
- Multi-use Paths: Such as Mohave Wash Pathway, provides a space separate from vehicles

Within the focus area, sidewalks are located along the entire length of Stockton Hill Road. A wide curb lane runs from south of Detroit Avenue to Gordon Drive. With the exception of two bike routes located south of I-40, the focus area lacks designated bicycle facilities. The 2011 KATS Study states that additional bicycle and pedestrian facilities will be needed to accommodate population and employment growth and sustainable transportation.

Figure 15: Bicycle and Pedestrian Facilities



2.4.3.2 *Transit Service*

Fixed-route bus service is provided by Kingman Area Regional Transit (KART) and is comprised of four routes, all of which service the study area. The routes, shown in Figure 16, are coordinated to connect at the KART/Wal-Mart Transfer Center at 45 minutes past the hour, and depart at the top of the hour. All routes have 60-minute headways from Monday to Saturday. Operating characteristics are detailed in Table 8.

Table 8: KART Fixed-Route Service Operations

Route	Weekday Hours	Weekday Headway	Saturday Hours	Saturday Headway
Blue	6:00AM-6:00PM	60 min	9:00AM-4:00PM	60 min
Green	6:00AM-8:00PM	60 min	9:00AM-4:00PM	60 min
Yellow	6:00AM-8:00PM	60 min	9:00AM-4:00PM	60 min
Red	6:00AM-6:00PM	60 min	9:00AM-4:00PM	60 min
*Routes do not operate on Sundays or Holidays				
Source: 2011 KATS Study				

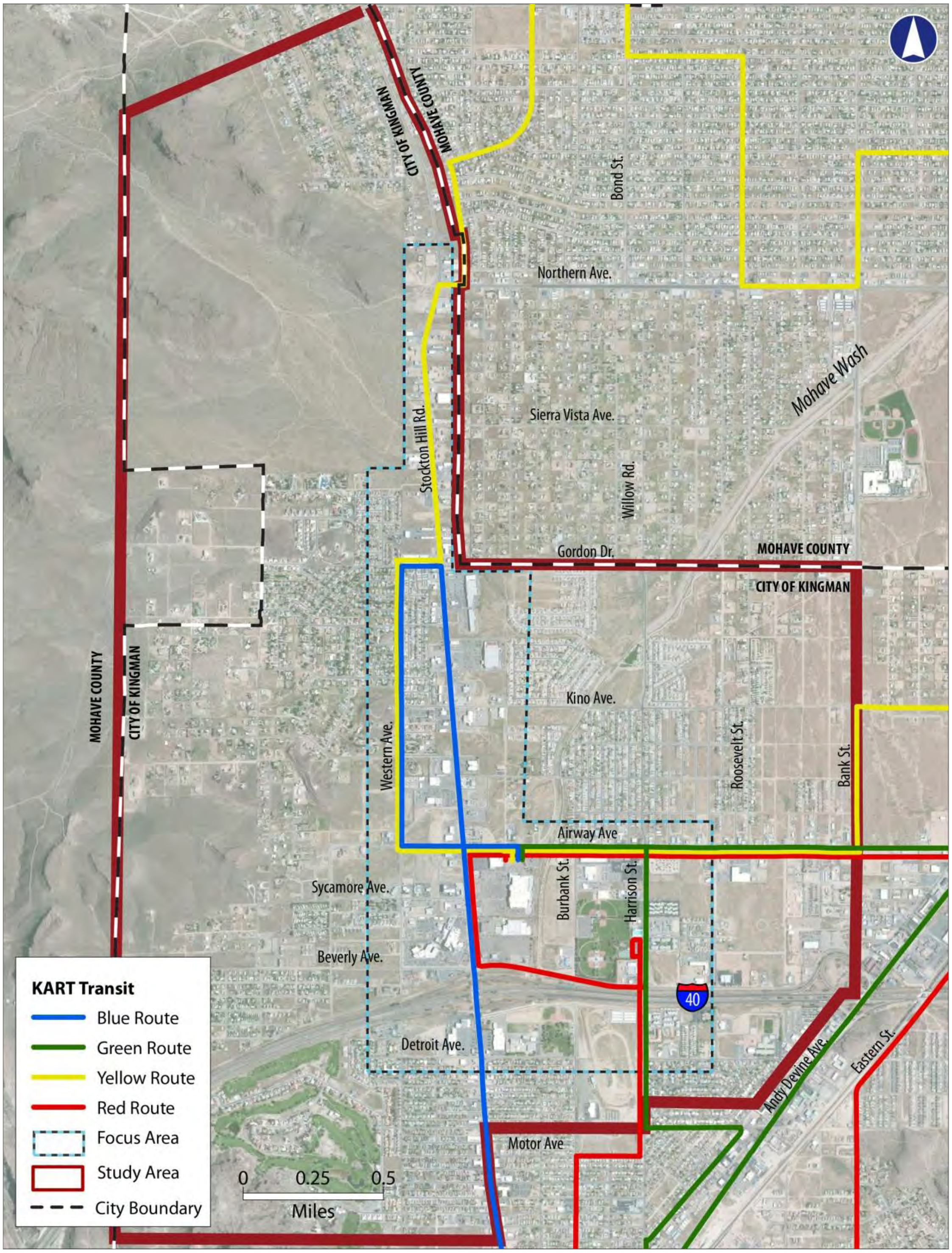
Curb-to-curb service is also available to seniors and the disabled within ¾-mile of the fixed routes. Advanced reservations and approval are required.

The fares per person, per boarding are as follows:

- Regular Bus Fare…………………………………………..$1.50 or one coupon
- Day Pass……………………………………………………..$5.00
- Monthly Pass (General)…………………………………..$65.00
- Monthly Pass (Seniors > 60 years or Veterans)……….$55.00
- Book of 30 Coupons……………………………………….$45.00
- Children under 10 accompanied by an adult………Free

Additional bus service into and out of Kingman is provided by Greyhound Bus. Popular destinations include Las Vegas and Flagstaff. The station is currently at KP Transportation, at Andy Devine Avenue and I-40, but is scheduled to relocate. The Kingman Area does not have public transit facilities such as commuter park-and-ride lots or bus pull-outs.

Figure 16: KART Transit Routes



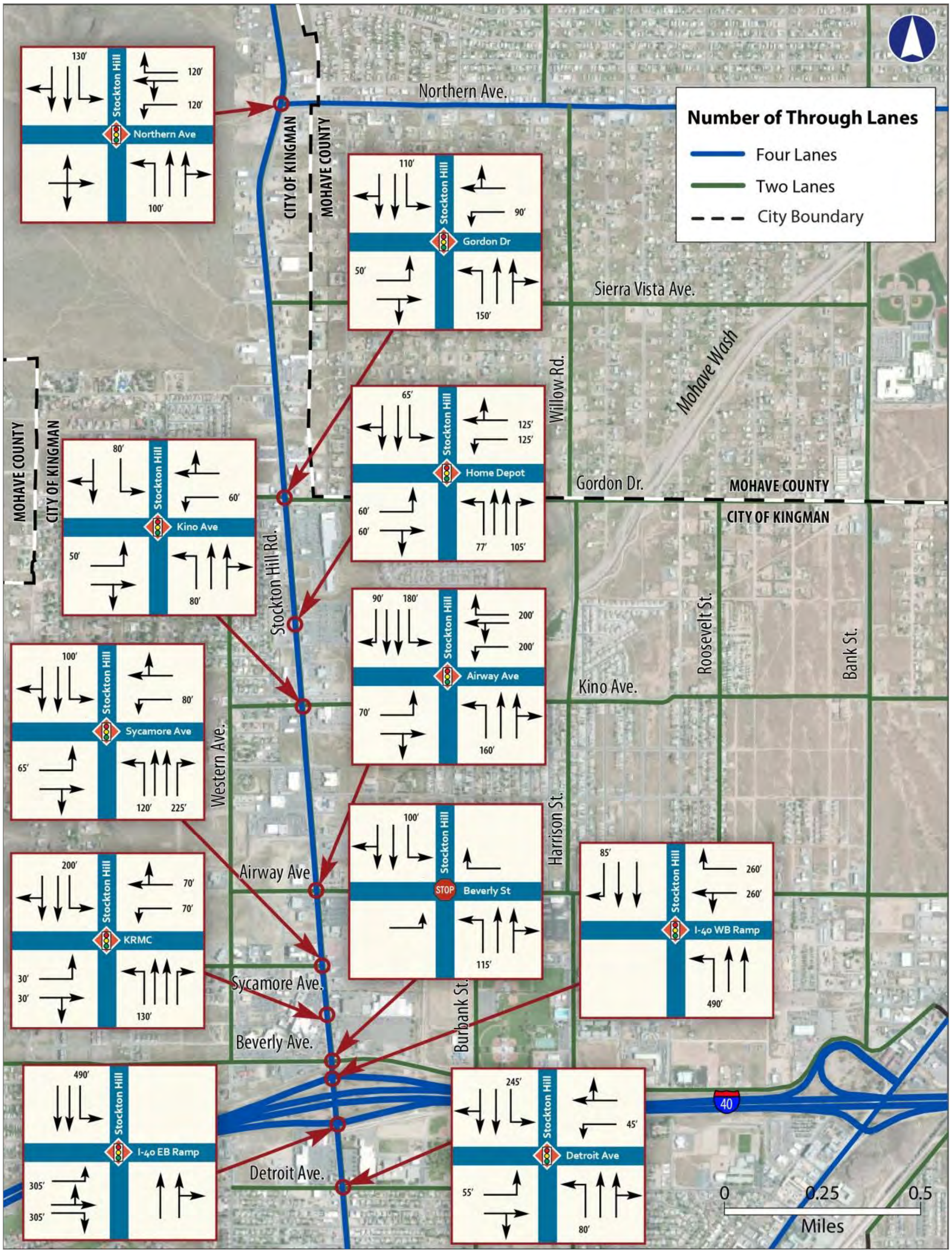
2.4.4 Traffic Conditions

2.4.4.1 Stockton Hill Road

Stockton Hill Road is a major route used by local commuters and recreational travelers to Northwest Arizona. The interchange with I-40 provides regional connectivity, which includes Flagstaff to the east and Nevada and California to the west. In addition, Stockton Hill Road provides access to the KRMC as well as retail stores, restaurants, and other businesses located in the corridor. New developments adjacent to Stockton Hill Road have increased traffic volumes, primarily north of I-40.

As shown in Figure 17, the roadway consists of four 12-foot through lanes separated by raised medians from Detroit Avenue to Airway Avenue. A two-way turn lane extends from Airway Avenue to Northern Avenue. In addition, right and left-turn lanes are located at several intersections and midblock locations for access to commercial businesses. The posted speed limit for the entire length of Stockton Hill Road is 35 miles per hour (mph).

Figure 17: Lane Configurations



2.4.4.2 Side Streets

Table 9 lists the side streets along Stockton Hill Road and the type of traffic control at each intersection. Side streets provide access to residential and commercial developments on either side of Stockton Hill Road. Adjacent streets form a grid network.

The intersection at Beverly Avenue is of particular interest due to its proximity to the I-40 westbound ramps. The intersection is located approximately 210 feet north of the westbound ramps. In addition, only stop-controlled right turns are allowed. Left turns and through movements are not permitted from Beverly Avenue. As a result, westbound vehicles on Beverly Avenue detour through the neighboring parking lot to use the KRMC signal to turn left onto Stockton Hill Road.

Table 9: Side Streets along Stockton Hill Road

Street	Intersection Type	Traffic Control
Detroit Avenue	Four Leg Intersection	Traffic Signal
I-40 Eastbound Ramp	Four Leg Intersection	Traffic Signal
I-40 Westbound Ramp	Four Leg Intersection	Traffic Signal
Beverly Avenue	Four Leg Intersection	Two-Way Stop
KRMC	Four Leg Intersection	Traffic Signal
Sycamore Avenue	Four Leg Intersection	Traffic Signal
Airway Avenue	Four Leg Intersection	Traffic Signal
Plaza Drive	Four Leg Intersection	Two-Way Stop
Khan Avenue	T- Intersection[1]	One-Way Stop
Morrow Avenue	T- Intersection[1]	One-Way Stop
Riata Valley Road	T- Intersection[1]	Two-Way Stop
Dunton Drive	T-Intersection	One-Way Stop
Kino Avenue	Four Leg Intersection	Traffic Signal
Home Depot	Four Leg Intersection	Traffic Signal
Hillcrest Drive	T- Intersection[1]	One-Way Stop
Gordon Drive	Four Leg Intersection	Traffic Signal
Sierra Vista Avenue	Four Leg Intersection	Two-Way Stop
Northern Avenue	Four Leg Intersection	Traffic Signal

[1] T-Intersection with private driveway

2.4.4.3 Traffic Volumes

Field counts of 24 hour traffic volumes at five segments within the study corridor were collected on March 19-20, 2013. Table 10 shows the Average Daily Traffic (ADT) volumes and the directional distribution of the traffic volumes at these locations. Traffic volume splits for northbound and southbound directions are almost equal. The combined traffic volumes are similar to the projected ADT for 2016 in the initial DCR for the I-40 Stockton Hill Road TI (1999). Turning movement traffic volume counts for AM, PM, and midday periods were collected at eleven intersections along the corridor. Figure 18 shows the turning movement volumes.

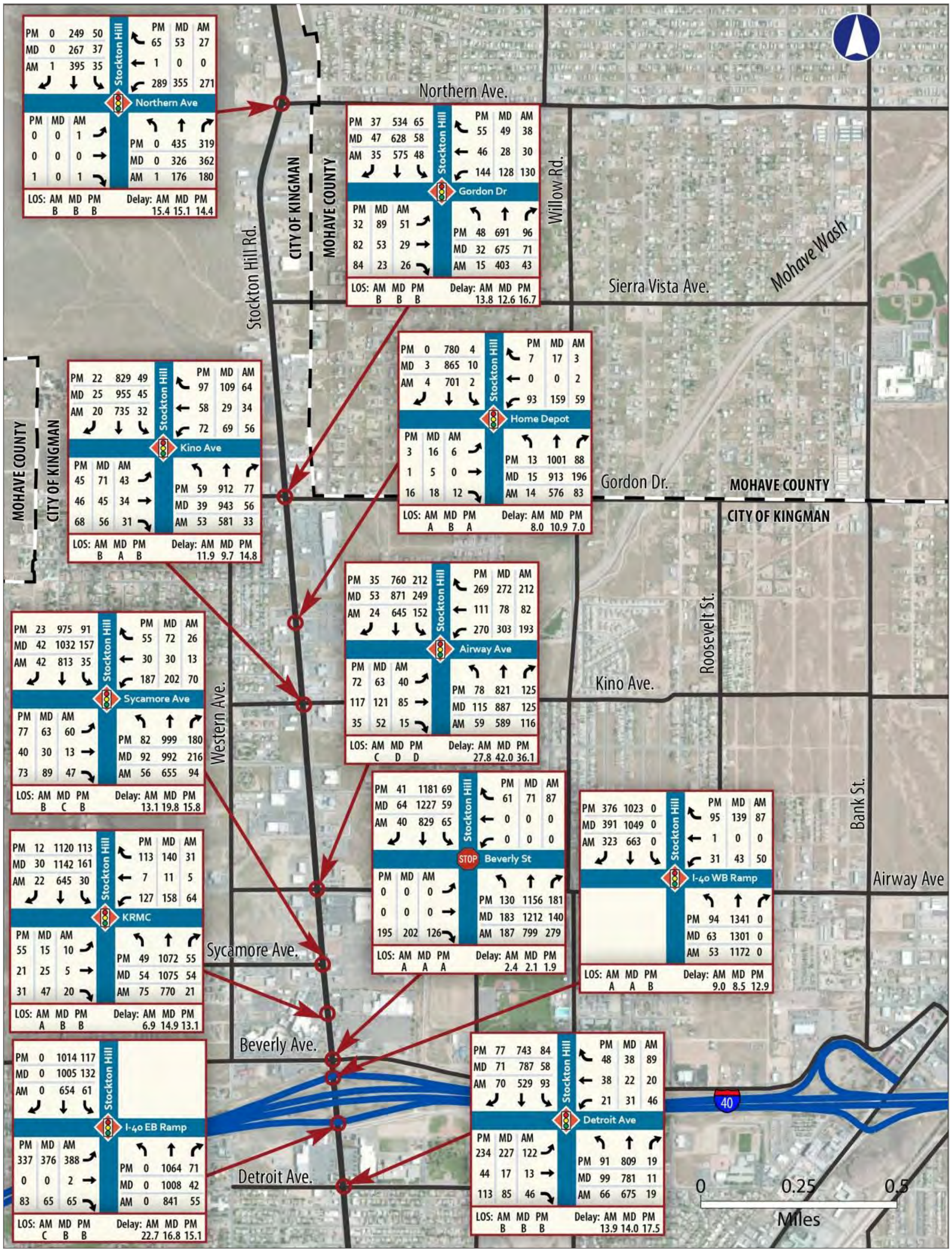
Table 10 : Estimated AADT on Stockton Hill Road

Segment on Stockton Hill Road	Approach Direction	Volume	Directional Split	ADT[1]	Estimated AADT[2]
North of I-40	NB	20855	51.9%	40168	41261
	SB	19313	48.1%		
South of I-40	NB	14078	54.3%	25922	26627
	SB	11844	45.7%		
North of Northern Ave.	NB	5116	51.3%	9966	10237
	SB	4850	48.7%		
Between Sycamore Ave. and Airway Ave.	NB	13558	47.4%	28633	29412
	SB	15075	52.6%		
Between Gordon Ave. and Hillcrest Dr.	NB	10214	43.8%	23307	23941
	SB	13093	56.2%		

[1] ADT is based on 24 hour volume counts collected in March 2013.
[2] Seasonal Factor=0.96; Daily Factor=1.07

Source: ADOT MPD Monthly Daily Factors by site 2010

Figure 18: Traffic Volumes (2013)



The ratio of peak hour traffic volume to ADT volume, expressed as a percentage, represents the "K-factor," which indicates intermittent traffic congestion by time of day. Table 11 shows the K-factor for the five locations. The average K-factor for the corridor is 17 percent. The highest traffic volume on Stockton Hill Road was north of I-40. The distribution of traffic volumes by time of day for this location and between Sycamore Avenue and Airway Avenue is shown in Figure 19 and Figure 20 respectively. Although there are distinct traffic volume peaks during the AM and PM periods, the highest traffic volume for is during the midday period, peaking approximately at noon.

Table 11: K-Factor for Stockton Hill Road

Location on Stockton Hill Road	Peak Hour Volume	Total Volume	K-factor
North of I-40	7,007	40,168	17.4%
South of I-40	4,170	25,922	16.1%
North of Northern Ave.	1,760	9,966	17.7%
Between Sycamore Ave. and Airway Ave.	4,909	28,633	17.1%
Between Gordon Ave. and Hillcrest Dr.	3,931	23,307	16.9%

Figure 19: Distribution of Traffic Volume by Time on Stockton Hill Road, North of I-40

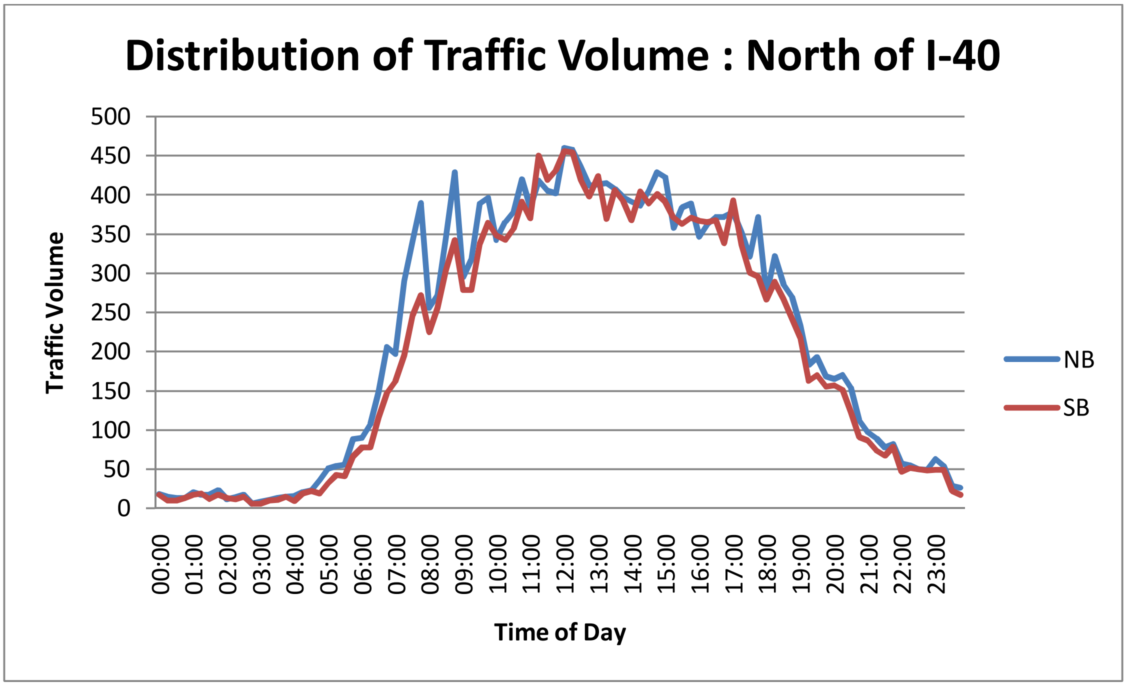
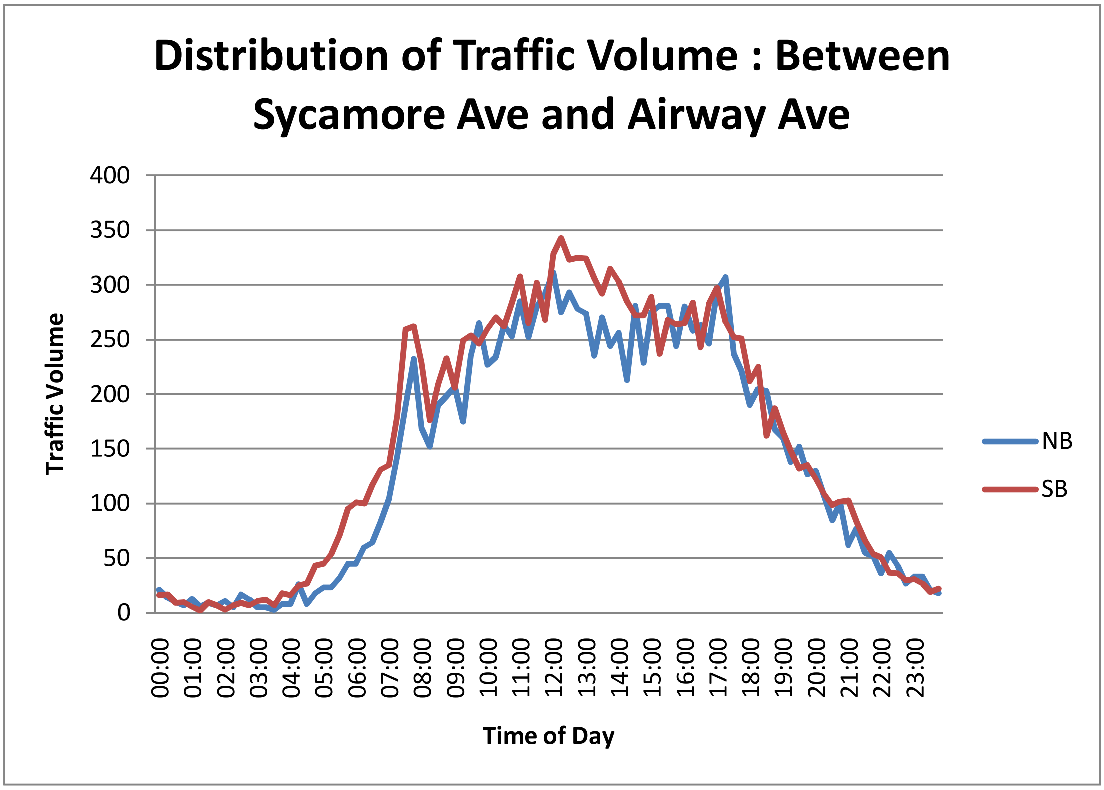


Figure 20: Distribution of Traffic Volume by Time on Stockton Hill Road, between Sycamore Avenue and Airway Avenue.



2.4.4.4 Traffic Signal Timing

With the exception of the intersection at Northern Avenue, all intersections along Stockton Hill Road have had coordinated traffic signal timing since 2008. The purpose of coordinated signal timing is to allow for vehicles to travel through the corridor at a given speed with a minimum number of stops at intersections. This is achieved by implementing fixed traffic signal cycle lengths for the intersections and defining the primary through flow as the coordinated movement. The green time for coordinated traffic flow for adjacent intersections is then offset for synchronized flow. In the City of Kingman, traffic signal timing consists of coordination schemes from 7:00 AM to 7:00 PM, Monday to Friday. At all other times, signals operate in “Free” mode, where a traffic signal controller provides demand responsive green times for vehicular movements and walk times for pedestrian movements. Hours of operation used for the coordination plan are provided in Table 12. Details of the plan’s number of phases, coordination cycle length, and offset is provided in Table 13. The intersections at Detroit Avenue and Sycamore Avenue both have eight phases, the most out of the Stockton Hill Road intersections. The intersections with the least are located at I-40 and Kino Avenue, with three and four phases respectively.

Table 12: Coordinated Timing Plans in Operation

Coordinated Plan	Start Time	End Time	Days
AM Plan	7:00 AM	11:00 AM	Monday to Saturday
Midday Plan	11:00 AM	3:30 PM	Monday to Saturday
PM Plan	3:30 PM	7:00 PM	Monday to Saturday

Source: ADOT Final Traffic Signal Timing Study, Stockton Hill Road, Kingman, AZ (2008); City of Kingman, AZ

Table 13: Intersection Coordinated Signal Timing Parameters

Intersection		Phases	AM		Midday		PM	
			Cycle	Offset	Cycle	Offset	Cycle	Offset
Stockton Hill Road	Detroit Avenue	8	115	107	120	75	115	32
Stockton Hill Road	I-40	3	115	68	120	36	115	112
Stockton Hill Road	KRMC	6	115	66	120	40	115	45
Stockton Hill Road	Sycamore Avenue	8	115	40	120	30	115	36
Stockton Hill Road	Airway Avenue	6	115	16	120	26	115	38
Stockton Hill Road	Kino Avenue	4	115	112	90	83	115	15
Stockton Hill Road	Home Depot	6	115	0	90	64	115	9
Stockton Hill Road	Gordon Drive	6	115	38	90	10	115	36

Note: All cycle length and offset values given in this table are in seconds.

Source: ADOT Final Traffic Signal Timing Study, Stockton Hill Road, Kingman, AZ (2008); City of Kingman, AZ

2.4.4.5 Level of Service Analysis

Level of service (LOS) is a qualitative description of how well an automobile transportation facility (roadway, intersection, etc.) operates under prevailing traffic conditions. It provides a common and consistent means of evaluating the need for roadway improvements. The LOS concept is widely used in traffic studies and reports and offers a uniform analysis and comparison method. It is a measure of driver delay, and is a function of traffic volumes, traffic composition, roadway geometry, and the traffic control at the intersection. The following grading system of A through F is used to assess the operational performance of the facility, and is generally defined as follows:

- LOS A represents free flow.
- LOS B is in the range of stable flow, but the presence of other vehicles begins to have have a noticeable impact on speeds and the freedom to maneuver.
- LOS C is in the range of stable flow, but marks the beginning of the range in which the operation of individual users becomes significantly affected by others.
- LOS D represents high-density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.

- LOS E represents operating conditions at or near the capacity level. All speeds are reduced to a low but relatively uniform value.
- LOS F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount that can traverse the point.

The daily capacity of Stockton Hill Road was analyzed using the capacity threshold volumes presented in the 2011 KATS Study. Table 14 presents the capacity threshold values for Collector/Arterial with and without left-turn lanes for LOS C and D. The threshold volumes were developed as a planning tool to assist in determining the expected average daily LOS.

Table 14: Capacity thresholds for LOS C and LOS D

Functional Classification	Number of Lanes	Capacity Threshold (LOS C)	Capacity Threshold (LOS D)
Collector/ Arterial with no left-turn lanes	2	9000	12300
Collector/ Arterial with left-turn lanes	2	11200	15400

Source: 2011 KATS Study (FDOT 2002 Quality/Level of Service Handbook)

Table 15 shows the existing maximum traffic volumes for Stockton Hill Road. As stated in the 2011 KATS study, the maximum Average Daily Traffic (ADT) volumes on Stockton Hill Road exceed the LOS D threshold values.

Table 15: Existing ADT

Location on Stockton Hill Road	ADT Volume
North of I-40	40168
South of I-40	25922
North of Northern Ave.	9966
Between Sycamore Ave. and Airway Ave.	28633
Between Gordon Ave. and Hillcrest Dr.	23307

Intersection LOS and delay are shown in Figure 18. All intersections on Stockton Hill Road have a LOS of either A or B, with the exception of the intersections at the I-40 eastbound ramps and Airway Avenue.

The traffic speeds and LOS for segments of Stockton Hill Road were analyzed using Synchro Software[1] to determine locations along the corridor where speeds are low due to lack of synchronized traffic flow. Table 16 and Table 17 present the existing LOS and

[1] Synchro 8 Traffic Modeling Software, Version 8.0, Build 804, Revision 795

speeds for the different sections of northbound and southbound Stockton Hill Road respectively. The segments with the lowest speeds are northbound, between Detroit Avenue and Airway Avenue, with some sections experiencing speeds lower than 15 MPH. LOS for northbound segments between Detroit Avenue and Airway Avenue vary from LOS C to LOS E. The segments north of Airway Avenue operate at LOS A to LOS C. The segments for southbound Stockton Hill Road have LOS ranging from A to D for all segments. The northbound corridor operates at LOS C with an average speed of 23 MPH. The southbound corridor operates at LOS C with an average speed of 24.6 MPH.

Table 16: LOS and Speed for Northbound Stockton Hill Segments (2013)

Segment – Stockton Hill Road Northbound	2013 Level of Service & Speed					
	AM	Speed	MD	Speed	PM	Speed
Detroit - I-40 EB	E	12.7	D	17.0	C	18.1
I-40 EB - I-40 WB	C	18.3	C	20.7	C	21.7
I-40 WB - KRMC	C	21.6	D	16.8	D	17.0
KRMC - Sycamore	D	14.1	D	14.8	D	16.9
Sycamore - Airway	E	13.5	E	10.7	E	13.8
Airway - Kino	B	25.7	B	27.9	B	24.7
Kino - Home Depot	B	26.2	C	18.9	B	25.8
Home Depot - Gordon	B	28.3	B	26.5	B	27.2
Gordon - Northern	A	34.0	A	33.8	A	33.4
Corridor	C	23.1	C	22.6	C	23.5

Table 17: LOS and Speed for Southbound Stockton Hill Segments (2013)

Segment – Stockton Hill Road Southbound	2013 Level of Service & Speed					
	AM	Speed	MD	Speed	PM	Speed
Northern - Gordon	A	32.4	A	32.0	A	31.6
Gordon - Home Depot	B	24.5	B	24.8	B	25.3
Home Depot - Kino	B	24.2	C	19.7	B	24.5
Kino - Airway	C	21.7	C	20.7	C	22.2
Airway - Sycamore	C	23.8	C	21.6	C	20.1
Sycamore - KRMC	C	23.9	D	17.2	C	19.7
KRMC - I-40 WB	C	19.8	C	19.4	D	14.2
I-40 WB - I-40 EB	B	24.4	B	24.9	B	25.1
I-40 EB - Detroit	C	23.3	B	25.0	C	20.3
Corridor	B	25.4	B	24.4	B	24.1

2.4.4.6 *Crash Analysis*

Stockton Hill Road Crash Analysis

To identify crash patterns and trends, a crash analysis was completed for the section of Stockton Hill Road between Detroit Avenue and Northern Avenue. Crash data was obtained from the ADOT Traffic Records section's *Arizona Information Data Warehouse (AIDW)* portal's *Safety Data Mart (SDM)* for the most recent five-year period, between November 1, 2007 and October 31, 2012 (Accessed February 22nd, 2013). The web portal notes that the data is up-to-date through October 2012.

A total of 601 crashes were documented along Stockton Hill Road within the study time period. There were two fatal crashes, with the majority resulting in property damage only. Table 18 shows the number of crashes by crash severity.

Table 18: Distribution of Crashes by Severity

Crash Severity	Number of Crashes
Fatal	2
Injury	233
Property Damage Only	366
Total	601
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

Table 19 summarizes the fatal, injury, and total crashes by year from 2007 through 2012.

Table 19: Summary of Stockton Hill Road Crashes by Year, 2007-2012

Year	2007[1]	2008	2009	2010	2011	2012[1]	Total
Fatal Crashes	0	0	0	1	0	1	2
Injury Crashes	7	46	45	46	50	1	195
Property Damage Only	14	73	54	68	78	7	294
Total Crashes	21	119	99	115	128	8	490
Average ADT	-	23,186	23,650	24,123	24,605	-	-
Crash Rate	-	5.21	4.25	4.84	5.28	-	-
Fatal Crash Rate	-	0	0	0.042	0	-	-
Statewide Crash Rate	-	1.95	1.79	1.74	1.74	-	-
Statewide Fatal Crash Rate	-	1.37	1.18	1.16	1.27	-	-
Note: Crash data is up-to-date through the end of February 2011. Crash rate equals the number of crashes per million vehicle miles traveled (MVMT).							
[1]Partial year data.							
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012							

Also shown is the crash rate by year. The crash rates were calculated from 2008 through 2011, where complete crash records were available. Table 20 summarizes the crash rate for three segments along Stockton Hill Road. The crash rate is highest for the segment between Detroit Avenue and Beverly Avenue.

Table 20: Crash Rate for Stockton Hill Road Segments

Stockton Hill Road Segment	ADT	Length (miles)	Crash Rate
Detroit Ave - Beverly Ave	33,944	0.32	9.4
Beverly Ave - Kino Ave	29,412	0.94	6.3
Kino Ave - Northern Ave	23,941	1.5	1.4
Note: Crash Data is up-to-date through the end of February 2011. Crash rate equals the number of crashes per million vehicle miles traveled (MVMT).			
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012			

The combination of crash frequency (crashes per year) and vehicle exposure (traffic volumes or miles traveled) results in a crash rate. Crash rates are expressed as "Crashes per Million Vehicle Miles Traveled" (MVMT) for roadway segments. The crash rate analysis is a useful tool to compare a study segment crash frequency with the average crash rates of similar facilities.

- The highest number of crashes was in year 2011 and the lowest was in 2009.(Partial year data was not used for comparison)
- Fatal crashes were approximately 0.33 percent of the total crashes.
- Injury crashes were approximately 39 percent of the total crashes.
- Over the analysis period from 2007 to 2012, the crash rate has varied from 4.25 to 5.28, much higher than the statewide crash rate of 1.74 to 1.95, as shown in Table 19.

Table 21 provides a comparative evaluation of the crash statistics for Stockton Hill Road, versus the average values for Mohave County and crash statistics for all urban roadway facilities in the state of Arizona.

Some of the key takeaways from this comparative evaluation are:

- The percentage of injury crashes for the section of Stockton Hill Road is slightly higher (38.77 percent) than Mohave County (33.59 percent) and Arizona (32.35 percent).
- The percentage of fatal crashes for the section of Stockton Hill Road between Detroit Avenue and Northern Avenue is lower (0.33 percent) than urban crashes in Arizona (0.45 percent) and lower than that of Mohave County (1.24 percent).

Table 21: Comparison of Crash Severity Statistics (Urban)

Crash Type	Stockton Hill Road	Mohave County	Arizona Urban Crashes
Fatal Crash	0.33%	1.24%	0.45%
Injury Crash	38.77%	33.59%	32.35%
Property Damage Only	60.90%	65.17%	67.21%

Sources: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012 , Arizona Motor Vehicles Crash Facts, 2011 (2012)

Figure 21 maps the locations of the crashes along Stockton Hill Road by severity. The highest portion of crashes is concentrated south of Kino Avenue, including both recorded fatalities.

Figure 21: Crash Locations

Table 22 and Figure 22 present the distribution of crashes along Stockton Hill Road by type, notably, 49 percent of the crashes are rear end crashes.

Table 22: Distribution of Crashes by Type

Crash Type	Number of Crashes
Rear End	296
Angle (Front to Side)	96
Left Turn	92
Sideswipe (Same Direction)	63
Single Vehicle	26
Rear to Side	6
Head On	4
Sideswipe (Opposite Direction)	3
Rear to rear	1
Other	14
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

Figure 22: Distribution of Type of Crashes

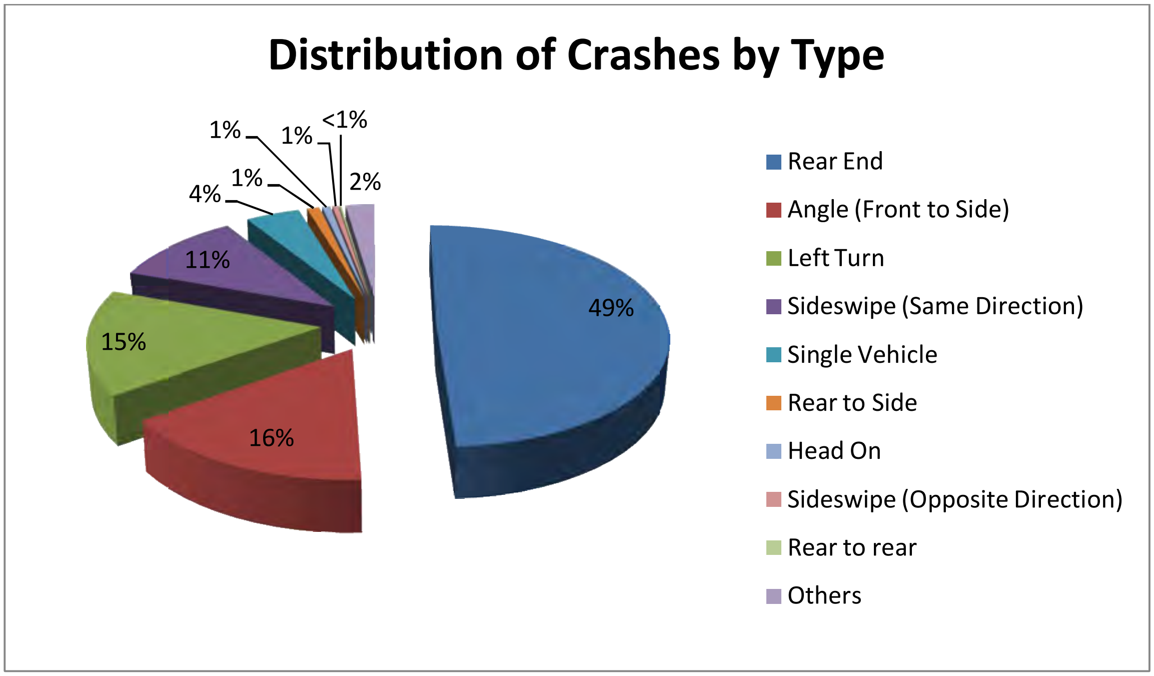


Figure 23 and Figure 24 show the distribution of crashes along the Stockton Hill Road by light and weather conditions during the crash. A majority of the crashes occur in clear weather (86%) and daylight (86%) conditions.

Figure 23: Distribution of Crashes by Light Conditions

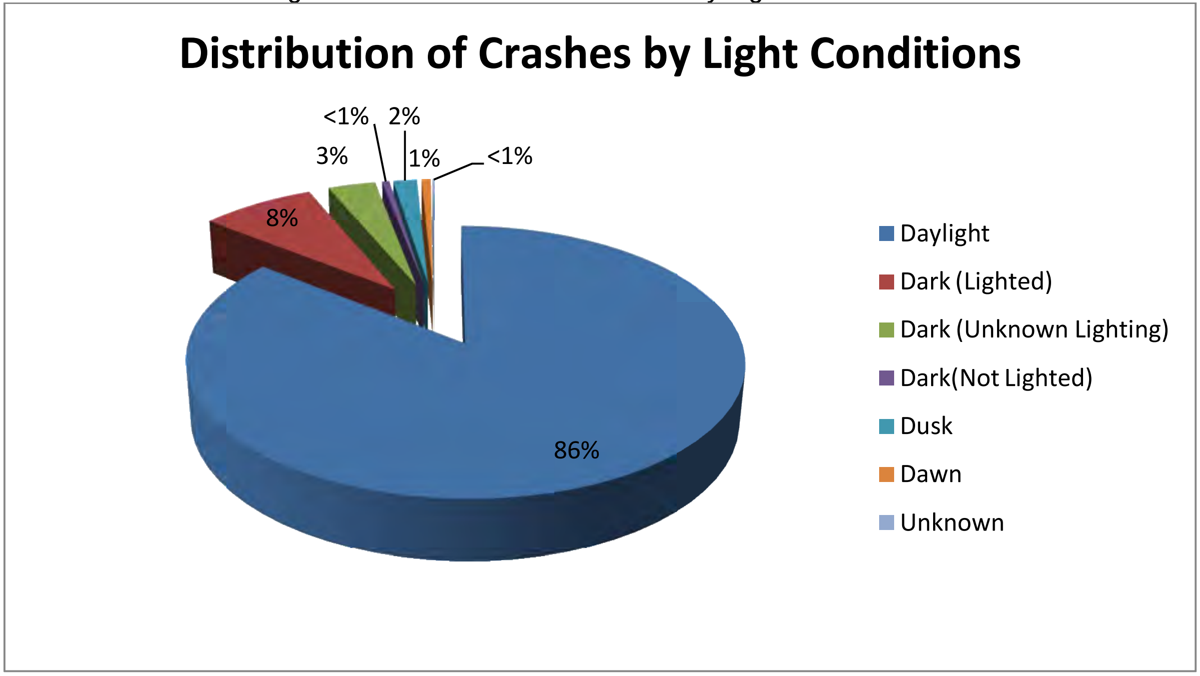


Figure 24: Distribution of Crashes by Weather Conditions

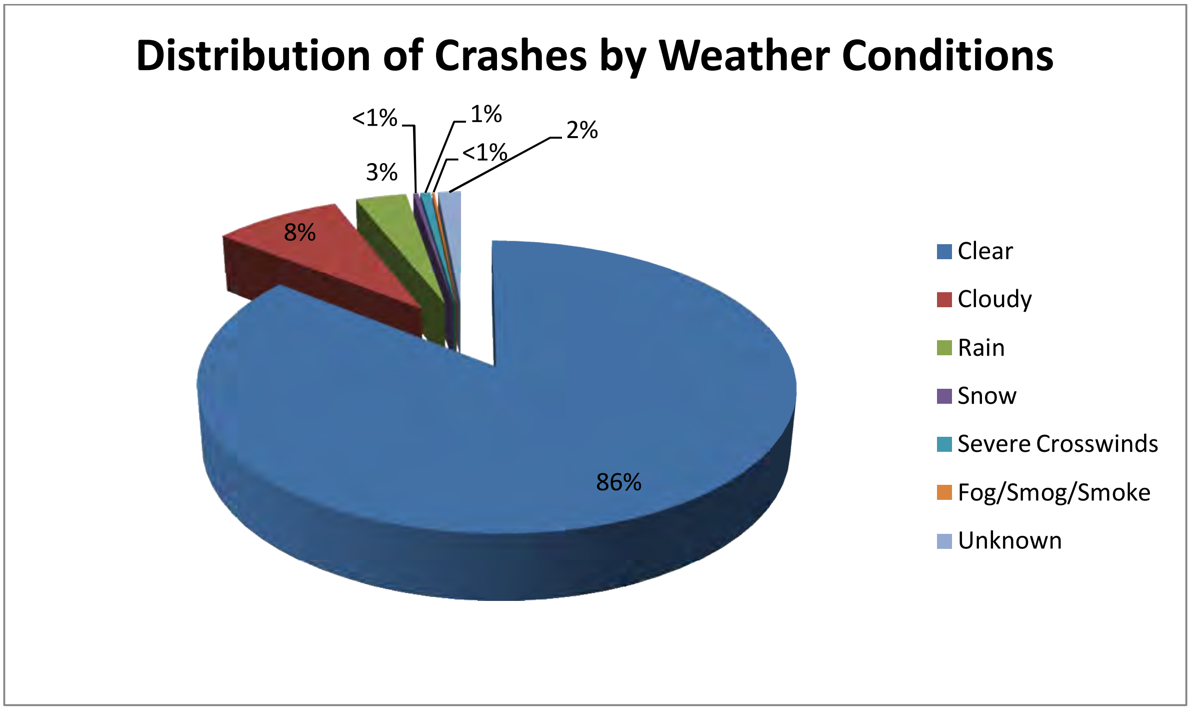


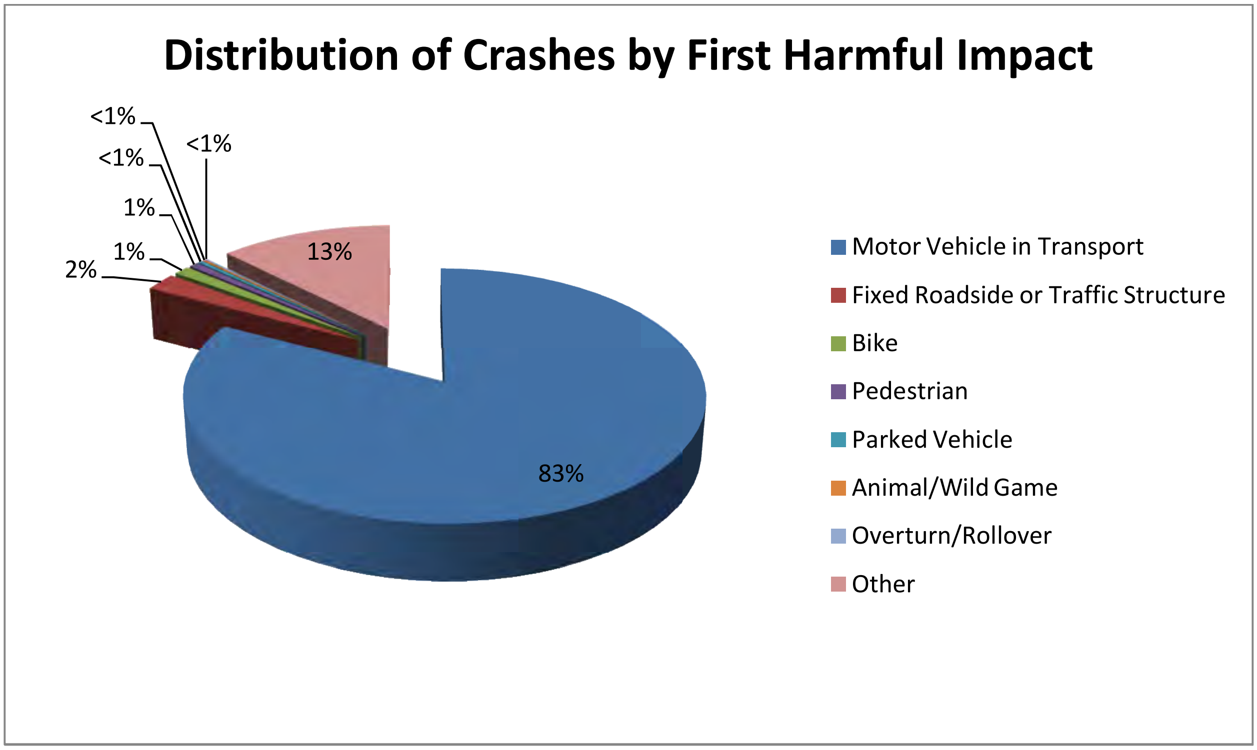
Table 23 and Figure 25 show the distribution of crashes by the type harmful impact. The majority of the crashes along Stockton Hill Road are vehicular crashes.

Table 23: Distribution of Crashes by First Harmful Impact

Harmful Impact	Number of Crashes
Motor Vehicle in Transport	497
Fixed Roadside or Traffic Structure	14
Bicycle	7
Pedestrian	4
Parked Vehicle	2
Animal/Wild Game	1
Overturn/Rollover	1
Other	75

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

Figure 25: Distribution of Crashes by First Harmful Impact



Intersection Crash Analysis

A crash analysis was completed for seven intersections on Stockton Hill Road to identify intersection crash patterns and trends. The web portal notes that the data is up-to-date through the end of February 2011. Crash data for the I-40 interchange and KRMC and Home Depot intersections were not available. The following intersections were analyzed:

1. Stockton Hill Road & Detroit Avenue
2. Stockton Hill Road & Beverly Avenue
3. Stockton Hill Road & Sycamore Avenue
4. Stockton Hill Road & Airway Avenue
5. Stockton Hill Road & Kino Avenue
6. Stockton Hill Road & Gordon Drive
7. Stockton Hill Road & Northern Avenue

Table 24 summarizes crashes by intersection to identify which locations have the most safety issues. The intersection at Stockton Hill Road and Airway Avenue had a total of 92 crashes between years 2007 and 2012, the most of the seven intersections. The intersections of Stockton Hill Road with Airway Avenue and Sycamore Avenue have crash rates of 1.47 and 1.37 crashes per million vehicle miles of travel respectively. The intersections at Detroit Avenue, Beverly Avenue, and Gordon Drive all had a total of 41 crashes. At all intersections, the majority of crashes were property damage only, with no fatal crashes.

Table 24: Total Number of Crashes by Intersection

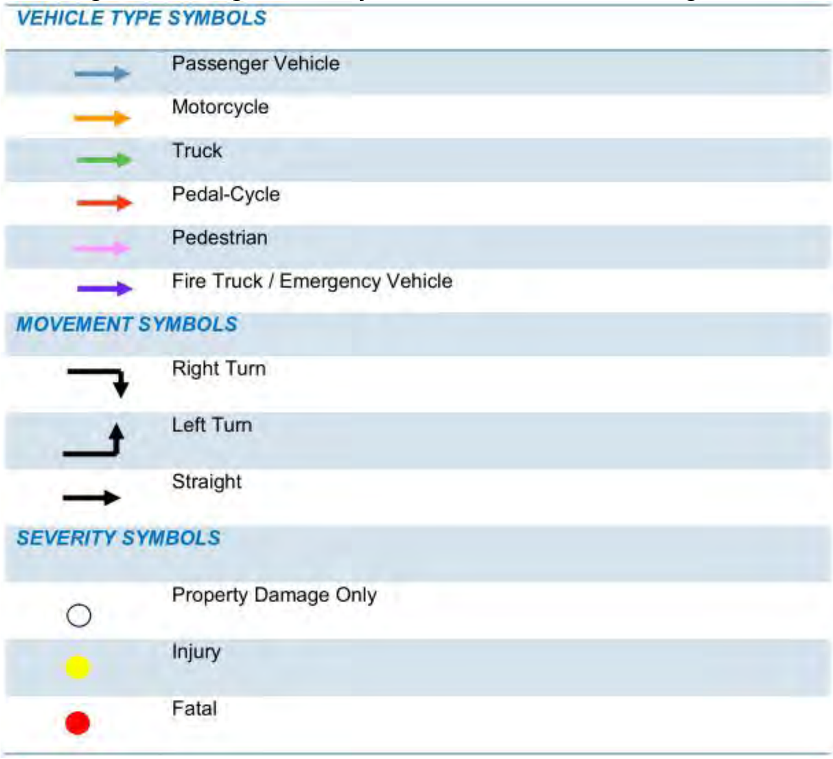
Intersection		Total Crashes	Type of Crash			Crash Rate
			Fatal	Injury	Property Damage	
Stockton Hill Road	Airway Avenue	92	0	38	54	1.47
Stockton Hill Road	Sycamore Avenue	65	0	21	44	1.37
Stockton Hill Road	Detroit Avenue	41	0	18	23	0.63
Stockton Hill Road	Beverly Avenue	41	0	20	21	0.62
Stockton Hill Road	Gordon Drive	41	0	18	23	1.02
Stockton Hill Road	Kino Avenue	27	0	8	19	0.53
Stockton Hill Road	Northern Avenue	16	0	7	9	0.53

Note: Crash Data is up-to-date through the end of February 2011. Crash rate equals the number of crashes per million vehicle miles traveled (MVMT).

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

The following sections provide a detailed crash analysis by intersection. Crash diagrams were created showing the crash patterns at each intersection. Figure 26 provides the legend for the symbols used in the crash diagram. The location of the crashes on the crash diagrams is approximate.

Figure 26: Legend for Symbols used in Crash Diagrams



1. Stockton Hill Road and Detroit Avenue

As shown in Table 25, there were 41 crashes at the intersection of Stockton Hill Road and Detroit Avenue during the study period. Of these crashes, 18 were injury crashes and 23 were property damage only. There were no fatal crashes. Over half of the crashes for the intersection were rear-end crashes. As seen in Table 26, the top three causes for crashes at the intersection were driver inattention, failure to yield right-of-way, and high speed.

Table 25: Summary of Crashes by Severity at Stockton Hill Road and Detroit Avenue

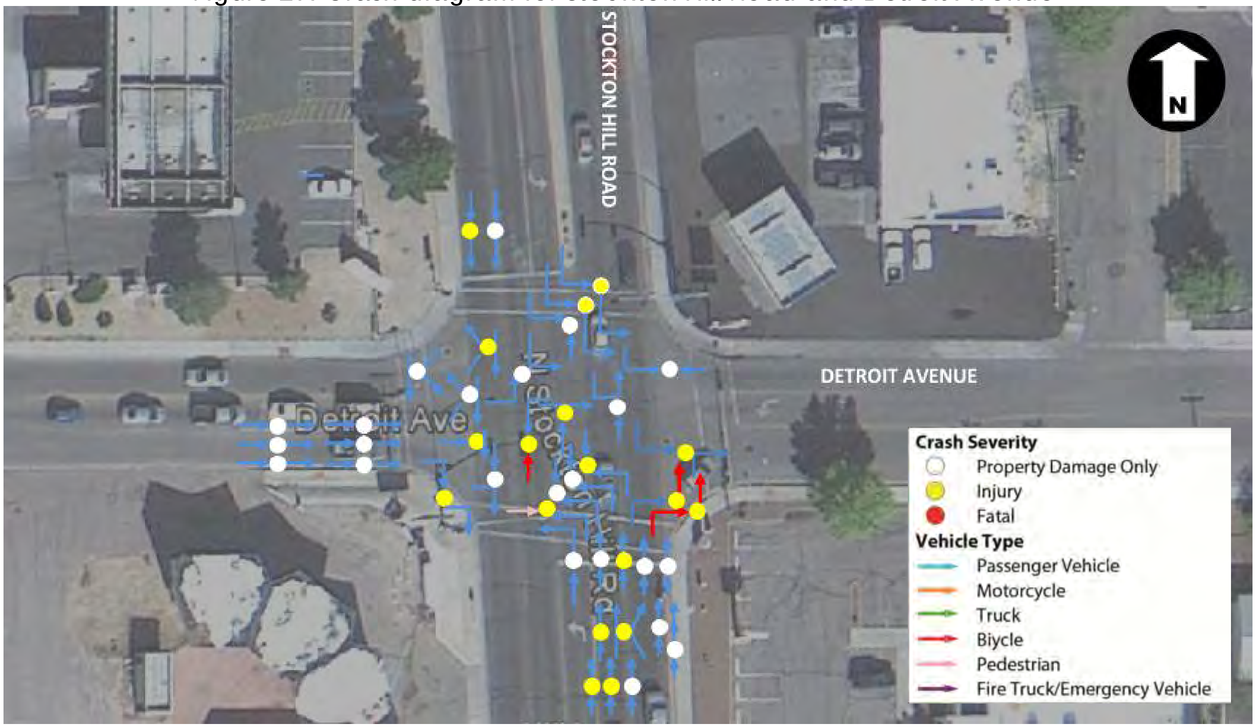
Crash Severity	Number of Crashes
Fatal	0
Injury	18
Property Damage Only	23
Total	41
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

Table 26: Summary of Crashes by Cause at Stockton Hill Road and Detroit Avenue

Cause	Number of Crashes
Disregard of traffic signal	3
Failed to yield right-of-way	7
Followed too closely	1
Inattention/Distraction	14
Made improper turn	2
No improper action	3
Operated with faulty/missing equipment	1
Speed too fast for conditions	7
Unsafe lane change	1
Other	2
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

The crash diagram, shown in Figure 27, details the crash patterns at the Stockton Hill Road and Detroit Avenue intersection. There is a high incidence of rear-end crashes from the northbound approach, with three bicycle crashes.

Figure 27: Crash diagram for Stockton Hill Road and Detroit Avenue



2. Stockton Hill Road and Beverly Avenue

As shown in Table 27, there were 41 crashes at the intersection of Stockton Hill Road and Beverly Avenue during the study period. Of these crashes, 20 were injury crashes and 21 were property damage only. There were no fatal crashes. Over 60 percent of the crashes for the intersection were rear-end crashes. As seen in Table 28, the top three causes for crashes at the intersection were driver inattention, high speed, and failure to yield right-of-way.

Table 27: Summary of Crashes by Severity at Stockton Hill Road and Beverly Avenue

Crash Severity	Number of Crashes
Fatal	0
Injury	20
Property Damage Only	21
Total	41

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

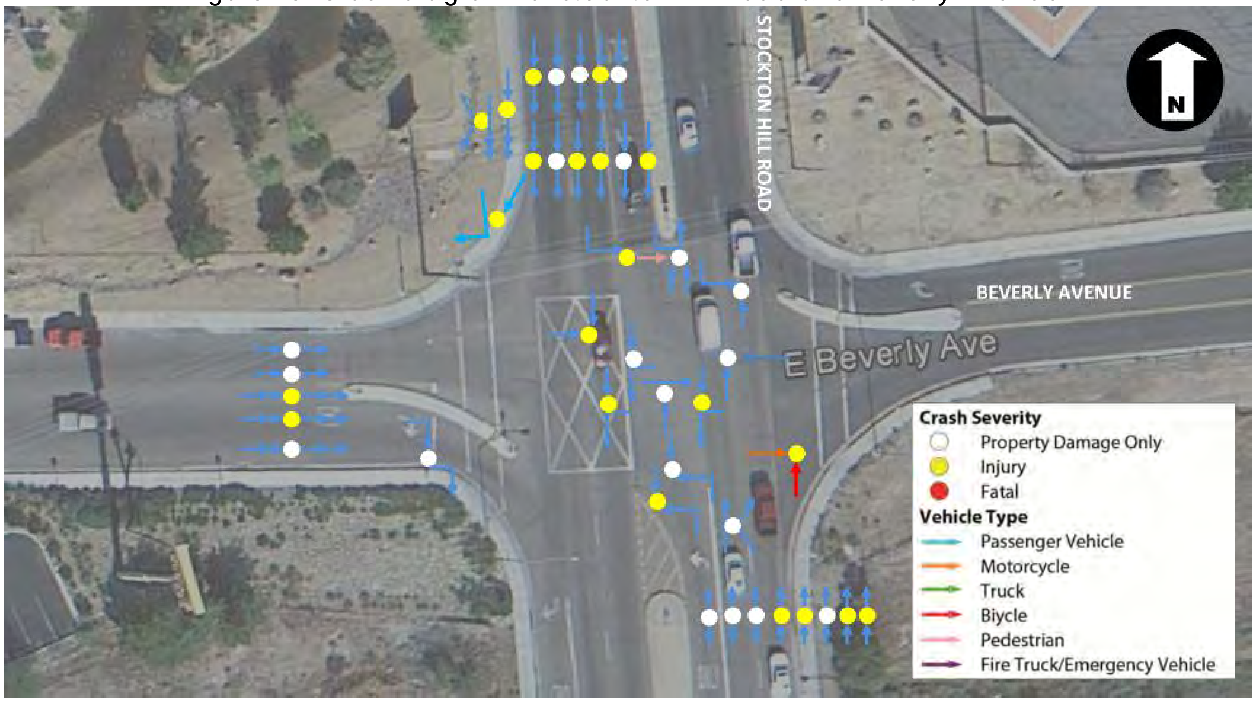
Table 28: Summary of Crashes by Cause at Stockton Hill Road and Beverly Avenue

Cause	Number of Crashes
Disregard to traffic signal	3
Failed to keep in proper lane	1
Failed to yield right-of-way	6
Followed too closely	1
Inattention/Distraction	15
Speed too fast for conditions	12
Other	3

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

The crash diagram, shown in Figure 28, details the crash patterns at the Stockton Hill Road and Beverly Avenue intersection. There is a high incidence of rear-end crashes from the northbound and southbound approaches.

Figure 28: Crash diagram for Stockton Hill Road and Beverly Avenue



3. Stockton Hill Road and Sycamore Avenue

As shown in Table 29, the intersection of Stockton Hill Road and Sycamore Avenue had 65 crashes during the study period. There were no fatal crashes. 21 of the crashes were injury crashes and 44 were property damage only. 24 crashes at the intersection were rear-end crashes. There were 15 left-turn crashes and 13 angle crashes. As seen in Table 30, the top three causes for crashes at the intersection were driver inattention, high speed, and failure to yield right-of-way.

Table 29: Summary of Crashes by Severity at Stockton Hill Road and Sycamore Avenue

Crash Severity	Number of Crashes
Fatal	0
Injury	21
Property Damage Only	44
Total	65
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

Table 30: Summary of Crashes by Cause at Stockton Hill Road and Sycamore Avenue

Cause	Number of Crashes
Disregard to traffic signal	5
Drove in opposing traffic lane	1
Failed to keep in proper lane	1
Failed to yield right-of-way	8
Followed too closely	1
Inattention/Distraction	19
Made improper turn	4
Speed too fast for conditions	14
Unsafe lane change	2
Other	10
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

The crash diagram, shown in Figure 29, details the crash patterns at the Stockton Hill Road and Sycamore Avenue intersection. There is a high incidence of rear-end crashes from the northbound and southbound approaches. There is also a high incidence of crashes involving left turning vehicles.

Figure 29: Crash Diagram for Stockton Hill Road and Sycamore Avenue

4. Stockton Hill Road and Airway Avenue

As Table 31 details, the intersection of Stockton Hill Road and Airway Avenue had 92 crashes in the study period. There were no fatal crashes. 38 crashes were injury crashes and 54 were property damage only. There were 38 rear-end crashes accounting for 41 percent of all crashes. Approximately 22 percent of crashes were left turn crashes and 18 percent were sideswipe crashes. As seen in Table 32, the top three causes for crashes at the intersection were driver inattention, high speed, and failure to yield right-of-way.

Table 31: Summary of Crashes by Severity at Stockton Hill Road and Airway Avenue

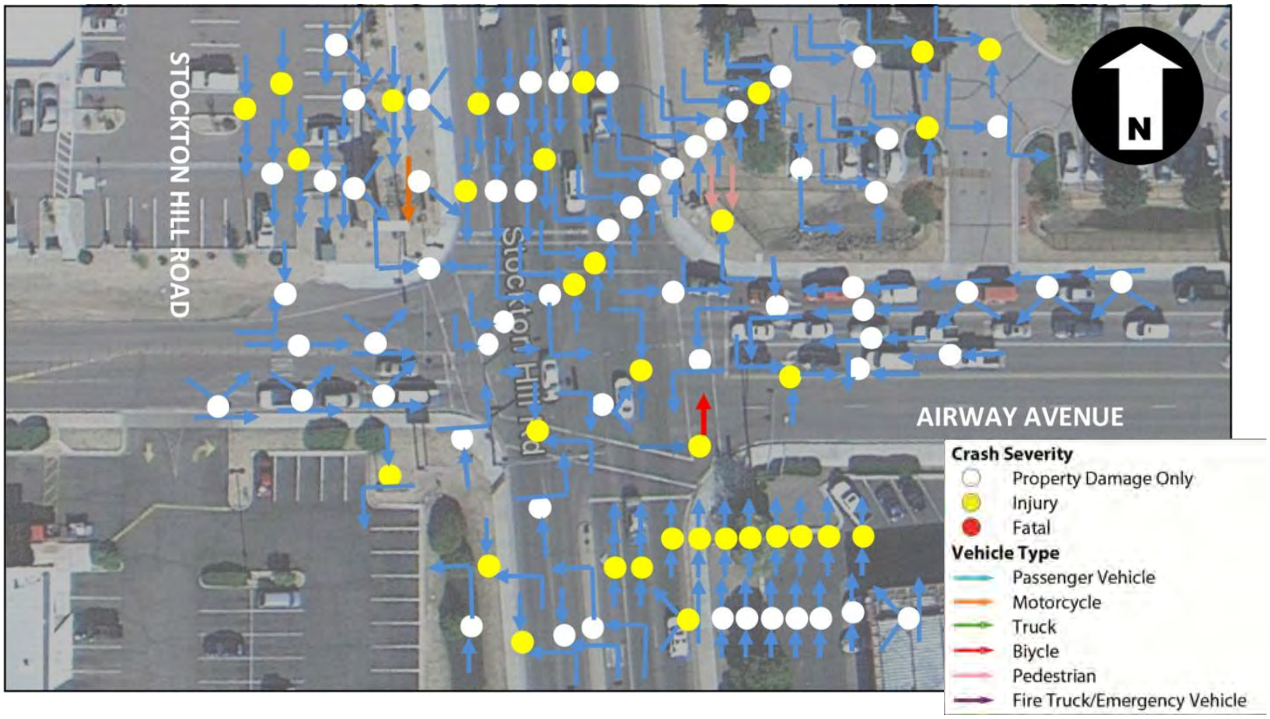
Crash Severity	Number of Crashes
Fatal	0
Injury	38
Property Damage Only	54
Total	92
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

Table 32: Summary of Crashes by Cause at Stockton Hill Road and Airway Avenue

Cause	Number of Crashes
Disregard to traffic signal	7
Failed to keep in proper lane	6
Failed to yield right-of-way	13
Followed too closely	2
Inattention/Distraction	30
Made improper turn	2
No improper action	1
Speed too fast for conditions	17
Unsafe lane change	3
Other	11
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

The crash diagram, shown in Figure 30, details the crash patterns for the intersection. There is a high incidence of rear-end crashes from the northbound and southbound approaches. There is also a high incidence of crashes involving southbound left turning vehicles.

Figure 30: Crash Diagram for Stockton Hill Road and Airway Avenue



5. Stockton Hill Road and Kino Avenue

The intersection of Stockton Hill Road and Kino Avenue had 27 crashes during the study period. As shown in Table 33, there were no fatal crashes. 8 crashes were injury crashes and 19 were property damage only. There were 11 rear-end crashes, accounting for 41 percent of all crashes. As seen in Table 34, the top three causes for crashes at the intersection were driver inattention, disregard for traffic signal, and high speed.

Table 33: Summary of Crashes by Severity at Stockton Hill Road and Kino Avenue

Crash Severity	Number of Crashes
Fatal	0
Injury	8
Property Damage Only	19
Total	27
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

Table 34: Summary of Crashes by Cause at Stockton Hill Road and Kino Avenue

Cause	Number of Crashes
Disregard to traffic signal	7
Failed to yield right-of-way	1
Followed too closely	1
Inattention/Distraction	8
Made improper turn	1
Speed too fast for conditions	5
Unsafe lane change	1
Other	3
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

The crash diagram in Figure 31 shows that the majority of crashes at the intersection involved northbound and westbound left-turning vehicles.

Figure 31: Crash diagram for Stockton Hill Road and Kino Avenue

6. Stockton Hill Road and Gordon Drive

Shown in Table 35, the intersection at Stockton Hill Road and Gordon Drive had 41 crashes during the study period. There were no fatal crashes. 18 crashes were injury crashes and 23 were property damage only. There were 15 rear-end crashes accounting for 37 percent of all crashes. As seen in Table 36, the top three causes for crashes at the intersection were high speed, disregard for traffic signal, inattention, and failing to yield right-of-way.

Table 35: Summary of Crashes by Severity at Stockton Hill Road and Gordon Drive

Crash Severity	Number of Crashes
Fatal	0
Injury	18
Property Damage Only	23
Total	41

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

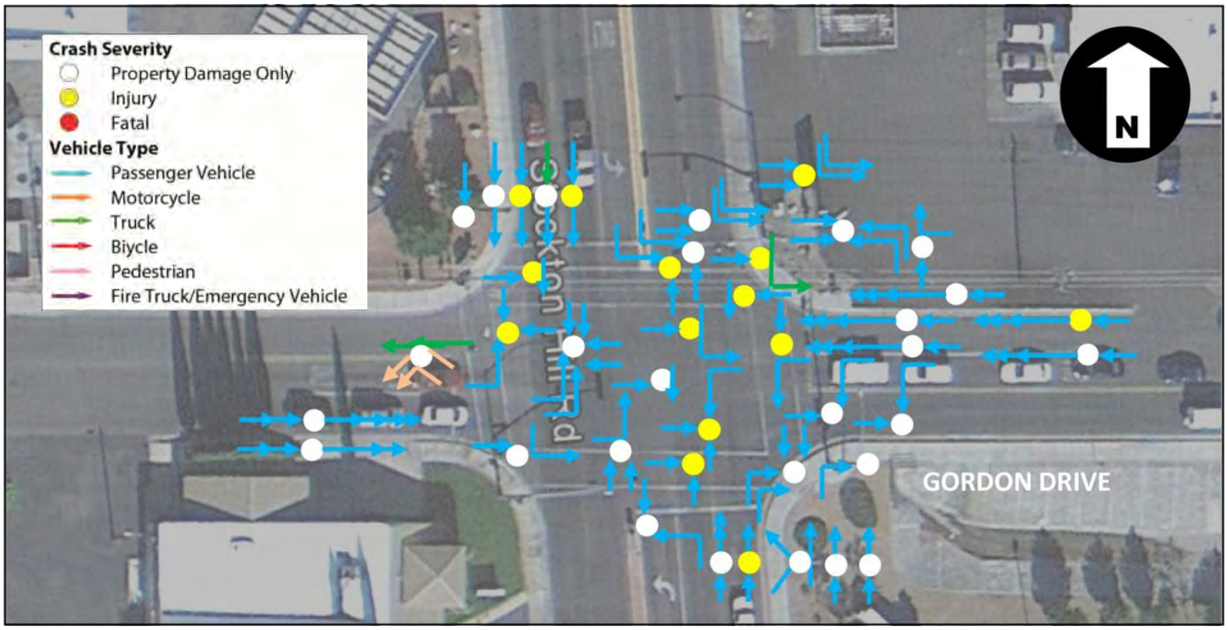
Table 36: Summary of Crashes by Cause at Stockton Hill Road and Gordon Drive

Cause	Number of Crashes
Disregard to traffic signal	7
Drove in opposing traffic lane	1
Failed to keep in proper lane	1
Failed to yield right-of-way	6
Inattention/Distraction	6
Made improper turn	4
No improper action	1
Speed too fast for conditions	12
Unsafe lane change	1
Other	2

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

The crash diagram, shown in Figure 32, details the crash patterns for the intersection. It is noteworthy that a number of crashes at this intersection involve multiple vehicles.

Figure 32: Crash Diagram for Stockton Hill Road and Gordon Drive



7. Stockton Hill Road and Northern Avenue

The intersection of Stockton Hill Road and Northern Avenue had 16 crashes during the study period. As shown in Table 37, there were no fatal crashes. 7 crashes were injury crashes and 9 were property damage only. There were 6 rear-end crashes and 5 left turn crashes. As seen in Table 38, the top two causes for crashes at the intersection were high speed and driver inattention.

Table 37: Summary of Crashes by Severity at Stockton Hill Road and Northern Avenue

Crash Severity	Number of Crashes
Fatal	0
Injury	7
Property Damage Only	9
Total	16
Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012	

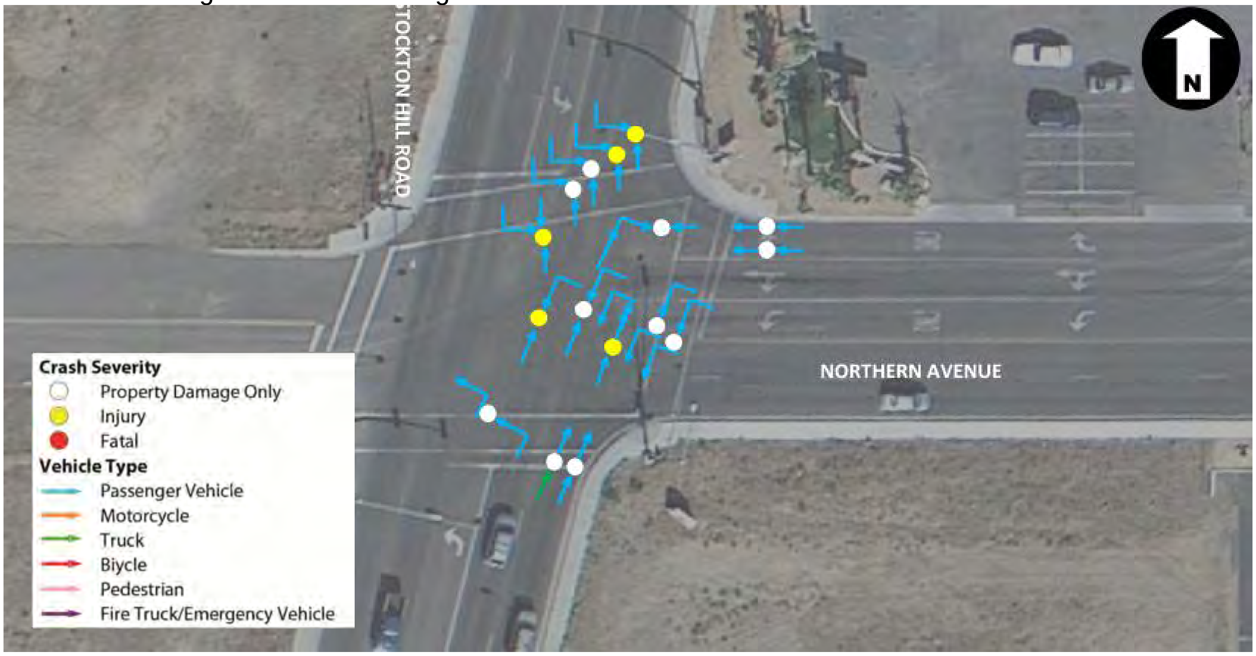
Table 38: Summary of Crashes by Cause at Stockton Hill Road and Northern Avenue

Cause	Number of Crashes
Disregard to traffic signal	2
Failed to yield right-of-way	2
Inattention/Distraction	4
Made improper turn	2
Speed too fast for conditions	4
Other	2

Source: ADOT Traffic Section's Safety Data Mart from November 1, 2007 to October 31, 2012

Figure 33 shows that most of the crashes at the intersection involve southbound and westbound left turning vehicles colliding with vehicle traveling northbound.

Figure 33: Crash Diagram for Stockton Hill Road and Northern Avenue

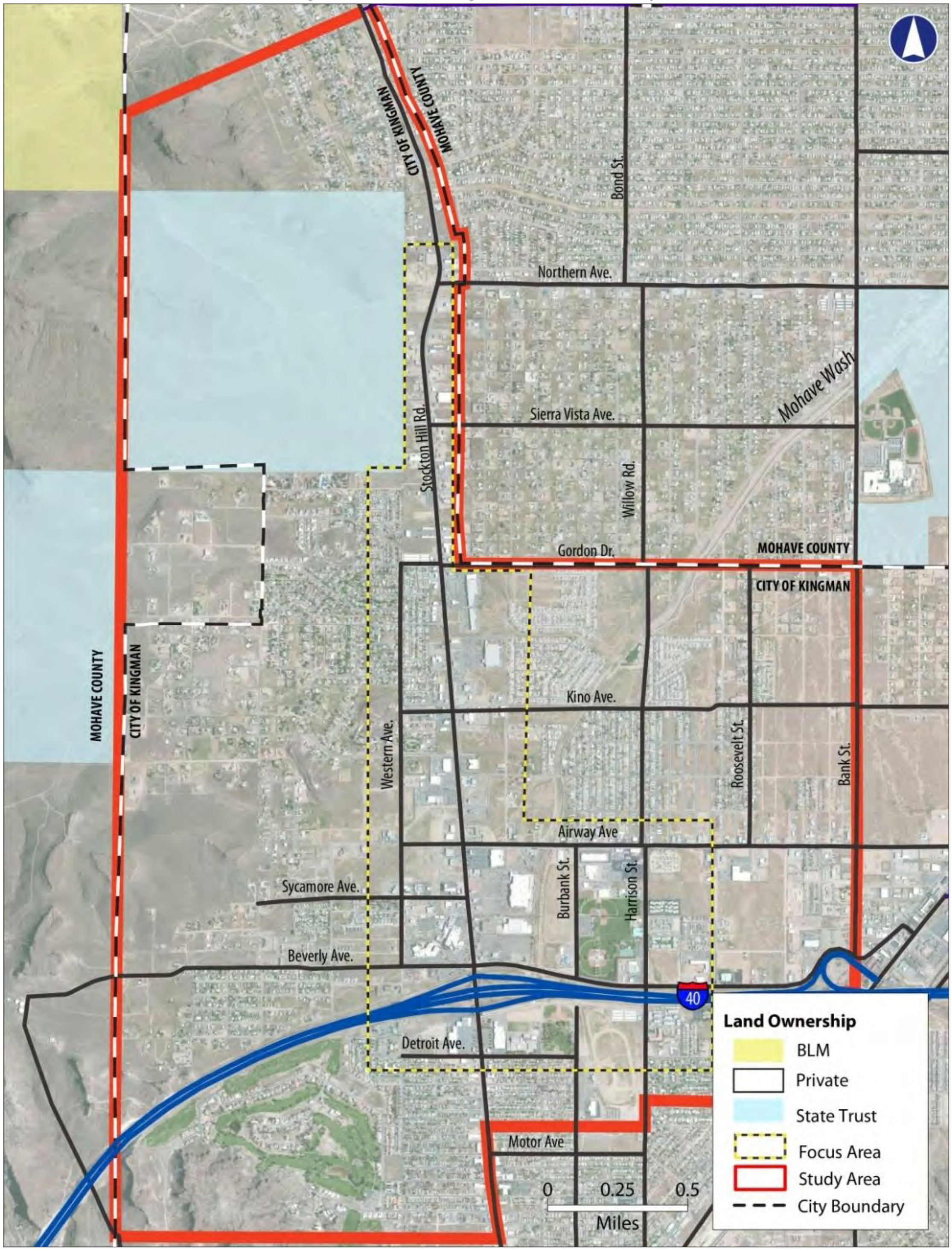


2.5 Current Development Framework

2.5.1 Existing Land Ownership

As shown in Figure 34, the land within the study area comprises private and State Trust land. With the exception of a tract of State Trust land located in the north, the study area is entirely privately owned. There are other tracts of State Trust Lands outside of the study area to the east and west. In addition, there is a section of land owned by the Bureau of Land Management (BLM) located northwest of the study area.

Figure 34: Existing Land Ownership



2.5.2 Existing Land Use

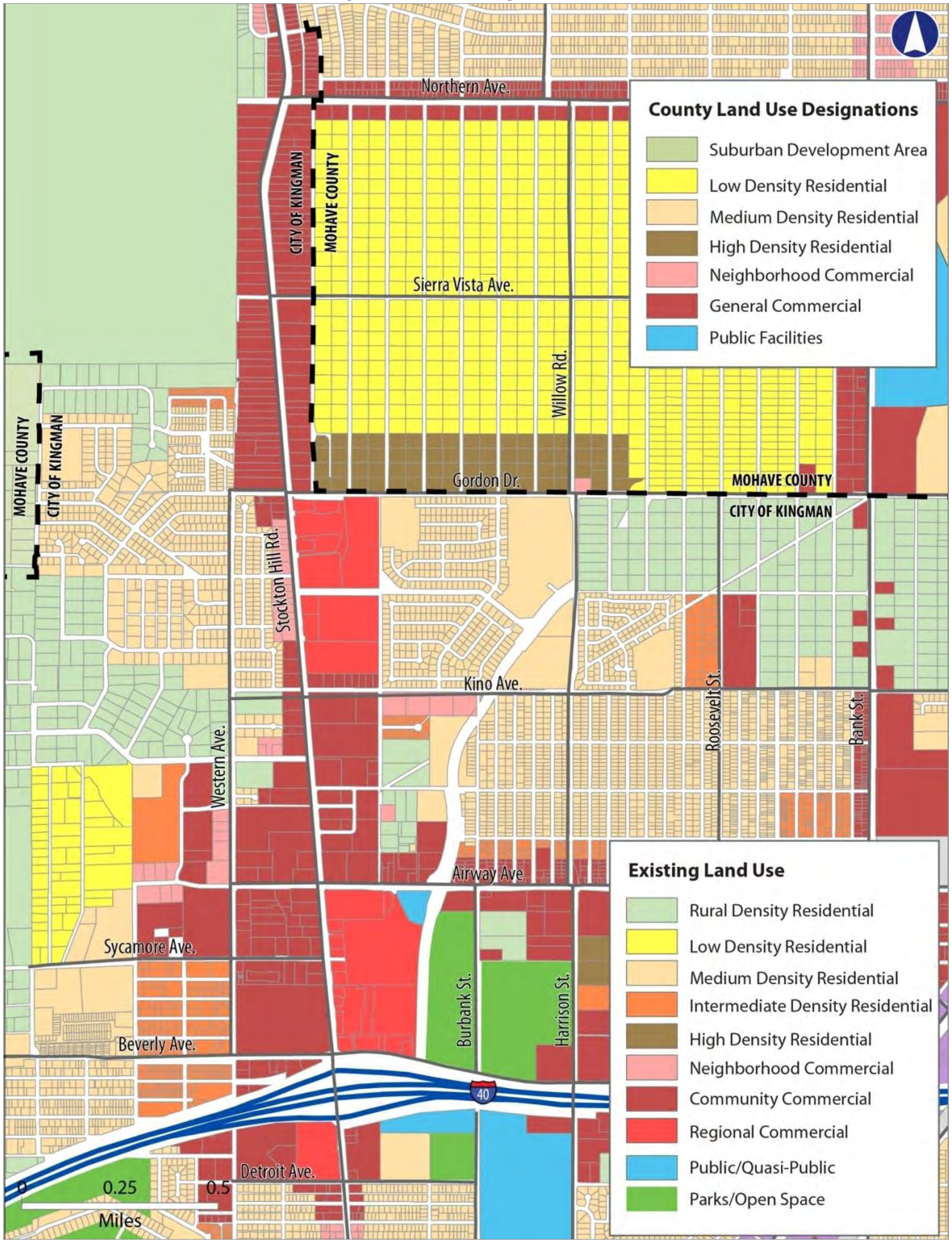
The City of Kingman supports a variety of land uses, including commercial, residential, industrial, public, and open space. In general, commercial areas are concentrated along Stockton Hill Road. The City of Kingman General Plan 2020 recognizes the study area as the city's commercial hub.

The current land use designations are shown in Figure 35. The focus area is predominantly commercial but also includes the following land uses:

- Rural density residential (1 or less units per Acre),
- Low to medium density residential (1 to 8 dwelling units per Acre),
- Medium to high density residential (8 to 28 dwelling units per Acre),
- Light industrial,
- Public and quasi-public spaces, and
- Recreation and open spaces.

Substantial commercial development in the form of big-box stores, medical offices, and small scale office and retail spaces is evident along Airway Avenue and Stockton Hill Road north of I-40. Stockton Hill Road is bordered by a mixture of older affordable housing, higher end residential housing, and parks. As stated in the General Plan, future commercial growth presents opportunities for further residential development in the study area. The KRMC will also continue to expand. The General Plan also states that Western Avenue and Sycamore Avenue are becoming corridors for medical offices.

Figure 35: Existing Land Use



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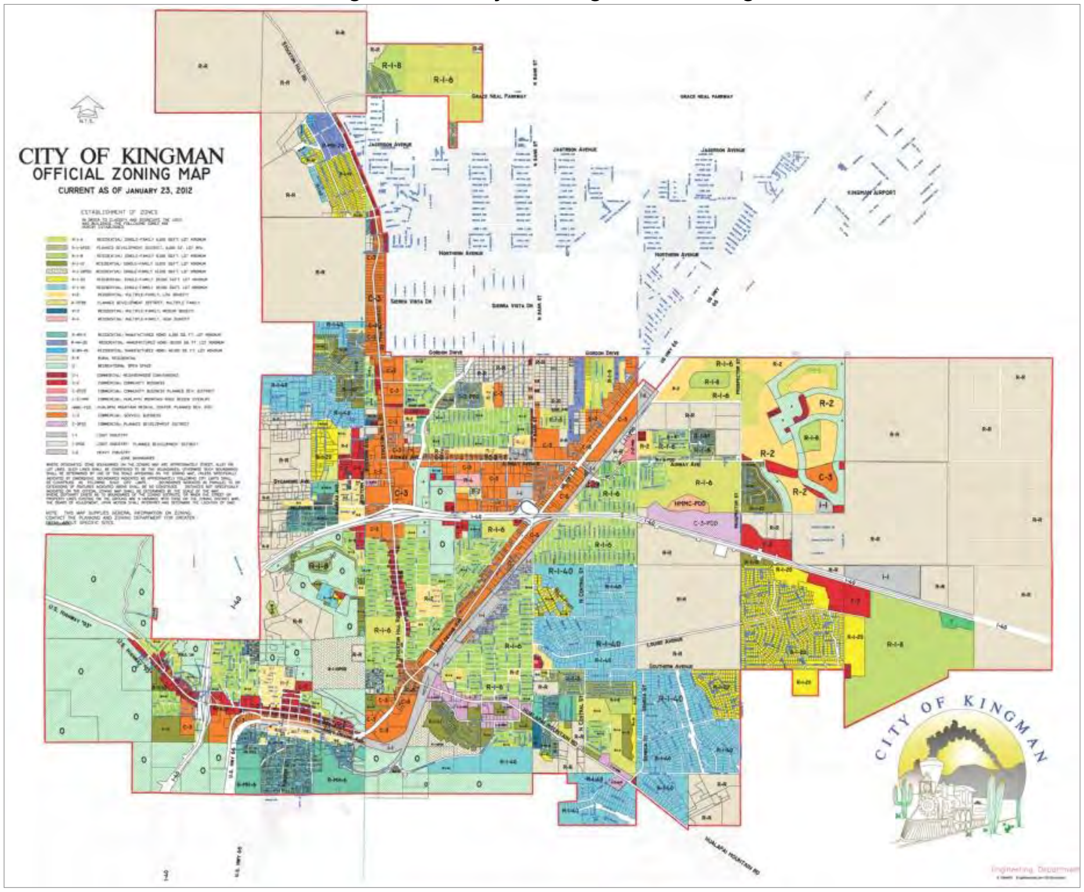
2.5.3 Development Policies

Understanding the development policies that guide community growth, such as zoning, setback, and parking requirements, is instrumental in guiding future transportation circulation patterns.

Zoning in the Stockton Hill Road corridor is depicted in Figure 36. The majority of the study area is zoned for commercial use, specifically C-3 Commercial: Service Business. The commercially zoned areas are coterminous with areas that are in the process of development. The lot located on the intersection of Western Avenue and Sycamore Avenue zoned for C-3 PDD (Planned Development District) is anticipated for the planned expansion of the Kingman Regional Medical Center. Located on the periphery of the study area are several zones for residential single-family, residential multi-family, rural residential and recreational open space uses.

Figure 36: City of Kingman Zoning



2.5.3.1 *Setbacks*

The various setback requirements for the study area are detailed in Table 39. For property with frontage on Stockton Hill Road, the City of Kingman Zoning Ordinance states that the front setback requirement is 15 feet for all buildings and signs from the right-of-way line.

The majority of the study area is zoned for C-3 Commercial: Service Business; most lots do not share a lot line with adjacent residential districts. Therefore, setbacks for the Stockton Hill are minimal or not required. For all commercial developments, setbacks may be used for parking, thus allowing for significant setbacks from the store to the roadway.

Table 39: Setback Requirements

Zone	Description	Front	Front-Side (Side Street)	Rear	Side
C-1	Commercial: Neighborhood Convenience	15	10	- / 15*	- / 5*
C-2	Commercial: Community Business	-	-	- / 10*	- / 10*
C-3	Commercial: Service Business	-	-	- / 10*	- / 10*
O	Recreational Open Space	50	50	50	50
R-1-6	Residential Single-Family 6,000 Sq. Ft. Lot Min.	20	10	15	5
R-1-10	Residential Single-Family 10,000 Sq. Ft. Lot Min.	20	15	15	5
R-1-40	Residential Single-Family 40,000 Sq. Ft. Lot Min.	30	30	20	20
R-2	Residential Multi-Family, Low Density	20	10	15	5
R-3	Residential Multi-Family, Medium Density	20	10	15	5
R-R	Rural Residential	30	30	20	20

* Setback required only if the lot line coincides with an adjacent residential district

Source: City of Kingman General Plan 2020 (2003)

2.5.3.2 *Parking*

In addition, developments must also meet the minimum parking requirements detailed in Table 40. Commercial buildings, public buildings, churches, and schools must have a minimum of two bicycle parking spaces or five percent of required automobile parking spaces. Because the corridor supports mostly commercial uses, commercial parking requirements lead to an overabundance of parking spaces within the study area. No shared parking standards have been adopted for this corridor, resulting in many parking lots remaining mostly empty throughout the day.

Table 40: Parking Requirements

Property Type	Number of Spaces Required	Additional Spaces Required
Automobile Service Station	1.5 per pump	-
Elementary or Junior High School	1.5 per classroom	1 per 5 assembly seats
Food and Beverage	1 per 5 seats	1 per 2 employees
Furniture, Appliance Sales and Repair	1 per 400 sq. ft.	-
High School or College	1 per 10 students	1.5 per classroom
Hospital	1 per bed	-
Hotel or Motel	1 per unit	1 per 5 units
Mortuary or Funeral Home	1 per 5 seats	1 per service vehicle
Office, Corporate or Headquarters	1 per 350 sq. ft.	-
Office, Medical or Dental	1 per 150 sq. ft.	-
Office, Other	1 per 250 sq. ft.	-
Open Air Commercial, Auto Sales	1 per 500 sq. ft.	-
Open Air Commercial, Nursery	1 per 1,000 sq. ft.	-
Residential, any	2 per unit	-
Retail or Service Business	1 per 200 sq. ft.	-

Source: City of Kingman General Plan 2020 (2003)

2.5.4

2.5.5 Existing Character and Urban Form

The Stockton Hill Road corridor is characterized as an automobile-oriented commercial strip made up of single-purpose land uses situated on large parcels. Recent developments have included commercial and medical office uses associated with the KRMC. The majority of new commercial development is dominated by big-box retailers such as Wal-Mart and Safeway, in addition to smaller, less traffic intensive uses in the form of restaurants, retail stores, and auto dealerships between I-40 and Northern Avenue.

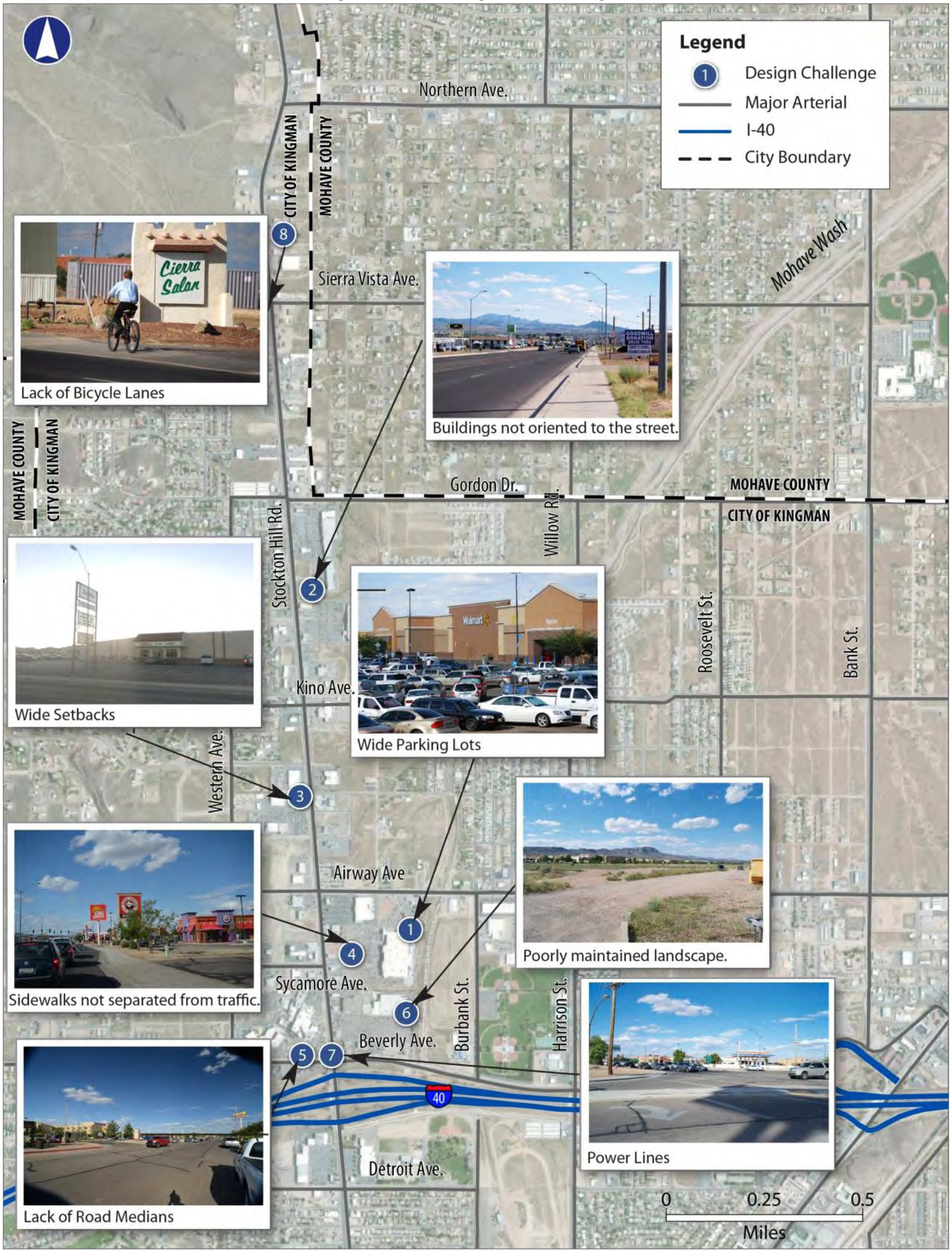
Due to City parking requirements for commercial developments, many properties within the corridor have an overabundance of available parking. Flexible setback requirements allow for parking lots to encompass nearly the entire setback. In most instances, sidewalks are then separated from the physical storefront by a large parking lot, which can create a development pattern with limited multimodal connectivity between uses and an uninviting pedestrian experience overall.

As a result of the City of Kingman's development policies and the subsequent character of the built environment, design challenges can arise which further compound issues preventing the creation of a vibrant multimodal corridor. These specific design challenges are listed below, with examples shown in Figure 37.

1. Buildings are often separated from the street by wide over-sized parking lots that can impede pedestrian access.
2. Many buildings are not adequately oriented to the street.
3. Wide setbacks create a massing of asphalt, which can degrade street appeal, and leave an undefined street edge.
4. Some sidewalks are poorly maintained, narrow, un-shaded, and close to fast moving roadway traffic or parking areas, diminishing the pedestrian experience.
5. Lack of medians can increase congestion, potential for collisions, and fail to provide a refuge for pedestrians crossing busy streets.
6. Some landscape areas are poorly maintained, creating a derelict appearance and an inhospitable environment for pedestrians and cyclists.
7. Power lines are visible and abundant, which can create challenges to widening sidewalks and also degrade street appeal.
8. There are no on-street bicycle lanes throughout the entire corridor, nor is there a comfortable network of pedestrian facilities.

These challenges create limitations and complicate the improvements that can be made to the existing circulation network and development pattern. The current physical constraints and development policies of the study area lead to a development framework which caters to the automobile and parking opportunities, often at the expense of pedestrian and bicycle safety and access.

Figure 37: Design Challenges



3.0 FUTURE CONDITIONS

This section documents the future conditions that are forecasted within the Stockton Hill Road corridor. Considerations include future socioeconomic conditions, transportation network, traffic conditions, and development framework.

3.1 Future Socioeconomic Conditions

Future socioeconomic conditions for the Kingman Area were evaluated by analyzing population and employment projections for the year 2030. The 2011 KATS study provides insight into the future population and employment projections for the year 2030. The following future conditions are based on the most reliable data that is currently available.

3.1.1 Future Population

The 2011 KATS model estimates the 2030 population to be 77,632 in the Kingman Area, and 15,914 for the study area, an increase of 48.6 percent and 33 percent, respectively. As presented in Table 41, the population in the study area will comprise 20.6 percent of the Kingman Area total.

Table 41: Future Population

Jurisdiction	Population		
	2030		Percent Change (2010-2030)
	Number	Percent	
Kingman Area (KATS)	77,362	100.0%	+48.6%
Study Area	15,914	20.6%	+33.0%

Sources: KATS model (2011)

Future population distribution is shown in Figure 38. The Kingman Area population is expected to continue to be distributed in a similar pattern to the existing population, with major concentrations to the south and northwest of the study area. As Figure 39 details, future population within the study area is also predicted to be similar to the current population distribution. Infill development is expected to occur in currently undeveloped land, and developments south of the I-40 are expected to increase to over 4,000 residents per square mile.

Figure 38: 2030 Kingman Area Population Density

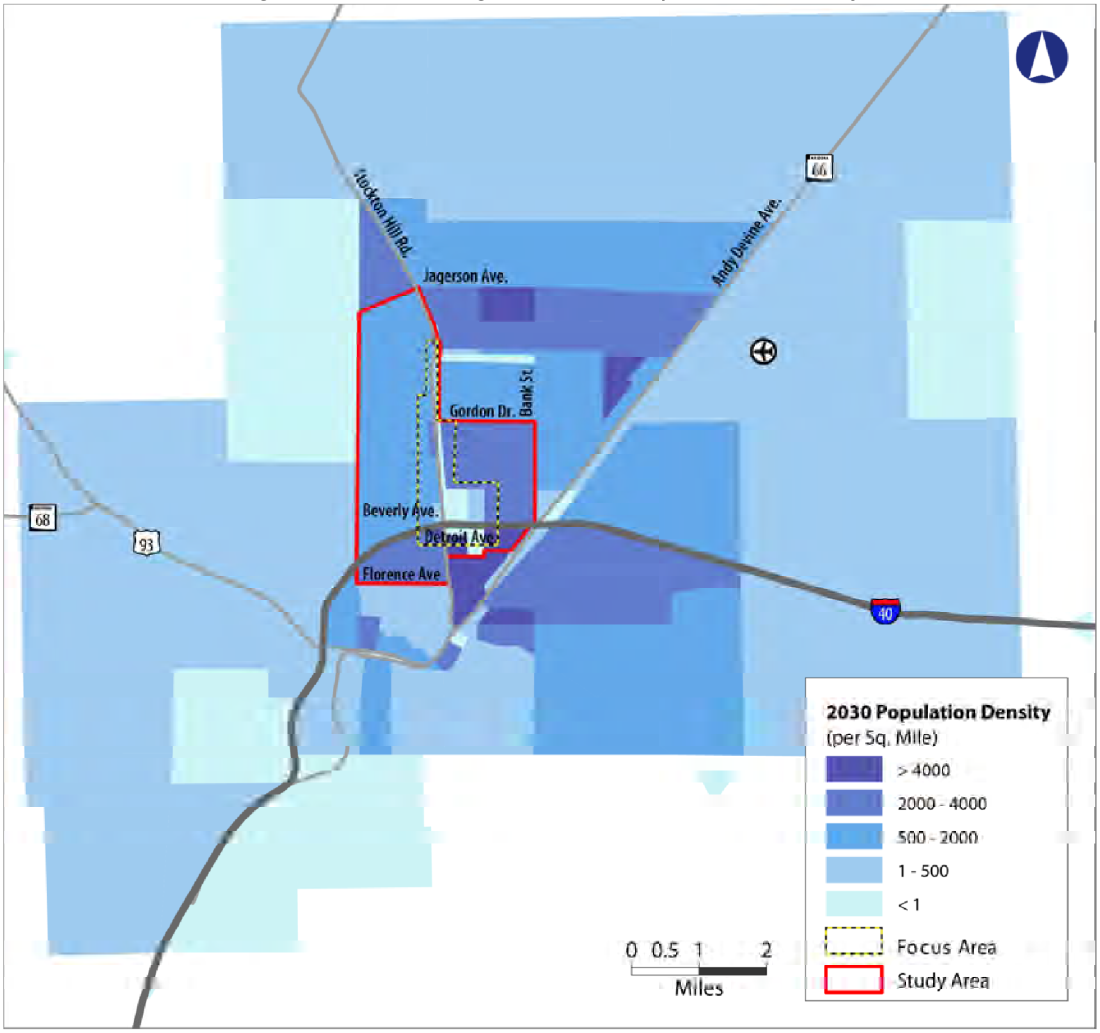
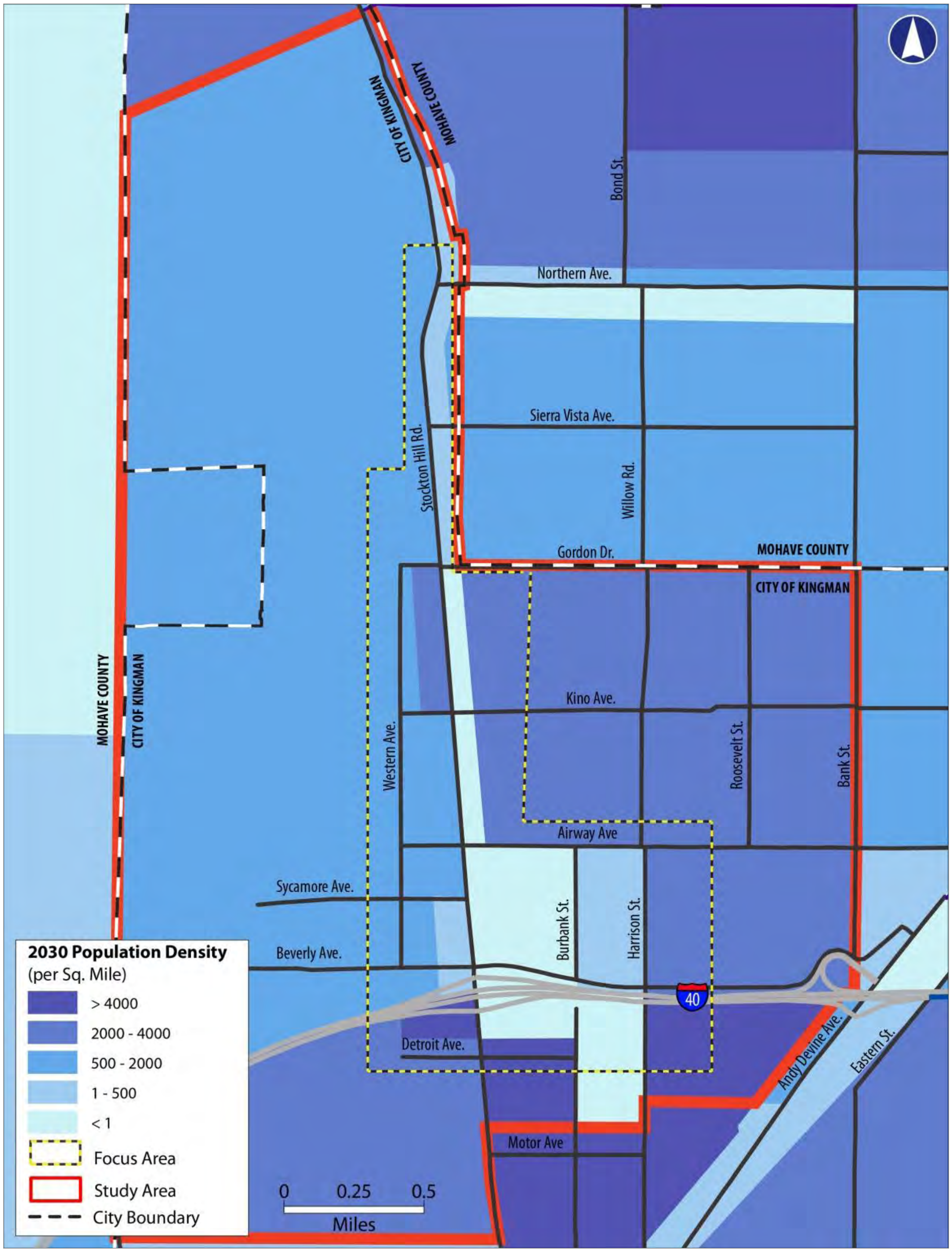


Figure 39: 2030 Study Area Population Density



3.1.2

3.1.3 Future Employment

Future employment estimates are shown in Table 42. The Kingman Area year 2030 employment is estimated to be 29,397, and the study area to be 9,624. Similar to population estimates, future employment is predicted to increase by 48.6 percent and 59.1 percent, respectively.

Table 42: Future Employment

Jurisdiction	Employment		
	2030		Percent Change (2010-2030)
	Number	Percent	
Kingman Area (KATS)	29,397	100.0%	+48.6%
Study Area	9,624	32.7%	+59.1%

Sources: KATS model (2011)

As shown in Figure 40, employment in the Kingman area is expected to continue to be concentrated within the Stockton Hill Road corridor. As shown in Figure 41, predicted employment within the study area is also expected to remain concentrated along Stockton Hill Road and Northern Avenue. Notable areas include the KRMC area and the area west of Stockton Hill Road, between Gordon Drive and Airway Avenue.

Figure 40: 2030 Kingman Area Employment Density

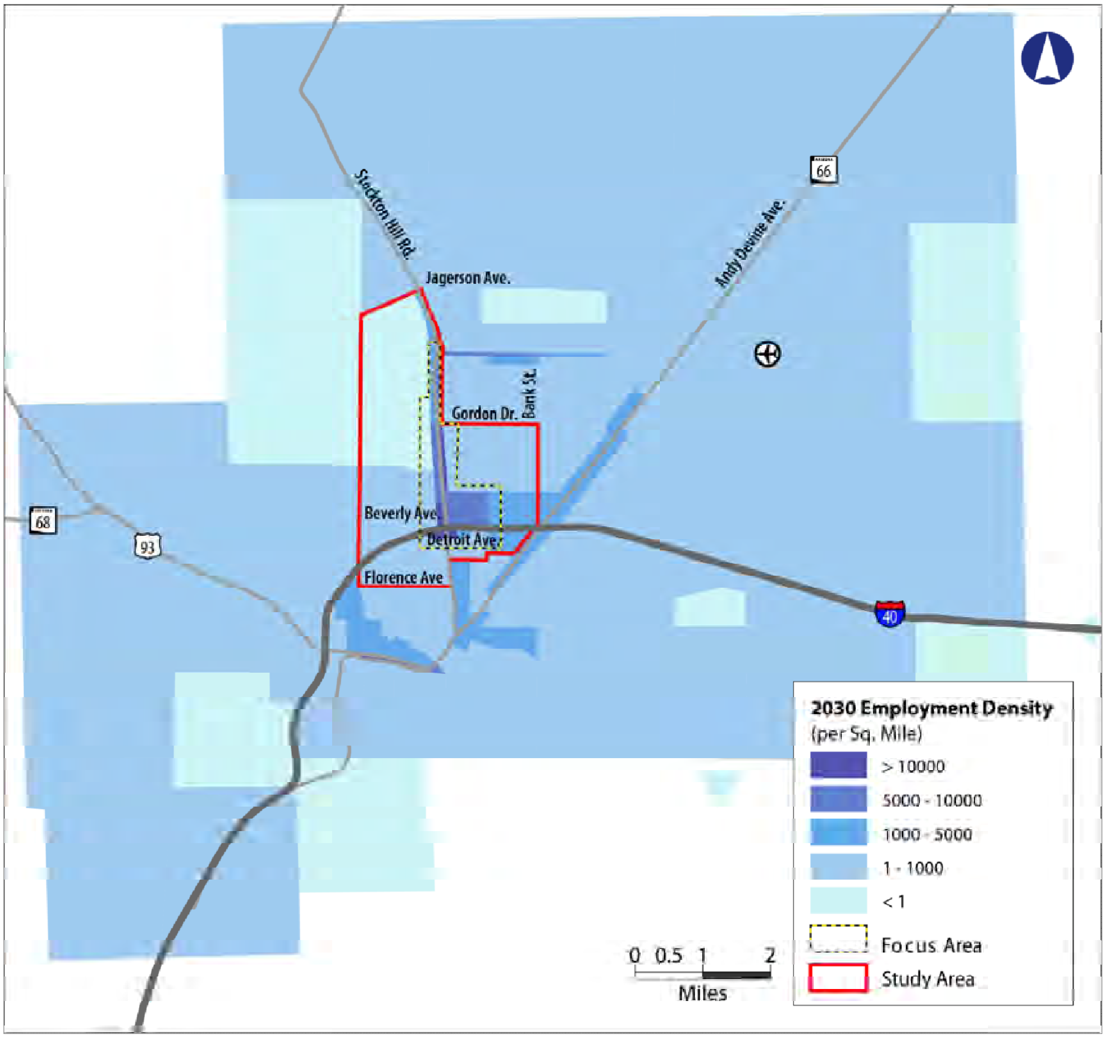
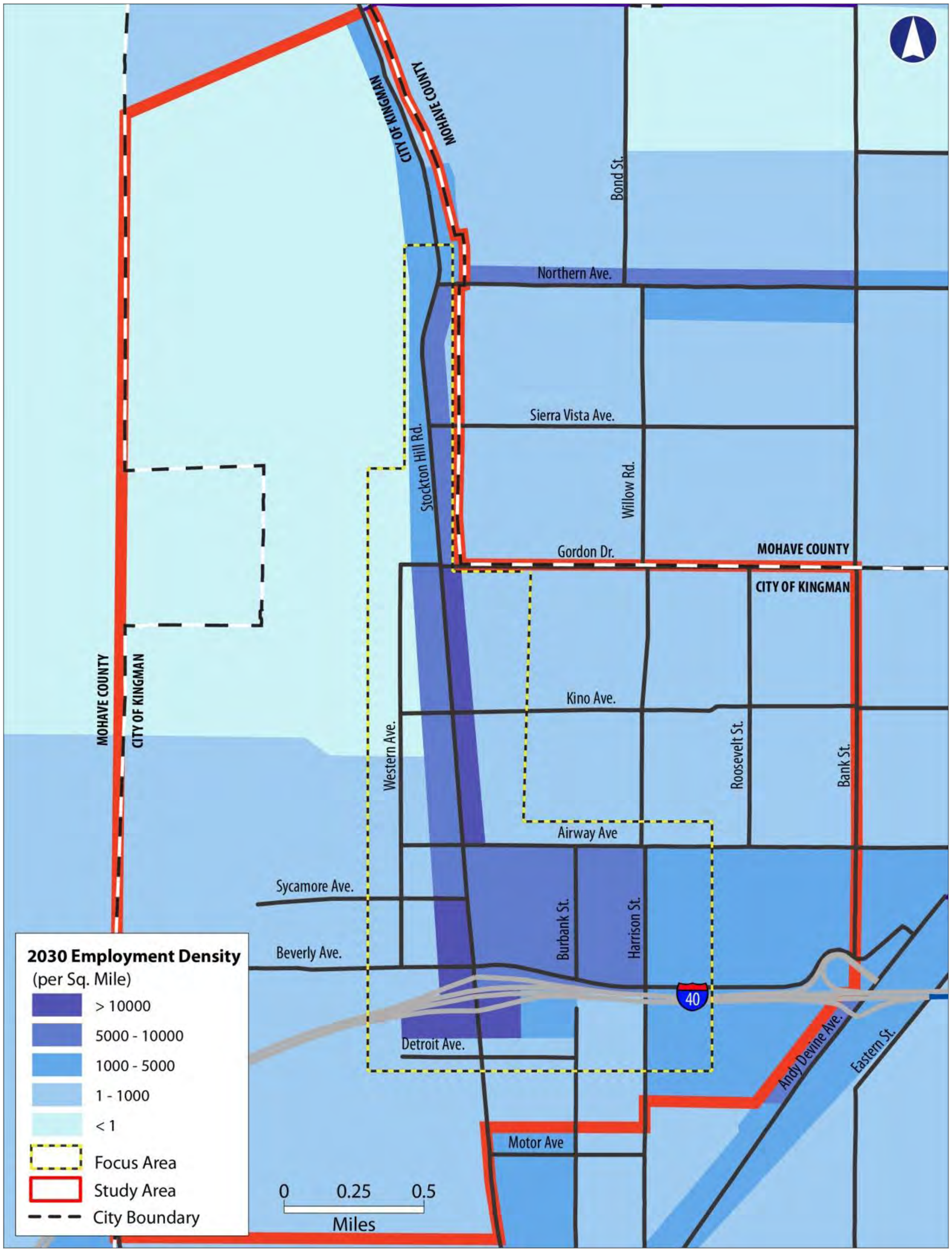


Figure 41: 2030 Study Area Employment Density



3.2 Future Transportation Network

For the 2030 horizon year, the 2011 KATS study recommended the following roadway, transit, bicycle, and pedestrian improvements that are located within in the Stockton Hill Road corridor. These recommendations are detailed in Table 43 and Table 44. Figure 42 illustrates the improvement locations. If implemented, these improvements will represent the future transportation network within the study area.

As shown in Table 43 and detailed in the 2011 KATS Study, two programmed improvements are located in the corridor. Both are roadway improvements located on Gordon Drive between Stockton Hill Road and Bank Street. Funding has already been secured for both projects.

Table 43: Programmed Improvements

Number	Project Location	Improvement Description
1	Gordon Drive: Stockton Hill Road to Bank Street	Widen from 2 to 5 lanes
2	Gordon Drive: Stockton Hill Road to Bank Street	Provide sidewalk and bike lanes

Source: 2011 KATS Study

In addition, the proposed Interstate 11, currently under design, is slated to pass through the Kingman Area, which will also impact the future transportation network. I-11 would connect Phoenix to Las Vegas and points beyond, potentially utilizing the existing I-40 alignment in the east and the existing US 93 alignment to the northwest.

Table 44 details the recommended improvements in the study area at the time of the 2011 KATS Study. The majority of that study's improvements relates to the future roadway network and includes additional lanes and medians, improved intersections, and enhanced freeway interchanges." Non-motorized improvements include added bicycle, pedestrian, and transit amenity facilities.

Table 44: Recommended Improvements

Number	Project Location	Improvement Description
3[a]	Glen Road: Airway Avenue to Gordon Drive	New two-lane roadway
4[b]	Western Avenue: Beverly Avenue to Gordon Drive	Improved two-lane roadway
5[c]	Airway Avenue: Western Avenue to Stockton Hill Road	Widen to four-lane roadway
6	Gordon Drive: Stockton Hill Road to Bank Street	Widen to four-lane roadway
7	Stockton Hill Road: Northern Avenue to Grace Neal Parkway	New four-lane roadway
8	Beverly Avenue: Stockton Hill Road to Bank Street	Widen to four-lane roadway
9	Stockton Hill Road: Airway Avenue to Gordon Drive	Raised median to four-lane roadway
10	Stockton Hill Road: Detroit to Northern Avenue	Widen to six-lane roadway
11	Stockton Hill Road and Airway Avenue	Intersection widening/ safety Improvements
12	Stockton Hill Road and Gordon Drive	Intersection widening/ safety improvements
13	I-40 and Stockton Hill Road	Freeway Interchange Improvements
14	Northern Avenue: Stockton Hill Road to Castle Rock Road	New KART Route
15	Gordon Drive: Stockton Hill to Castle Rock Road	New KART route
16	Kino Avenue: Stockton Hill Road to Bank Street	New KART route
17	Harrison Street/Willow Road: Andy Devine Avenue to Gordon Drive	Add bike and pedestrian facilities
18	Airway Avenue: Stockton Hill Road to Andy Devine Avenue	Add bike and pedestrian facilities
19	Gordon Drive: Stockton Hill Road to Andy Devine Avenue	Add bike and pedestrian facilities
20	Beverly Avenue: Willow Road to Bank Street	Add bike and pedestrian facilities
21	Northern Avenue: Stockton Hill Road to Bank Street	Add bike and pedestrian facilities

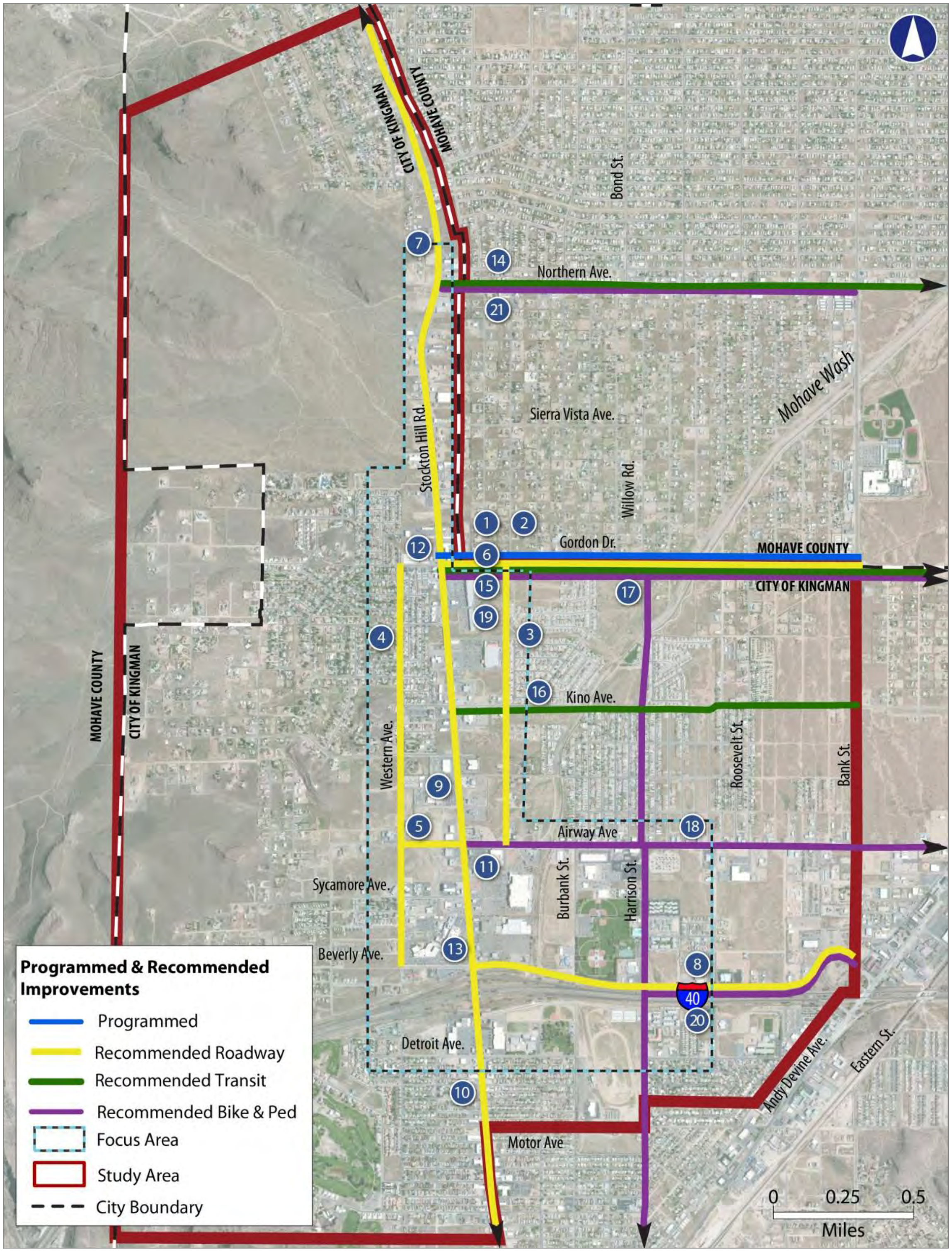
[a] Segment from Morrow Avenue to Kino Avenue is scheduled for design and construction after July 1, 2013
[b] Segment from Sycamore Avenue to Riata Valley Road is funded and under contract
[c] Currently Funded and under contract
*Segment adjacent to Walgreens is pending negotiations for right of way

Source: 2011 KATS Study

Currently, all KART bus routes have 60-minute headways throughout the entire day and have minimal facilities such as shelters and pull-outs. While there are no committed transit improvements, transit-related recommendations include (2011 KATS study):

- Providing new KART routes in general,
- Providing 30-minute headways during peak periods,
- Adding bus pull-outs and shelters, and
- Constructing a new transit transfer center.

Figure 42: Programmed and Recommended Roadway Improvements



3.2.1 Traffic Conditions

With the afore-mentioned improvements in place, traffic volumes for 2015 (near term), 2020 (mid term) and 2030 (long term) were calculated using an approximate growth rate of two percent obtained from the planning model TRANSCAD. Table 45 shows the ADT growth over time.

Table 45: Existing and Estimated ADT for Future Years

Location on Stockton Hill Road	ADT Volume			
	2013	2015	2020	2030
North of I-40	40,168	41,791	46,140	56,245
South of I-40	25,922	26,969	29,776	36,297
North of Northern Ave	9,966	10,369	11,448	13,955
Between Sycamore Ave. and Airway Ave.	28,633	29,790	32,890	40,093
Between Gordon Ave. and Hillcrest Dr.	23,307	24,249	26,772	32,635

Intersection-level LOS analysis for future traffic conditions was completed using Synchro modeling software. The LOS and intersection delay for years 2015, 2020, and 2030 are presented in Figure 43, Figure 44, and Figure 45 respectively. In the long term the LOS for the intersections at Airway Avenue and I-40 eastbound will deteriorate to LOS D, while the intersections at Detroit Avenue and I-40 westbound will deteriorate to LOS C.

The intersection LOS analysis suggests that in the near term, traffic signal improvements should be planned to enhance traffic signal operations along the corridor. In the mid to long term, capacity improvements should be considered, especially for the intersection at Airway Avenue and the I-40 interchange. Future improvements to the I-40 interchange should note the intersections at Detroit Avenue and Beverly Avenue due to its proximity and limited movements for eastbound and westbound vehicles.

Figure 43: Traffic Volumes (2015)

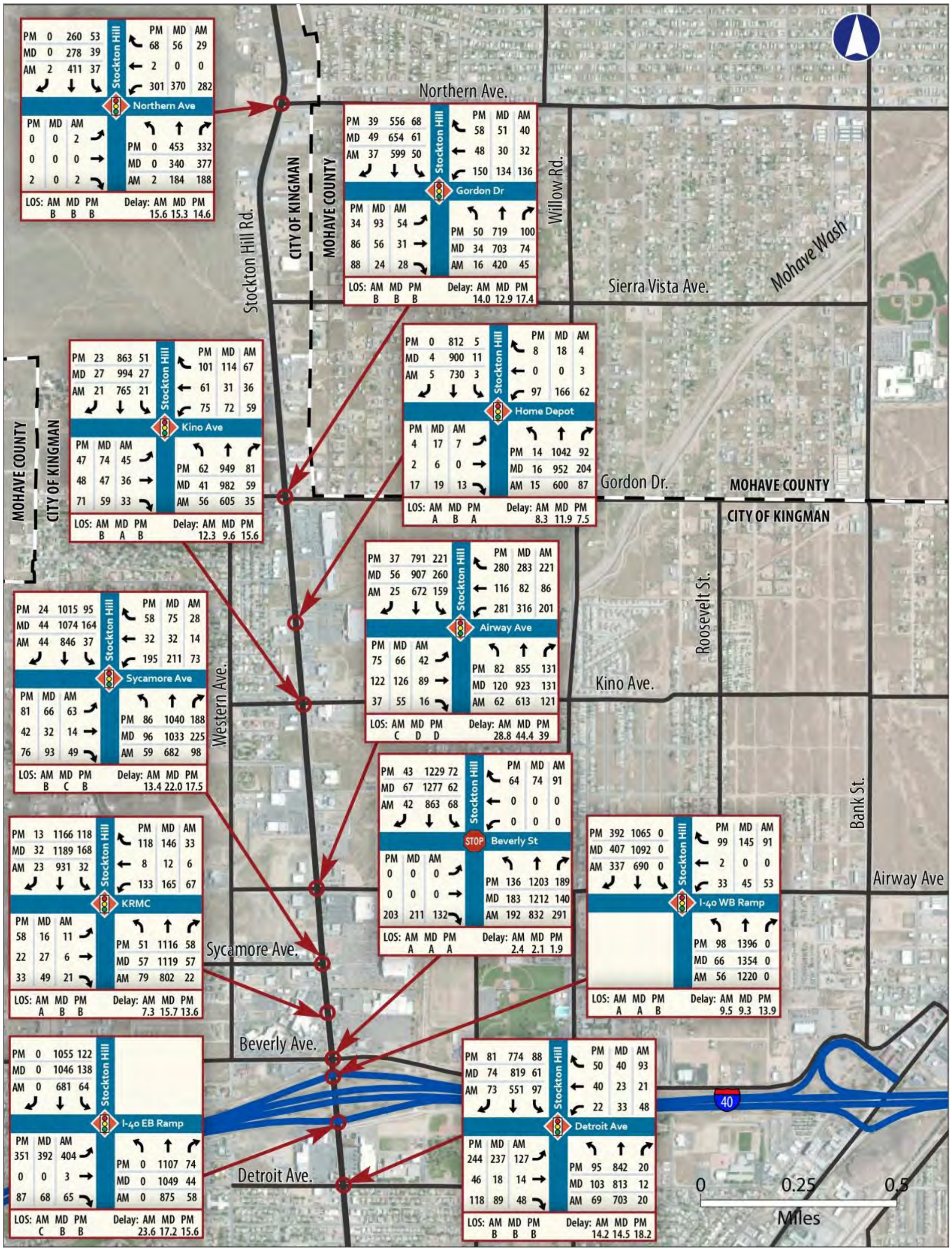


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Figure 44: Traffic Volumes (2020)

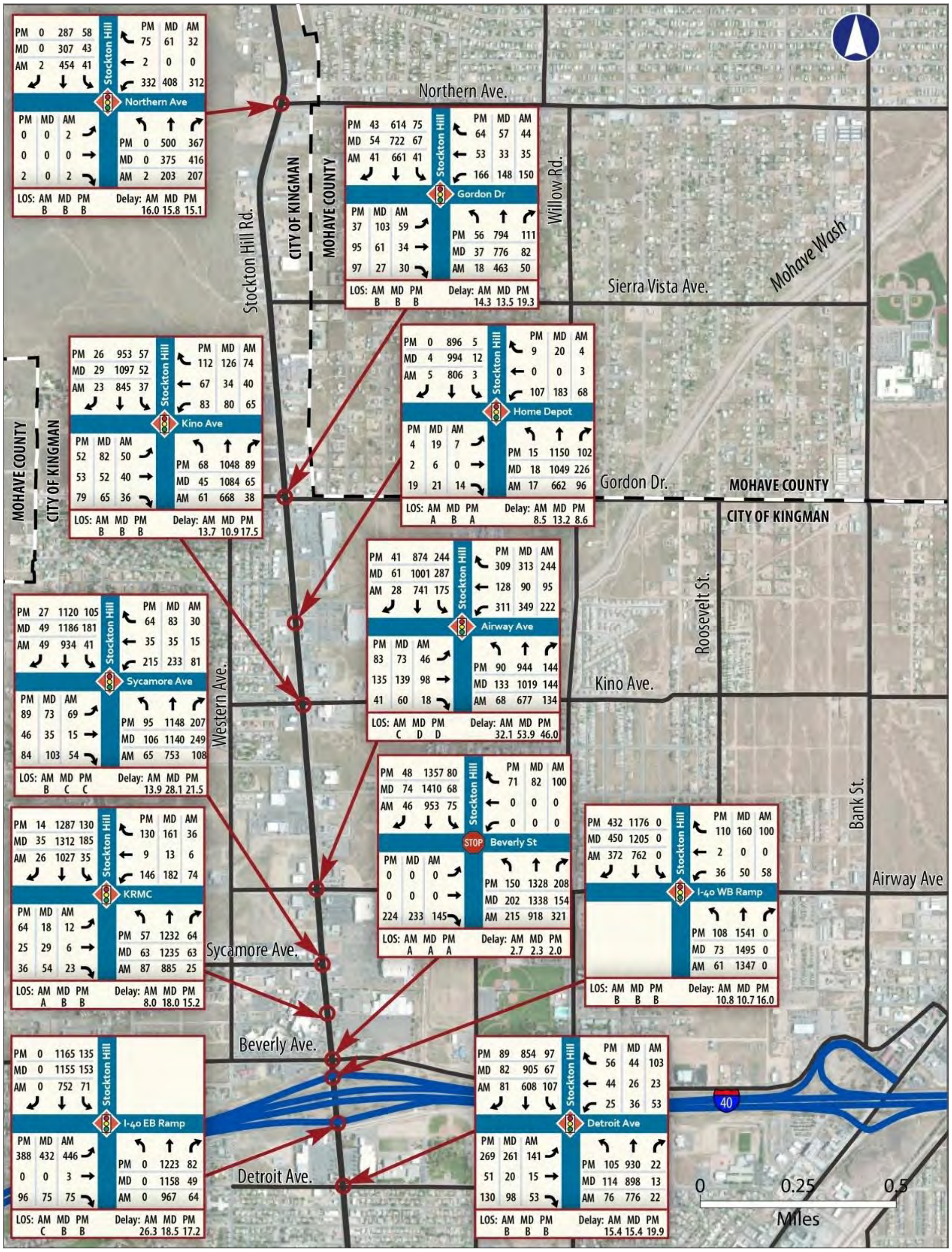
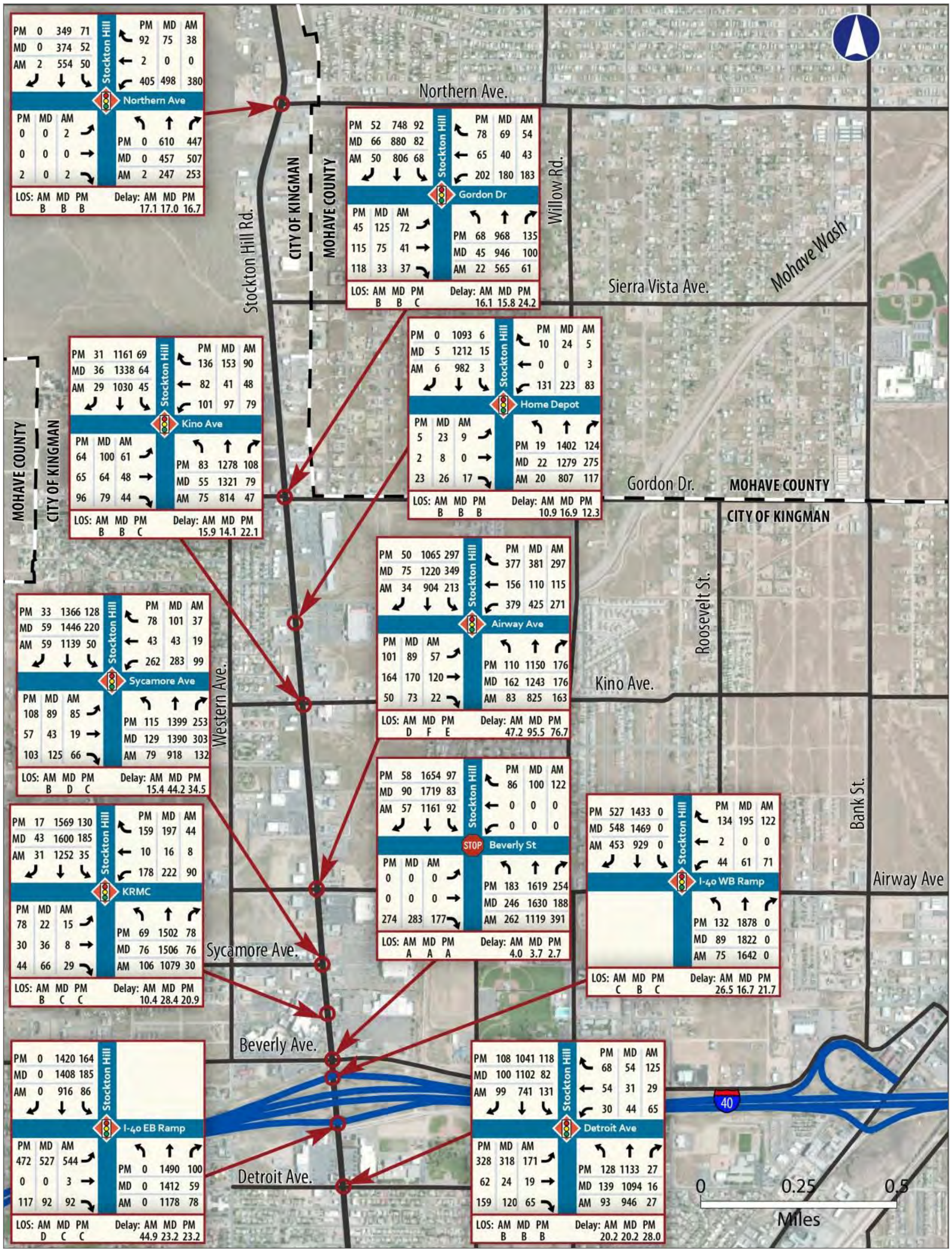


Figure 45: Traffic Volumes (2030)



3.2.1.1 Level of Service Analysis

The projected traffic volumes for the near term (2015), mid term (2020), and long term (2030), were used to develop Synchro traffic models for the corridor. The model was used to estimate the LOS and speeds for segments of the corridor. Table 46 and Table 47 present the LOS and speeds for the northbound corridor segments. Table 48 and Table 49 present the LOS and speed for the southbound corridor segments.

Several northbound segments between Detroit Avenue and Airway Avenue will operate at an LOS of D or worse for the near term horizon year. The LOS for these segments will deteriorate further for the mid and long term horizon years. The speeds for several of these segments will fall below 15 MPH. The northbound corridor operates at LOS C for the 2030 AM peak period and at LOS D for the midday and PM peak periods. The average speed for the northbound corridor for the 2015, 2020 and 2030 horizon years are 22.7 MPH, 21.5 MPH, and 17.8 MPH respectively.

The southbound corridor between Sycamore and I-40 westbound has segments that operate at LOS C and LOS D for the near term horizon year. The LOS for these segments will deteriorate to LOS D and LOS E for the long term horizon year. The southbound corridor operates at LOS C for all peak periods in the 2030 horizon year. The average speed for the southbound corridor for the 2015, 2020 and 2030 horizon years are 24.3 MPH, 23.8 MPH, and 22.0 MPH respectively.

Table 46: Future LOS for Northbound Stockton Hill Segments

Segment - Stockton Hill Road NB	Level of Service								
	2015			2020			2030		
	AM	MD	PM	AM	MD	PM	AM	MD	PM
Detroit - I-40 EB	E	D	D	E	D	D	F	E	E
I-40 EB - I-40 WB	D	C	C	D	C	C	E	D	D
I-40 WB - KRMC	C	D	D	C	D	D	C	E	E
KRMC - Sycamore	E	E	D	E	E	E	E	F	E
Sycamore - Airway	E	E	E	E	F	E	F	F	F
Airway - Kino	B	B	B	B	B	C	B	B	C
Kino - Home Depot	B	C	B	B	D	B	B	D	C
Home Depot - Gordon	B	B	B	B	B	B	B	B	C
Gordon - Northern	A	A	A	A	A	A	A	A	A
Corridor	C	C	C	C	C	C	C	D	D

Table 47: Future Speed for Northbound Stockton Hill Segments

Segment - Stockton Hill Road NB	Speed (MPH)								
	2015			2020			2030		
	AM	MD	PM	AM	MD	PM	AM	MD	PM
Detroit - I-40 EB	12.1	16.4	17.5	10.8	15.4	16.0	8.3	12.4	12.5
I-40 EB - I-40 WB	17.8	20.3	21.4	16.7	19.6	20.6	13.0	17.1	18.0
I-40 WB - KRMC	21.3	16.3	16.7	20.6	15.4	15.8	18.5	12.0	13.7
KRMC - Sycamore	13.9	13.8	15.9	13.5	12.3	13.8	13.0	8.6	10.2
Sycamore - Airway	13.3	10.2	13.1	12.4	8.2	11.8	8.1	4.1	6.0
Airway - Kino	25.4	27.8	24.4	24.9	27.4	23.7	24.1	26.4	22.0
Kino - Home Depot	26.2	18.4	25.8	26.1	17.1	25.5	25.5	14.2	22.1
Home Depot - Gordon	28.2	26.4	26.6	28.2	25.9	25.0	27.6	24.6	21.8
Gordon - Northern	34.0	33.8	33.3	33.9	33.5	33.0	33.7	32.9	32.5
Corridor	22.9	22.1	23.1	22.0	20.7	21.9	19.3	16.3	17.8

Table 48: Future LOS for Southbound Stockton Hill Segments

Segment - Stockton Hill Road SB	Level of Service								
	2015			2020			2030		
	AM	MD	PM	AM	MD	PM	AM	MD	PM
Northern - Gordon	A	A	A	A	A	A	A	A	B
Gordon - Home Depot	B	C	B	B	C	C	C	C	C
Home Depot - Kino	B	C	B	C	C	C	C	C	C
Kino - Airway	C	C	C	C	C	C	C	C	C
Airway - Sycamore	C	C	C	C	C	C	C	C	D
Sycamore - KRMC	C	D	C	C	D	C	C	E	D
KRMC - I-40 WB	C	C	E	C	D	E	D	E	E
I-40 WB - I-40 EB	B	B	B	B	B	B	C	B	B
I-40 EB - Detroit	C	B	C	C	B	C	C	C	C
Corridor	B	B	C	B	C	C	C	C	C

Table 49: Future Speed for Southbound Stockton Hill Segments

Segment - Stockton Hill Road SB	Speed (MPH)								
	2015			2020			2030		
	AM	MD	PM	AM	MD	PM	AM	MD	PM
Northern - Gordon	32.3	31.9	31.4	31.9	31.6	30.9	30.8	30.7	29.6
Gordon - Home Depot	24.4	24.0	24.8	24.1	23.5	23.7	22.3	22.5	21.6
Home Depot - Kino	24.1	20.5	24.2	23.9	20.0	23.4	23.6	18.5	20.5
Kino - Airway	21.4	20.5	22.1	20.8	20.1	21.4	18.9	18.6	20.2
Airway - Sycamore	23.7	21.3	19.3	23.4	20.7	18.1	21.8	18.2	15.0
Sycamore - KRMC	23.4	16.9	19.4	22.6	16.0	18.5	19.8	13.5	15.9
KRMC - I-40 WB	19.5	18.7	13.5	18.8	17.5	12.3	16.1	13.7	10.4
I-40 WB - I-40 EB	24.2	24.8	24.9	24.1	24.7	24.7	23.7	24.2	24.2
I-40 EB - Detroit	23.4	24.6	20.1	23.5	24.4	20.4	22.5	22.4	18.6
Corridor	25.2	24.1	23.7	24.8	23.6	22.9	23.1	21.8	21.0

3.3 Future Development Framework

3.3.1 Future Land Use

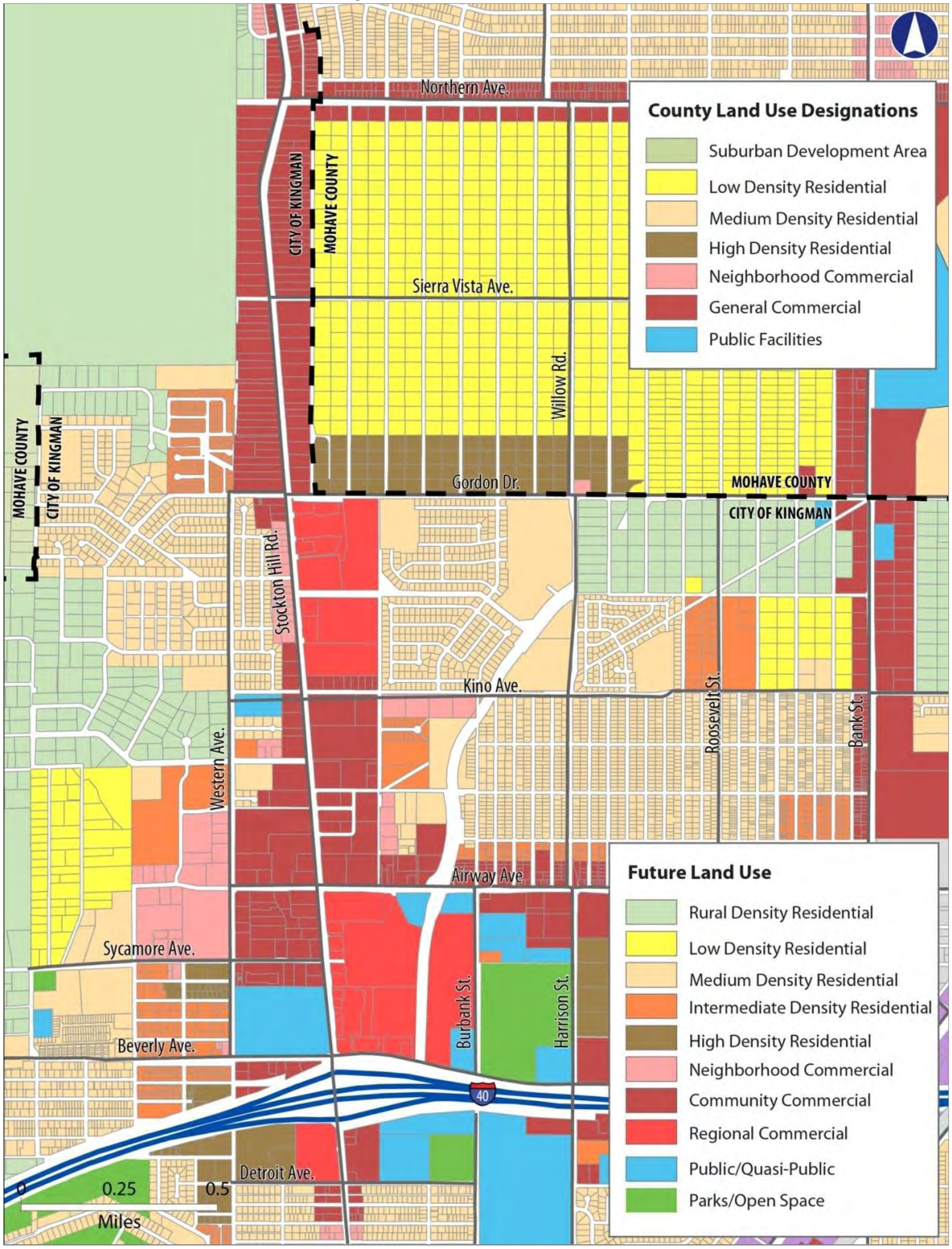
According to the 2011 KATS study, while most of the existing land ownership will remain the same, State Trust land within and near the City limits may be sold to developers by the Arizona State Lands Department (ASLD). Three existing State Trust sections are located within and around the study area. However, the General Plan 2020 states that much of this land has been set aside for open space preservation. Future development in these areas is unlikely due to steep topography, poor soil, and lack of access.

Figure 46 details future land use designations for the study area. As stated in the 2011 KATS Study, future commercial land uses are expected to continue in existing areas, specifically along Stockton Hill Road, Andy Devine Avenue, Northern Avenue, and Airway Avenue. Future industrial uses are anticipated to continue along Bank Street and Armour Avenue. Residential uses are predicted to replace vacant land north and east of the city limits.

The City of Kingman General Plan 2020 identifies the Stockton Hill Road corridor as a growth area. The study area is targeted for rapid commercial development and consequent residential development. Residential areas along Stockton Hill Road and I-40 are expected to see increased densities.

As commercial development and subsequent residential densities continue to increase, accommodations will have to be made to provide adequate circulation.

Figure 46: Future Land Use



3.3.2 Future Character and Urban Form

As described in Section 2.5.5, the current character of the Stockton Hill Road corridor can be described as an automobile-oriented commercial strip, made up of an urban form of single-purpose, mostly commercial, land-uses situated on large parcels set back from the street by parking lots. If existing City development polices for commercial properties are maintained, the future character and urban form within the corridor will remain largely the same.

As described previously, the Stockton Hill Road corridor is planned for additional commercial development in the future, as well as increased residential densities in adjacent neighborhoods. To accommodate this continued growth, previous studies have recommended roadway widening projects on Stockton Hill Road itself, as well as the parallel routes of Western Avenue and Glen Road. These changes, although beneficial from a traditional circulation perspective, would increase congestion and further compound the challenges to urban form and the pedestrian environment that exist within the corridor.

In order to address the current design challenges in the corridor, and take systematic steps towards creating a vibrant multimodal commercial corridor, a comprehensive review of current City of Kingman development policies must be undertaken. Considerations should include, but should not be limited to: an analysis of setback and parking requirements; parcel configuration; street design; and multimodal circulation policies.

4.0 PRELIMINARY IMPROVEMENT APPROACHES

The analysis of existing and future corridor conditions, discussed in Sections 2.0 and 3.0, made apparent several deficiencies along Stockton Hill Road in terms of mobility and development framework. This section presents these deficiencies and proposes methods to address them through two different improvement approaches: (1) mobility approaches and (2) development framework approaches.

The mobility and development framework approaches presented in this study are developed from the study's goals and objectives, as well as input from community stakeholders and the public. Mobility approaches are more technical design solutions which provide mobility, safety, and congestion relief. Development framework approaches are more long term strategies which focus on policies that affect the development of the built environment. Section 5.0 evaluates each category separately and provides a detailed description of each improvement and policy solution. Section 6.0 includes an implementation strategy for prioritized improvements.

4.1 Identified Deficiencies

The following deficiencies were gleaned from analyses of existing and future conditions within the corridor. Various approaches to address these deficiencies are described in Sections 4.2 and 4.3.

4.1.1 Traffic Congestion

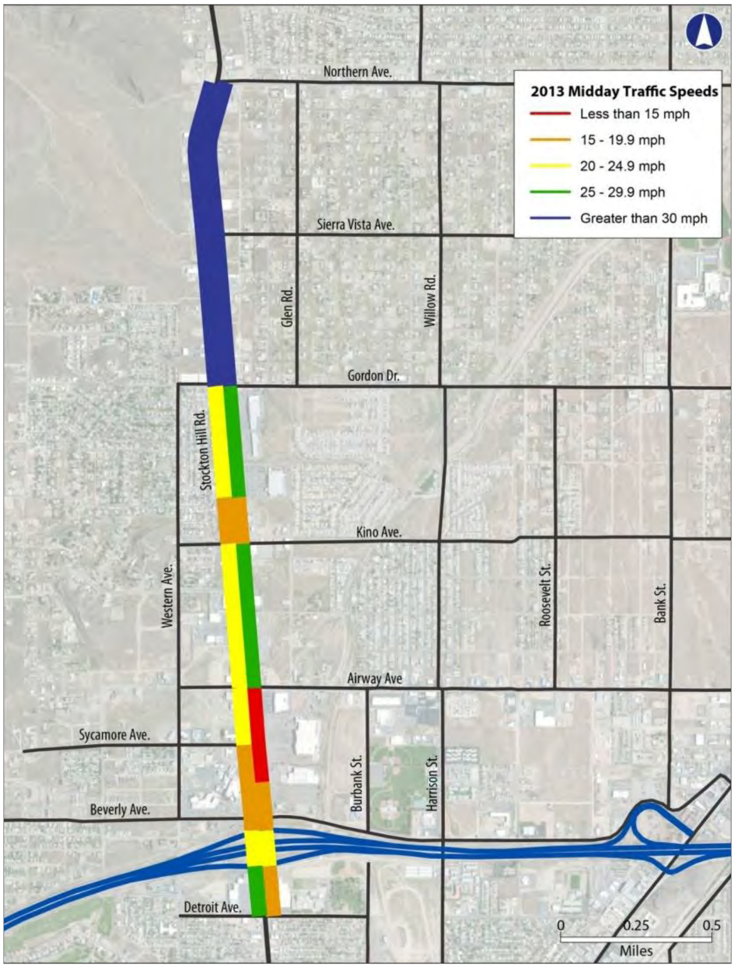
The analyses of existing and future level of service (LOS) and traffic speed within the corridor identified several congested segments which suggest a need for further improvements. Table 50 highlights the midday LOS among corridor segments. An analysis was also done for AM and PM peak periods. However, the midday period was shown to be the most congested. Multiple segments, particularly between Detroit Avenue and Airway Avenue were shown to have an existing midday LOS of D or worse. In rural areas, the acceptable LOS is C or better. The analyses also indicated that individual functionality of the Airway Avenue, Detroit Avenue, and Gordon Drive intersections is also sub optimal.

Figure 47 displays the midday traffic speeds along the corridor. The posted speed limit for the entire length of Stockton Hill Road is 35 miles per hour (mph); however, all segments from Detroit Avenue to Gordon Drive experience speeds of less than 30 mph both northbound and southbound. The segment with the lowest speed of less than 15 mph is between the Kingman Regional Medical Center (KRMC) and Airway Avenue. Based on the traffic analysis presented, roadway and traffic improvements are necessary to alleviate the current and future congestion along Stockton Hill Road, as conditions are expected to deteriorate further over time.

Table 50: Midday LOS on Stockton Hill Road (2013)

Roadway Segment on Stockton Hill Road	Northbound LOS	Southbound LOS
Detroit - I-40 EB	D	B
I-40 EB - I-40 WB	C	B
I-40 WB - KRMC	D	C
KRMC - Sycamore	D	D
Sycamore - Airway	E	C
Airway - Kino	B	C
Kino - Home Depot	C	C
Home Depot - Gordon	B	B
Gordon - Northern	A	A
Corridor	C	B

Figure 47: Midday Traffic Speed (2013)



4.1.2 Non-motorized Facilities

As shown in Figure 15, the Stockton Hill Road corridor lacks designated bicycle facilities and interconnected sidewalks. With the exception of two bike routes located south of the I-40 the focus area lacks designated bike facilities. The pedestrian network comprises sidewalks and the Mohave Wash Pathway. Although sidewalks are located along the entire length of the Stockton Hill Road, the sidewalks of some adjacent streets have gaps and do not connect. As stated in the *Kingman Area Transportation Study (KATS) 2011*, additional bicycle and pedestrian facilities will be needed to accommodate population and employment growth and sustainable transportation.

4.1.3 Beverly Avenue Intersection

The previously signalized Beverly Avenue/Stockton Hill Road intersection is identified as a particular point of concern due to its proximity to the I-40 westbound ramps and restricted turn movements. The intersection is approximately 210 feet north of the westbound ramps. Stockton Hill Road traffic queues for up to 300 feet behind the I-40 westbound signals, causing severe congestion at the Beverly Avenue intersection. In addition, only right turns can be made from the eastbound and westbound directions on Beverly Avenue; through and left-turns are not permitted. As a result, motorists cut through the Ross parking lot and use the KRMC signal to turn left onto Stockton Hill Road or cut through the KRMC parking lot. Consequently, traffic flow is disrupted, causing potential safety issues. Figure 48 illustrates the areas of concern at the Beverly Avenue intersection.

Figure 48: Beverly Avenue Intersection

4.1.4 Access Management

Current access control strategies in the corridor are limited and include raised medians from Detroit Avenue to Airway Avenue and restricted right and left-turn lanes located at several intersection and midblock locations. Development in the area has come in phases, thus allowing for property access and circulation inconsistencies between adjacent properties. There are approximately 116 driveways along Stockton Hill Road (see Figure 14). In many cases, commercial properties have inadequate driveway spacing and more than one dedicated access location. Primary access for many parcels is located on Stockton Hill Road; rear or side parcel access is infrequent. The configuration of parcel access encourages long strip development and discourages walking. Ultimately, the number, location, and length of curb cuts affect the free flow of traffic and cause automobile and pedestrian conflicts. To accommodate the corridor's anticipated commercial growth, additional access management for Stockton Hill Road is critical for safe turning paths, reduced conflict points with pedestrians and bicyclists, and minimum interference with traffic.

4.1.5 Land Use

The corridor consists of many single-use parcels dominated by big-box retail stores. Commercial development is automobile-oriented and concentrated along Stockton Hill Road. As shown in Figure 35, current land use designations in the focus area are predominantly commercial with a mix of residential, public, and open space uses. With the exception of residential areas, parcels have inconsistent lot depths which discourage pedestrian activity and encourage automobile usage. Narrow parcel frontages on cross streets create a development scenario with multiple small single-use parcels, each with their own access point within close proximity of the adjacent parcel. This design approach discourages development of larger commercial centers, and compounds access control issues. Land use policy improvements are necessary to support this anticipated growth and increased traffic flow and congestion.

4.1.6 Development Policy

The City of Kingman's development policies cater to the corridor's automobile-oriented commercial growth. Currently, the majority of the focus area is zoned for commercial service businesses, facilitating the development of big-box retail stores and strip malls. Because the corridor supports many commercial uses, flexible on-site parking and setback requirements for the corridor lead to an overabundance of parking lots and inconsistent frontages set back far from the street. The City's Zoning Ordinance lacks shared parking standards and permits commercial developments to meet setback requirements with parking lots. By allowing for significant setbacks from the roadway to the store, the City's development framework discourages walking, diminishing the pedestrian experience.

Many commercial properties have more than one driveway to access the property, thus affecting the right travel lane on Stockton Hill Road and contributing to the overall congestion of the corridor. The City's development policies for the corridor have resulted in the disruption of traffic flow and act as an impediment to pedestrian and non-motorized traffic.

4.1.7 Character and Urban Form

As the City has evolved, the City's transportation and development policies have defined the corridor's character. Due to the flexible nature of the development framework, the corridor is primarily characterized by single-purpose land uses situated on large parcels. Retail stores and parking lots dominate the area, creating a development pattern with limited multimodal connectivity between uses.

As a result of the City's development policies and the subsequent character of the corridor, various design challenges inhibit multimodal connectivity. The current physical constraints and development policies of the area lead to a corridor which favors automobile and parking opportunities, often unintentionally impacting mobility, access, and safety of pedestrians. The current design challenges are discussed in more detail in Section 2.5.5 and shown in Figure 37.

4.1.8 Safety

Based on the deficiencies previously identified, safety for motorists, pedestrians, and bicyclists is an area of concern. The corridor's commercial strip development is planned primarily for automobile access, negatively impacting pedestrian and bicyclist mobility, safety and access. As a result, pedestrian and bicyclists share the roadway with motorists, creating dangerous conditions for pedestrians and bicyclists. Of particular concern is KRMC, which has a high volume of pedestrians and motorists. In the past, there have been several pedestrian and motorist collisions. Furthermore, commercial developments along the corridor generate large traffic volumes in the relatively small area, increasing congestion and the potential for conflict between multimodal users.

4.1.9 Circulation

In addition to safety, circulation issues arise from the aforementioned deficiencies. Within the study area, Stockton Hill Road serves as the primary north-south route, connecting Kingman to I-40 and surrounding areas. Because current policies have encouraged development to be concentrated on Stockton Hill Road, the roadway network is extremely congested in the form of suburban style thoroughfares and lacks alternative travel routes in a fully developed grid network. The abundance of strip development and parking lots restrict turn movements on the right travel lane, and ultimately disrupt traffic flow along the corridor.

4.2 Mobility Approaches

Mobility approaches were developed to improve safety and reduce congestion along the corridor. These approaches are more technical in nature and include traffic operations, access control, non-motorized improvements, and specific design solutions for the Beverly Avenue and Airway Avenue intersections. The goal is to relieve congestion and increase multimodal mobility and safety. Because Stockton Hill Road carries the bulk of the corridor's traffic volume, improvements in this section will be focused on Stockton Hill Road itself.

4.2.1 Traffic Operations

Evaluation of the existing and future traffic operations on Stockton Hill Road revealed that the intersections within the corridor are projected to operate at the acceptable LOS of C or better for the near term (2015), mid term (2020) and long term (2030) horizon years. However, an analysis of corridor segments showed that northbound and southbound segments, between Detroit Avenue and Airway Avenue exhibited less than acceptable LOS and speeds, and that traffic conditions would continue to decline in the future.

Several traffic engineering related approaches could be utilized to improve traffic operations and enable more efficient traffic management; signal timing and synchronization, intelligent transportation systems (ITS), and intersection capacity improvements. These three approaches are detailed in the following sections.

4.2.1.1 Traffic Signal Timing and Synchronization

A traffic signal at a given intersection is ideally programmed to properly proportion the amount of green time allotted to different intersection movements based on demand. The goal is to minimize overall intersection delay and maximize traffic flow through the intersection. However, achieving optimal performance at an individual intersection does not necessarily result in the optimal performance of an entire corridor. For the most efficient signal operation along a corridor, the programmed timing of green signals throughout the corridor should be coordinated to optimize corridor traffic flow.

Signal coordination allows for the green signal at downstream intersections to be offset from the upstream intersections in such a way that groups of automobiles travelling at the proper speed arrive on at a green signal and do not have to wait at intersections. For Stockton Hill Road, the slow segment speeds discussed in Section 4.1.1 suggest a lack of coordinated flow through the intersections, especially along the south side of the corridor between Detroit Avenue and Airway Avenue. As part of a signal timing and synchronization effort, it is also important to ensure that pedestrian signal and crosswalk timing is not affected in a way which restricts pedestrian access of bicycle and transit flow.

Once a corridor is coordinated, the efficiency of traffic control should be continuously monitored to ensure that signal timing meets the traffic demand. For a region like

Kingman which has experienced sustained growth, traffic signals should be retimed at least once every three years. The last retiming effort for intersections along the corridor was completed in 2008. Signal retiming and coordinating could improve corridor traffic flow, which results in perceptible improvement to the users. It also provides secondary benefits such as reduction in crashes and reduction in emissions. Signal coordination and retiming yields much higher benefits than costs. However, signal timing works best when complemented by a coordinated ITS, which is explained in the next section.

4.2.1.2 Intelligent Transportation Systems

ITS elements are an important consideration in improving the traffic flow of a corridor, and can greatly complement a signal timing and coordination effort. One of the essential elements of coordinated signal operation is for the internal controller clocks to be synchronized. Internal controller clocks can drift from the true time; as a result, timing parameters such as plan offsets which are referenced to a common start point can vary. This can result in a loss of signal synchronization along the corridor. Various signal and traffic signal system upgrades could be adopted to ensure the corridor is coordinated. These elements are discussed in the following sections, and include GPS clock receiver and interconnect systems, interconnect systems with central control, and adaptive signal control. The improvements discussed here assume a signal retiming effort for the Stockton Hill Road corridor.

A. <u>GPS Clock Receiver & Interconnect Systems:</u> Global Positioning System (GPS) satellites carry on-board atomic clocks. These satellites broadcast location and time information for receivers on the ground. GPS clock receivers in a traffic signal cabinet use the GPS time information to set the internal time clocks of traffic signal controllers. Typically GPS clock receivers are deployed in two configurations to prevent controller clock drift and achieve signal synchronization: 1. GPS clock receivers are installed at all signal control cabinets at intersections along the coordinated corridor. The GPS clocks at all the intersections are programmed to set the controller at the same time(s) everyday. 2. Alternately, the GPS clock receiver is installed in one cabinet at an intersection which is designated as the master intersection. All the signal controllers along the corridor are connected to the master controller using a wired or wireless interconnect system, providing a communication channel between the cabinets. The master controller or the GPS clock utilizes this to set the controller clocks for all the intersections at the same time(s) everyday. Having synchronized controller clocks will ensure that the benefits from a traffic signal retiming effort are realized over a longer period of time (as long as traffic flow characteristics do not change).

B. <u>Interconnect System with Central Control:</u> In this system the traffic signal controllers are connected to each other and a Traffic Management Center (TMC) using wired, wireless or hybrid (mix of wired and wireless) communications network. The TMC will have a central system that will help monitor intersection and corridor performance. Data from the intersection controllers can be used to evaluate if the corridor or system is performing optimally. It provides timely notification of equipment failures at intersections, which enables agencies to fix issues proactively. Closed-circuit television (CCTV) cameras can be deployed at key intersections to monitor intersection performance. One of the major advantages of this type of system is that system performance data can be used to make changes to signal timing as and when needed, ensuring optimal system performance. Central system allows the agency to have special signal timing plans for special events and for managing incidents. These can be put in effect from the central system more quickly and efficiently.

C. Adaptive Signal Control: An adaptive system is a special case of an interconnect system with central system. In an adaptive system the traffic flow is monitored and measured using detectors at and in advance of intersections. This data is transmitted to the adaptive control central system which processes the data from all the intersections to provide the controllers with the most efficient signal timings to maximize traffic flow and minimize vehicular delay for the corridor or the system. This type of system is very effective in managing traffic flow through a corridor that has a highly stochastic traffic demand. The City of Grapevine, Texas, in the Dallas - Fort Worth region, maintains one of the largest integrated adaptive signal control systems in the Country deployed on all major arterials.

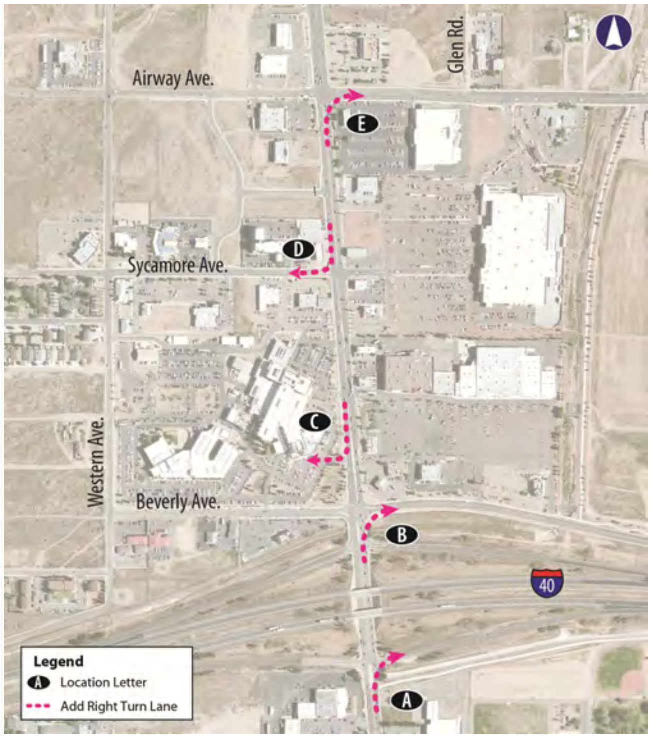
ITS upgrades would allow for more efficient signal operation. The installation of such systems could improve traffic signal coordination and assist in effectively managing the traffic flow of the Stockton Hill Road corridor. By integrating advanced transportation technologies into the current infrastructure, ITS can ultimately improve the corridor’s transportation safety and mobility.

4.2.1.3 Initial Vehicular Capacity Improvements

Vehicular capacity improvement alternatives involve the addition of turn lanes at intersections or the addition of additional through lanes. At locations where shared through and turn movements are present, adding channelization for turn lanes will reduce delay for through automobiles. Initial analyses indicated that these improvements were primarily needed on Stockton Hill Road itself, in the segment between Detroit Avenue and Airway Avenue. The improvements considered are listed below and shown in Figure 49.

A. Add Right turn lane for Northbound Stockton Hill Road at the intersection with I-40 EB on-ramp.
B. Add Right turn lane for Northbound Stockton Hill Road at the intersection with Beverly Avenue.
C. Add Right turn lane for Southbound Stockton Hill Road at the intersection with KRMC.
D. Add Right turn lane for Southbound Stockton Hill Road at the intersection with Sycamore Avenue.
E. Add Right turn lane for Northbound Stockton Hill Road at the intersection with Airway Avenue.

Figure 49: Vehicular Capacity Improvements



4.2.2 Micro-level Intersection Improvements

Further review of the initial vehicular capacity improvements analysis described in Section 4.2.1.3 indicated that several problematic intersections along the corridor required a more detailed analysis. Micro-level analyses of the Airway Avenue, Gordon Drive, and Detroit Avenue intersections were conducted, in order to more comprehensively evaluate possible capacity improvements along Stockton Hill Road, in concert with improvements to cross streets, and adjacent property access points.

Each intersection was further evaluated through Synchro analyses and a review of geometric constraints. Existing midday volumes were used as the basis for all modeling, as they have shown to cause the most significant delays. All possible improvements included ways to convert the current split phase signal system into a standard phasing signal, which the Synchro modeling shows to be a very significant improvement without additional geometric improvements. Technical information for the micro-level intersection analysis, including Synchro model outputs, is included in Appendix B.

4.2.2.1 Airway Avenue Intersection

A comprehensive analysis of the Airway Avenue intersection resulted in the development of two improvement options. Preliminary concept layouts for the options were designed based on Synchro modeling results using a WB-50 design vehicle, standard intersection features such as curb and gutter, and typical intersection taper lengths. The latest versions of the Manual on Uniform Traffic Control Devices (MUTCD) and American Association of State Highway and Transportation Officials (AASHTO) Green Book were also used to develop the intersection concepts. The options are intended to compliment and build upon the recent improvements constructed on the eastbound approach of the intersection. The two options for Airway Avenue are described in detail below as Option 1 and Option 2. However, it is important to note that these options are conceptual and specific design parameters could be refined at future design stages.

<u>Airway Avenue – Improvement Option 1</u>

Improvement Option 1 is the recommended approach based solely on Synchro modeling analysis. This configuration allows westbound left turn queues to be less than 150 feet (the existing left turn bay lengths are approximately 220 feet), allowing dedicated access to be given to the east driveway of the Cracker Barrel Restaurant for left turning vehicles along Airway Avenue. Specific aspects to the improvement, including advantages and disadvantages are detailed below and shown in Figure 50.

Included Improvements:

- Northbound Approach:
  - Third through lane
  - Exclusive right turn lane

- Southbound Approach:
  - No change from the existing configuration

- Eastbound Approach:
  - No change from the existing configuration
- Westbound Approach:
  - Exclusive dual left turn lanes
  - Exclusive right turn lane
  - Single through lane
  - Raised median channelization
  - Opposing left turn pocket for east Cracker Barrel property driveway
  - Closure of Cracker Barrel west access drive
- Other Items:
  - Standard-phased traffic signal

Advantages:
- Providing a standard-phased signal allows for shorter queue storage lengths at westbound approach
- Eliminates the existing conflict between eastbound vehicles turning left into west Cracker Barrel property driveway and westbound approach vehicles immediately adjacent to intersection. The Cracker Barrel property east driveway for eastbound Airway Avenue is maintained with an eastbound left turn pocket, while also providing directional separation with a raised median for the opposing westbound left turn lanes.
- The Midday peak intersection delay for this configuration is 42.7 with LOS D, compared to existing conditions of 104.6 and LOS F, respectively

Disadvantages:
- Two signal poles and associated equipment will require relocation
- Impacts property on two quadrants
- Conversion of the existing westbound shared through and left lane to a dedicated left turn lane, while maintaining the existing two through receiving lanes, allows drivers to proceed through the intersection using this lane
- Higher in cost compared with Option 2

Figure 50: Airway Intersection – Improvement Option 1

Airway Avenue – Improvement Option 2

Improvement Option 2 is an interim solution meant to maintain the existing east leg roadway width, and convert the existing shared through and left turn lane to a dedicated through lane. The improvement option is considered interim because it results in intersection performance at LOS D, but does not accommodate future traffic volumes as efficiently as Improvement Option 1. The addition of a raised median is provided to prevent eastbound traffic from accessing the west and east Cracker Barrel property access drives, but would still allow property access via a U-turn using the downstream left turn pocket. However, storage required for the westbound left turn lane would not allow adequate length to accommodate a left turn pocket for the east Cracker Barrel property access drive. Characteristics of the Option 2 configuration are detailed below and shown in Figure 51.

Included Improvements:

- Northbound Approach:
  - Third through lane
  - Exclusive right turn lane
- Southbound Approach:
  - No change from the existing configuration
- Eastbound Approach:
  - No change from the existing configuration
- Westbound Approach:
  - Exclusive left turn lane
  - Shared through and right turn lane
  - Single through lane
  - Raised median channelization
  - Left turn pocket across to vacant property
- Other Items:
  - Standard-phased traffic signal

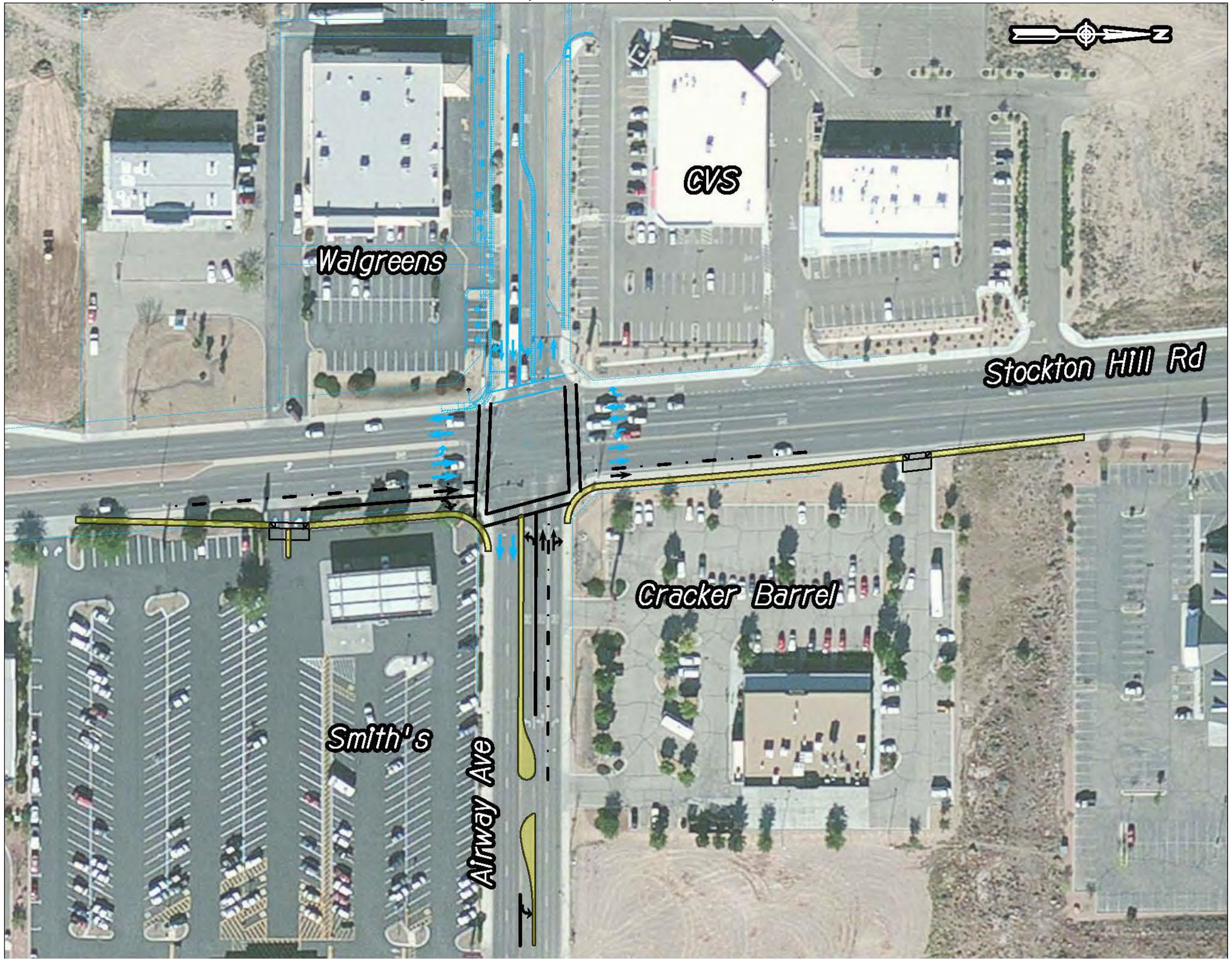
Advantages:

- Providing a standard-phased signal allows for shorter queue storage lengths at westbound approach
- Eliminates the existing conflict between eastbound vehicles turning left into west Cracker Barrel property driveway and westbound approach vehicles immediately adjacent to intersection
- Provides left turn pocket for U-turn and access to vacant property
- Impacts property on only one quadrant
- Lower in cost compared with Option 1

Disadvantages:

- Two signal poles and associated equipment will require relocation
- Results in a midday peak intersection delay of 43.6 (LOS D), but does not accommodate future volume increases (interim solution)
- The 95th percentile queue for existing volumes of westbound left turns in Synchro model extends past the east driveway of the Cracker Barrel property, which would force the eastbound left turn pocket further downstream from the intersection

Figure 51: Airway Intersection – Improvement Option 2



Both improvement options would require driveway reconstruction/relocation the Smith's property access drive along Stockton Hill Road to accommodate the proposed northbound exclusive right turn lane. In addition, driveway reconstruction/relocations will be required for the Cracker Barrel property access off of Stockton Hill Road to accommodate the additional third northbound through lane.

4.2.2.2 Detroit Avenue Intersection

Based on the Synchro modeling analysis, the intersection of Stockton Hill Rd and Detroit Avenue can provide overall LOS B for all the three time periods. However, the individual turning movement LOS shows that the eastbound left turn would experience LOS E throughout the day. Existing model counts show 200-250 vehicles per hour (vph) on eastbound left turns from noon to early evening, which are only served by a single left turn lane with a protected/permissive phase. Average vehicle queues of 200-300 are frequently present.

However, improvements to eastbound left turn queues can be achieved through fine tuning of traffic signal timings. With more green time allocated for east-west left turns from north-south through movement, the delay and queue length could be significantly reduced without impact to northbound and southbound approaches, or overall intersection performance. Based on these findings, vehicular capacity improvements for the Detroit Avenue intersection are not deemed necessary.

4.2.2.3 Gordon Drive Intersection

The Synchro modeling analysis shows that the intersection of Stockton Hill Road and Gordon Drive currently functions well throughout the day. As a result, no vehicular capacity improvements for the Gordon Drive intersection are recommended.

4.2.3 Access Control

Access control is an important aspect in achieving optimal automobile circulation within a corridor. An ideal access control policy would seek to preserve roadway capacity, safety, and the level of traffic service while simultaneously providing access to activity centers. Policies are typically implemented through access management codes and include considerations such as spacing criteria, design standards, and traffic permit procedures specific to designated functional classifications. An effective policy or program would also complement access considerations included in local land use controls and zoning ordinances in order to coordinate transportation and land development over the long term.

The implementation of access control standards along an already established commercial roadway is often more challenging and complex compared to an undeveloped corridor. Land for needed improvements is often unavailable, making certain access management techniques impossible to implement and requiring the use of minimum rather than desirable standards. The legal, social, and political aspects of access management, including the rights of access to existing property, are also particularly relevant in retrofit situations and should be thoroughly understood by those responsible for implementation.

The following access management principles were used to develop improvement approaches for the Stockton Hill Road corridor. The included principles address the existing access and circulation deficiency along the corridor:

Minimum Access Spacing / Driveway Location

Minimum access spacing between driveways or side streets provides sufficient perception-reaction time to address one potential conflict area at a time. Guidelines for minimum un-signalized driveway or local street spacing should consider the speed of the major roadway, stopping sight distance, the elimination of right-turn conflict overlays and the functional area of the access points. The functional area of any access point should be kept clear of any additional points of access.

Driveway location should be influenced by the following factors: the amount of site frontage available for access, the approach directions of development traffic, the locations of existing cross streets and traffic signals, the queuing patterns along the artery, the traffic signal coordination requirements, and the location of nearby driveways. Minimum spacing standards can be established for the distance between driveways. For example, the City of Peoria, Arizona follows a minimum spacing guideline of 180 feet on roadways with a speed limit of 35 miles per hour[1]. For intersection/access spacing, best practices state that driveways that are closer than 100 feet from a public street intersection should be candidates for closure, and that left turns to or from driveways within 100 to 200 feet of a signalized intersection should be prohibited by a sign or by a center median.

Corner Clearance

Corner clearance is the distance from an access drive and the nearest cross road intersection. The distance should provide drivers with adequate perception-reaction time (typically accepted as 2.5 seconds) to assess potential downstream conflicts and is intended to prevent driveways from being located within the functional area of an intersection. Corner clearance requirements will also minimize driveway/intersection conflicts by preventing blockage of driveways upstream of an intersection due to standing signal queues. For a roadway signed for 35mph, typical corner clearance of at least 100 feet should be provided.

Medians/Median Openings

Medians are the center portion of a roadway that separate opposing traffic flows, not including a center two-way left turn lane. A non-transferable, or raised median, includes a physical barrier such as a concrete structure or landscaped island that restricts left

[1] City of Peoria, Arizona – Access Management Guidelines 2011

turn movements. Directional median openings should ideally be limited to every ¼ mile on arterials and major collectors.

Internal Site Circulation / Thru-Access

To promote unified access and circulation systems, unified parcels should include developments under the same ownership or consolidated developments comprised of more than one building site. The number of connections permitted should be the minimum number necessary to provide reasonable access to the overall site and not the maximum available for that frontage. Access to parcels should be internalized using the shared circulation system and designed to avoid excessive movement across parking aisles or queuing across surrounding parking and driving lanes. Where abutting properties are under different ownership and not part of an overall development plan, cooperation between the various owners in development of a unified access and circulation system is encouraged.

Recommended Improvements

Figure 52 to Figure 56 show the most feasible access control solutions for the corridor with respect to site topography, physical impacts to property owners, and ease of implementation. The solutions shown are improvements that can be implemented to reduce friction along the Stockton Hill Road corridor. They are listed numerically from south to north and are not necessarily in implementation order. Consideration should be given to the potential economic impacts to property owners due to reduced number of parcel access points. Note that only driveways along Stockton Hill Rd proper were evaluated for purposes of this study. No cross road evaluation of access control closures and combinations were completed solely on the basis of access control principles.

Access control solutions provided for the Stockton Hill Road corridor includes closing driveways, consolidating or combining driveways (where there are two adjacent driveways), providing thru-access between parcels, and installing raised medians/channelization locations.

As shown in Figure 52 to Figure 54 and Table 51, location numbers 4, 5, 7, 12, 13, 14 and 15 provide increased access control by closing or combining driveway locations. Location numbers 3, 6, 8, 9, and 10 provide a thru-access location between adjacent parcels, allowing for internal site circulation. Locations 1, 2 and 11 provide left turn bays and channelization features to the roadway median. (See Figure 55 and Figure 56 for concepts at these median locations.) Locations were selected based on minimal driveway spacing with adjacent properties, multiple/excessive driveways per parcel frontage, and insufficient corner clearance. Many of the solutions below can be implemented in a number of combinations and in any order. The suggested order is presented in Section 0 and is based on the cost of the improvement at each location.

A Traffic Impact Analysis (TIA) was completed in July 2013 for the proposed redevelopment of the vacant shopping plaza located at the southeast corner of Stockton Hill Road and the I-40 eastbound ramps. To improve access control and safety, and eliminate ongoing vehicle congestion, the TIA proposed the reconfiguration of the Stockton Hill Road and Detroit Avenue intersection. Specific components of the TIA concept included the provision of a left turn channelization for access to the property from southbound Stockton Hill Road, a raised median with left turn channelization on Detroit Avenue east of the intersection, and the closing of direct access drives servicing the northeast corner parcel (currently a Circle K).

The driveway closures, left turn medians, and lane configurations as proposed in the report *Retail Development SEC Stockton Hill Road & I-40 Traffic Impact Analysis*[1], were evaluated using the existing Synchro traffic model for the purposes of the Stockton Hill Road Corridor Study. The analysis revealed that the existing corner parcel driveways did not have significant impacts on the traffic signal operations at the intersection of Stockton Hill Road and Detroit Avenue. The intersection would continue to operate at LOS B in both conditions. However, the left turn median on Detroit Avenue did show an improvement to traffic conditions and has been incorporated into this document as a recommendation. In order to allow full access to the corner Circle K parcel and redevelopment parcel, the left turn median concept is recommended in conjunction with a parcel thru-access improvement (Access Control Locations 2 and 3).

In addition, a VISSIM model was developed to evaluate queuing resulting from the proposed left turn channelization on southbound Stockton Hill Road north of the Detroit Avenue intersection (Location # 1 in Figure 55). Current year midday traffic volumes were used for the analysis, as they represent the most congested period throughout the day. The analysis showed that the left turn median would not result in significant queuing that would impede through traffic flow and increase congestion. The maximum queue length was found to be approximately 74 feet (4 car lengths) which would not decrease safety conditions or cause conflicts with I-40 ramp traffic.

[1] Prepared by Lee Engineering for Wadsworth Development Group

Table 51: Access Control Solutions

Location Number	Type of Solution	Solution Notes
1	Install left turn bay / channelization: Between Detroit Avenue and I-40	• No existing left turn access, blocked by existing continuous raised median • Plan for future adjacent parcel development
2	Install left turn bay / channelization: Along the east leg of Detroit Avenue / Stockton Hill Road intersection	• Existing EB left turn movement into the Circle K driveway queues into the intersection • Corner clearance (<100’) • Plan for future adjacent parcel access and development (in conjunction with Location 3)
3	Provide thru-access: Between Circle K and the Tractor Supply development	• No existing access between parcels • Existing raised median on Stockton Hill Road prevents left turn movements into the parcels • Plan for future adjacent parcel access and development (in conjunction with Location 2)
4	Close driveway: At KRMC and south of O’Reilly Auto Parts	• Driveway spacing with adjacent properties (<100’) • Provides additional parking
5	Combine driveways: Chevron	• Driveway spacing within property (<100’) • 3 existing access points • Contributes to side friction on Stockton Hill Road • Corner clearance (<100’)
6	Provide thru-access: Between Wal-Mart and Ross/Petsmart	• No existing access between high-traffic parcels • Contributes to side friction along Stockton Hill Road
7	Close driveway: Del Taco	• Corner clearance (<100’) • Existing driveway is location within a dedicated right turn bay
8	Provide thru-access: Between AutoZone and Smith’s	• No existing access between parcels • Contributes to side friction along Stockton Hill Road • Existing dead-end customer parking lot
9	Provide thru-access: Between Wal-Mart and Smith’s	• No existing access between high-traffic parcels • Contributes to side friction along Stockton Hill Road
10	Provide thru-access: South of Chase Bank	• No existing access between parcels • Driveway spacing with adjacent properties (<150’)
11	Install raised median / left turn channelization: Between Kino Avenue and Gordon Drive	• Consistent with termini • Plan for future adjacent parcel access and development
12	Close driveway: Stockton Hill Tire	• Driveway spacing with adjacent properties (<150’) • 2 existing access points
13	Combine driveways: Action Automotive Center	• Driveway spacing with adjacent properties (<150’) • 2 existing access points
14	Close driveway: Circle K	• Corner clearance (<100’) • 2 existing access points
15	Close driveway: Hyundai dealership	• 3 existing access points • Contributes to side friction along Stockton Hill Road

Figure 52: Access Control Solutions

Figure 53: Access Control Solutions

Figure 54: Access Control Solutions

Figure 55: Access Control Concept - Locations 1, 2, 3

Figure 56: Access Control Concept - Location 11

4.2.4 Beverly Intersection Improvements

The existing Beverly Avenue intersection is in close proximity to the I-40 WB Off-Ramp, WB On-Ramp and I-40 EB and WB overpass structures. Beverly Avenue is currently a two-way roadway, functioning much like an interstate frontage road through the Stockton Hill Road area. Currently, channelization islands and signage permit only right turns at the Beverly Avenue intersection; Through and left turn movements are not permitted., but drivers cut through adjacent properties instead.

A Design Concept Report (DCR) for this intersection was completed in 1999 and analyzed options for the Beverly Avenue intersection. The study recommended a standard roundabout at the existing intersection. An additional roundabout analysis was conducted in 2000, which found that due to directional volume imbalance on Stockton Hill Road, a traditional roundabout would not provide necessary capacity improvements.

Based on traffic analyses of current data and field investigations, the segment of Stockton Hill Road from Detroit Avenue to Airway Avenue experiences the most congestion along the corridor, with the Beverly Avenue intersection potentially being the linchpin for improvements to Stockton Hill Road through traffic, as well as improved circulation movements for the adjacent street network and neighboring developments.

Four preliminary Beverly Avenue improvement alternatives were developed and presented at the project Technical Advisory Committee (TAC) meeting in May 2013:

Alternative 1: Standard Roundabout

Alternative 2: Elongated Roundabout

Alternative 3: Moved Ramp Terminus (J-Hook)

Alternative 4: Single Controller for Interchange and Beverly Avenue intersections

A VISSIM analysis was developed to pare the four alternatives evaluated down to two feasible alternatives that restore directional movements to the Beverly Avenue intersection and provide the necessary traffic capacity for Stockton Hill Road. Based on the analysis, the Elongated Roundabout and Moved Ramp Terminus (J-Hook) were selected for further study. These two alternatives are detailed in the following sections.

Advanced Alternative 1: Elongated Roundabout

Roundabouts have recently become popular in the United States as they have proven to serve all approaches in a yield condition while maintaining a safe driving condition for users. (However, they can negatively impact pedestrian conditions.) An elongated roundabout is suitable for the Beverly Avenue/Stockton Hill Road due to the large amount of traffic and proximity of nearby intersections. This alternative was developed to prevent queuing within the limits of a standard roundabout and is shown in Figure 57. The advantages and disadvantages are discussed below:

Advantages:

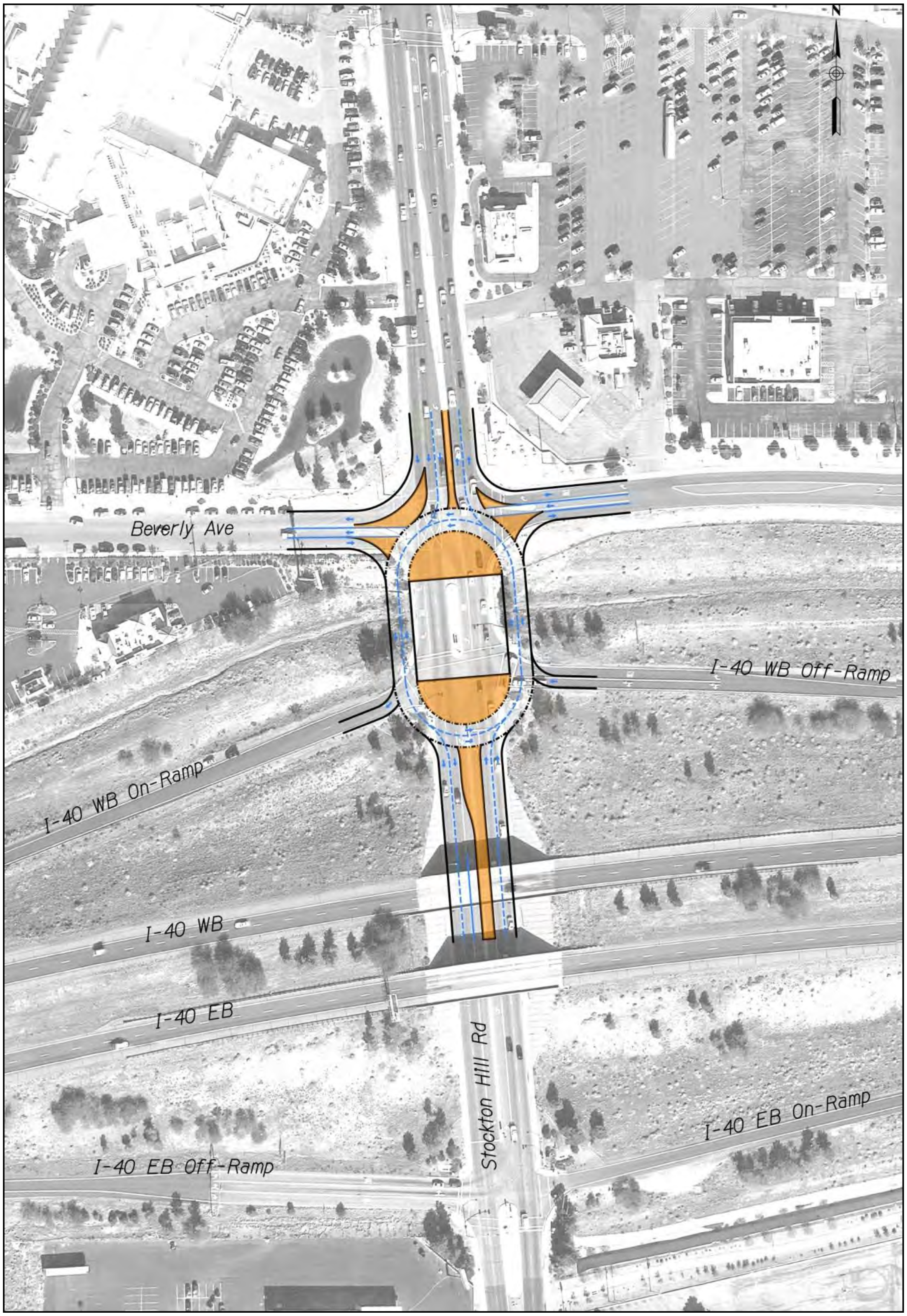
- Provides left turn movements from Beverly Avenue that are currently not permitted
- Minimal impacts to the existing roadways of the roundabout approach legs
- Eliminates signal at I-40 WB on-ramp and Beverly Avenue
- Reduces the number of conflict points through both intersections
- Reduces the number of stops for automobiles making the through movement on Stockton Hill Road
- Lower operations and maintenance costs versus a traditional signal
- East-west neighborhood connectivity

Disadvantages:

- Non-standard concept, driver population may need to adjust to the new concept
- May result in greater delay for the Beverly Avenue/I-40 WB movement compared to other alternative
- Higher initial build cost compared with other alternative
- Requires greater amount of right-of-way to construct compared to other alternative
- Potential for queuing at multiple locations, including southbound Stockton Hill Road between KRMC signal and westbound I-40 onramp, and westbound I-40 off ramp.

The items above were used in the evaluation of the alternatives, shown in the tables of Section 5.2.1.4.

Figure 57: Advanced Alternative 1 – Elongated Roundabout



Advanced Alternative 2: Moved Ramp Terminus (J-Hook)

This alternative would realign the existing I-40 WB Off-ramp and construct a new terminus on Beverly Avenue, east of Stockton Hill Road. As shown in Figure 58, the existing traffic signal at the I-40 WB ramp termini would be removed. The J-Hook concept was developed to eliminate a movement from the Beverly Avenue signal and move traffic volumes from Stockton Hill Road to Beverly Avenue. The advantages and disadvantages are discussed below:

Advantages:

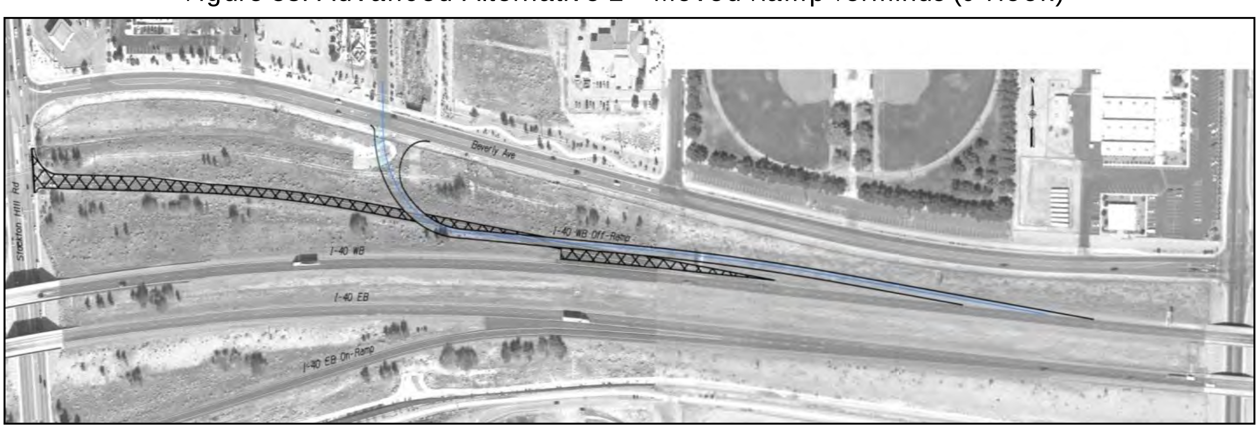
- Allows more storage for the northbound to westbound movement from Stockton Hill Road to Beverly Avenue
- Reduces the accident type (drivers disobeying channelization) at Beverly Avenue
- Eliminates the signal at I-40 WB On-ramp
- Reduces delay for the I-40 WB Off-ramp movement
- Allows Beverly Avenue/Stockton Hill Road intersection to function as a standard 4-leg signal with all movements permitted

Disadvantages:

- Would require a Change of Access Report through Federal Highway Administration (FHWA)
- Would require a public hearing as part of the Change of Access Report
- Would require ADOT design and district acceptance
- Non-standard ramp terminus geometry/design, driver population would have to adjust to new design
- Initial VISSIM modeling indicated that the J-Hook would stop functioning as a viable option due to increases in traffic over the next 15 to 20 years, indicating that this alternative may not meet the purpose and need of the corridor study.

The items above were used in the evaluation of the alternatives, shown in the tables of Section 5.2.1.4.

Figure 58: Advanced Alternative 2 – Moved Ramp Terminus (J-Hook)



4.2.5 Non-motorized Improvements

The provision of non-motorized infrastructure is crucial in promoting a sustainable, pedestrian- and bicycle-friendly environment. The *Kingman Pedestrian and Bikeway Plan (2000)* identified the Stockton Hill Road corridor as a specific area in need of additional pedestrian and bikeway improvements, as the existing pedestrian and bicycle facilities within the corridor are somewhat limited and disconnected, lacking a complete network of sidewalks and bicycle lanes, and lacking any midblock crossings completely. Well-designed pedestrian and bicycle facilities integrated with nearby land uses have the potential to provide social, economic, environmental, and aesthetic benefits to the overall community. In addition, corridors such as Stockton Hill Road could lesson automobile congestion and improve traffic flow by encouraging alternative modes of transportation.

The *Kingman Pedestrian and Bikeway Plan (2000)* provides the following design criteria for bicycle and pedestrian facilities targeted for the Stockton Hill Road corridor:

- *Sidewalks*:
  - Minimum 5 feet wide on major and minor arterials
  - Minimum 4 feet wide on collectors, local, and rural streets
  - Typically used by pedestrians or inexperienced slow-moving bicyclists
- *Bike Lanes*:
  - Striped, one-way travel lane on the street
  - Minimum 4 feet from the edge of pavement
  - Minimum 5 feet from face of curb
- *Wide Curb Lanes*:
  - Wider lane on a street that provides more room for bicycle travel
  - Not specifically designated as a bicycle area and can be used by automobiles
  - Typical width is 14 feet for the outside lane with an optional lane stripe

Sidewalk Improvements

This approach includes sidewalk construction and upgrades. Within the corridor focus area, sidewalk gaps were identified along the north-south routes of Western Avenue, Glen Road, and Burbank Street, and the east-west routes of Gordon Drive, Airway Avenue, Sycamore Avenue and Beverly Avenue. The installation of sidewalks in these locations would provide a more continuous network, furthering pedestrian mobility and offering alternatives to automobile travel for short trips. Completing facilities on the north-south routes of Western Avenue and Glen Avenue should be of particular importance, as they offer parallel routes to Stockton Hill Road. Table 52 and Figure 59 summarize the recommended sidewalk improvements.

Table 52: Sidewalk Improvements

Sidewalk Improvement	Location	Distance (mi)
Western Avenue	Airway Avenue to Sycamore Avenue	0.25
Glen Road	Airway Avenue to Kino Avenue	0.75
Burbank Street	Airway Avenue to Mohave Wash	0.50
Gordon Drive[1]	Stockton Hill Road to Bank Street	3.0
Airway Avenue	West of Western Avenue	0.50
Sycamore Avenue	West of Western Avenue	0.75
Beverly Avenue	West of Western Avenue	0.25

In addition to the actual sidewalk construction listed in Table 52, each sidewalk improvement is also recommended to incorporate several other amenities. These would include buffers between the new sidewalk and the street (preferably landscaped to provide additional separation), adequate pedestrian lighting in currently less developed areas, and audible pedestrian crossing signals at signalized intersections.

Bicycle Improvements

This approach includes bicycle improvements including the addition of bicycle lanes or the upgrading of an existing wide curb lane to a bicycle lane. A wide curb lane, which is considered a bicycle facility by the *Kingman Pedestrian and Bikeway Plan (2000)*, currently exists along Stockton Hill Road from Andy Devine Avenue to Gordon Road. The first step is to upgrade the space provided by the wide curb lane to a designated striped bicycle lane, and to extend the bicycle lane northward to Northern Avenue. Secondly, bicycle lanes are recommended for the north-south routes of Western Avenue, Glen Avenue, Burbank Street, and Harrison Street / Willow Road. Bicycle lanes are also recommended along the east-west routes of Gordon Drive, Airway Avenue, and Sycamore Road west of Stockton Hill Road. Table 53 and Figure 59 summarize the recommended bicycle improvements.

[1] Pedestrian improvements Gordon Drive from Stockton Hill Road to Bank Street are programmed for 2014 (KATS 2011)

Table 53: Bicycle Improvements

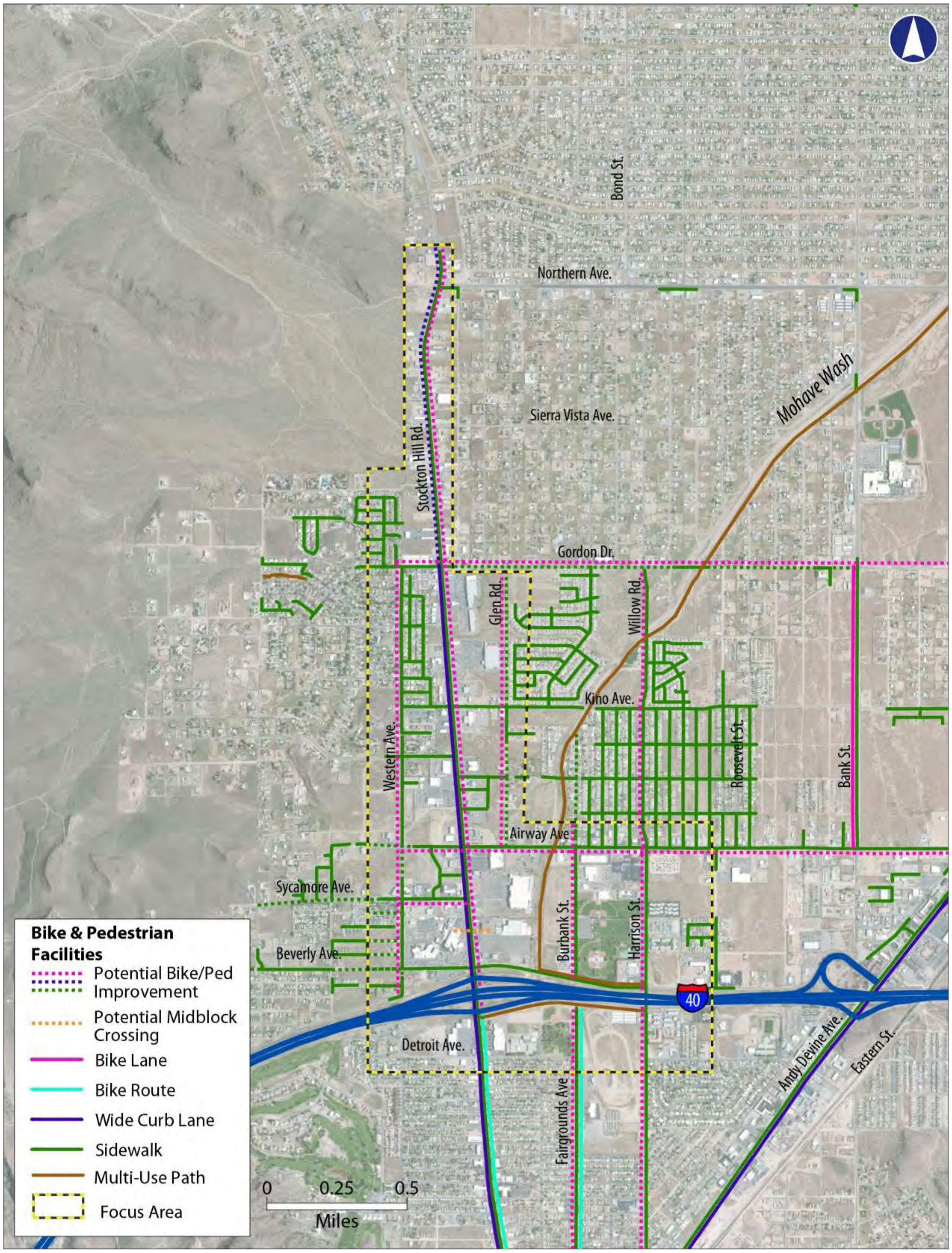
Bicycle Improvement	Location	Improvement Type	Distance (mi)
Stockton Hill Road	Detroit Avenue to Gordon Drive	Upgrade curb lane	3.5
Glen Road	Airway Avenue to Gordon Drive	Bicycle lane	1.0
Western Avenue	Beverly Avenue to Gordon Drive	Bicycle lane	3.0
Burbank Street	Beverly Avenue to Airway Avenue	Bicycle lane	1.0
Fairgrounds Avenue	Andy Devine Avenue to I-40	Bicycle lane	2.75
Harrison Street / Willow Road	Beverly Avenue to Gordon Drive	Bicycle lane	3.0
Harrison Street / Willow Road	Andy Devine Avenue to I-40	Bicycle lane	2.0
Gordon Drive[1]	Stockton Hill Road to Bank Street	Bicycle lane	3.0
Sycamore Avenue	Western Avenue to Stockton Hill Road	Bicycle lane	0.5
Airway Avenue	East of Western Avenue	Bicycle lane	4.0

Midblock Pedestrian Crossing

This approach includes the near term construction of a midblock pedestrian crossing spanning Stockton Hill Road between Sycamore Avenue and Beverly Avenue in the vicinity of the KRMC. The KRMC draws large volumes of foot traffic compared to many other destinations within the corridor, and has been particularly problematic in terms of pedestrians unsafely crossing at un-signalized locations resulting in increased automobile-pedestrian conflicts. Although the development of a corridor wide midblock crossing policy is recommended in Section 4.3.3, input from City of Kingman staff and stakeholders has prioritized this location for nearer term construction.

[1] Bicycle improvements from Stockton Hill Road to Bank Street are programmed for 2014 (KATS 2011)

Figure 59: Potential Multimodal Improvements



4.3 Development Framework Approaches

Development framework approaches were identified to enhance the visual quality and urban character of the Stockton Hill Road corridor. Rather than recommend specific technical solutions, these approaches suggest possible development, street network, and multimodal transportation policy changes. The goal is to transition the corridor from one with automobile-dominated strip development to a more pedestrian-friendly area with more compact development and more choice in the transportation network. These changes would create transportation and development opportunities. It is important to note that the following policy alternatives are not absolute and only intended to provide guidance to community stakeholders when creating a formal policy framework.

4.3.1 Development Policy

Policies that guide development, such as zoning ordinances, subdivision regulations, parking standards, and development review processes all play an influential role in determining the character of a corridor. Development policies also have a direct affect on automobile and multimodal mobility and access outcomes. The City of Kingman's current development polices within the corridor cater towards automobile-oriented commercial uses in the form of strip malls and big-box retail developments. Existing parking, set-back, and access requirements are flexible, which leads to an overabundance of parking facilities with inconsistent property frontages set back far from the street.

The development framework within the corridor could be augmented in order to prevent new development or redevelopment projects along the corridor from compounding existing character, mobility, and access issues. Specifically, there are several strategies that the City of Kingman could implement through the zoning ordinance or development review functions.

4.3.1.1 Zoning Ordinance

The following is a set of potential actions that could be integrated into the City of Kingman Zoning Ordinance within the Stockton Hill Road corridor to improve existing character, mobility, and access issues.

Frontage and Setback Requirements

Establishing targeted zones with longer lot frontage and dimensional requirements along Stockton Hill Road and major cross streets would allow for greater spacing between commercial and residential driveways. Zones with smaller lot frontages could then be permitted in areas with alternative access options from Stockton Hill Road, including parallel streets such as Western Avenue and Glen Road. More consistent setbacks located closer to the street, allowing parking in the rear, would improve the corridor's visual appeal and pedestrian experience, while accommodating similar mixed use land use types to those discussed in Section 4.3.1.

Corner Lot Sizes

Corner lot sizes are of particular importance at an intersection of two major roads. Corner clearance is the distance from an intersection to the nearest access connection. Corner clearance standards preserve traffic conditions at intersections and safe and convenient access to corner properties. Many commercial uses that prefer corner lots also prefer large land area or multiple access points, such as gas stations, pharmacies, or big-box retail stores. Adopting a policy for corner lots within the corridor that ensures an adequate lot size and appropriate corner clearance will protect the development potential and market value of corner properties, while preventing access and congestion problems.

Outparcel Access

Many commercial properties develop in a pattern with an anchor retail center set back from the street, and multiple smaller outparcels with separate commercial uses located closer to the street. If individual access points are provided for each outparcel and the principle retail center, the overabundance of curb cuts can increase congestion and circulation issues for automobiles and pedestrians. Local policies should require access to outparcels through an internalized circulation system. The development code can be used to require that adjacent development sites under the same ownership, or those consolidated for development, will be considered one property for the purposes of access regulation.

Overlay Zone

The use of an overlay ordinance for the Stockton Hill Road corridor is a particular regulatory tool that could be used to implement the development policies discussed previously. This overlay would be a supplemental set of development policies that would apply to projects within a specified distance of Stockton Hill Road, or within a designated district encompassing the corridor study area. Zones of this type can be designed to address the unique circumstances of the corridor while addressing access management problems. Specific standards could be included that address a variety of issues such as right-of-way preservation, limitations on new driveways, and driveway spacing standards.

Planned Development Zones

Planned Unit Development Zones or (PUD) is another widely used regulatory tool that could be used to implement additional development policies for the Stockton Hill Road corridor. A PUD is a designated zone, where particular development standards are relaxed, and individual site development characteristics are negotiated between the developer and the local government. This process involves a much more extensive site-plan review process, and provides considerable discretionary authority to the development review body. Most communities utilize PUD as a floating zone that may be applied to individual sites upon request. The City of Kingman Zoning Ordinance currently includes the Commercial Planned Development District (C-3PDD) zoning designation. City of Kingman staff could utilize the C-3PDD zone in targeted areas within the Stockton Hill Road corridor in order to apply special access and pedestrian/ bicycle amenity requirements, or to accommodate similar land use types to those discussed in Appendix D.

4.3.1.2 Development Review

The following actions to improve corridor character, mobility, and access can take place during development review. These strategies are not formally adopted ordinances, but rather policy principles, programs, or design strategies that could be incentivized and encouraged by local government staff during the site plan review process.

Optimized Driveway Location and Access Design

The site plan review process itself offers opportunities to require changes to the site design and layout of developments to avoid access problems, insure adequate circulation, and provide amenities for pedestrians and bicyclists. Many times these goals can be achieved through site specific design strategies rather than through a regulatory approach.

Landscaped Buffers

Landscape buffers consist of native or decorative plantings that separate incompatible land uses. They have the potential to improve roadway aesthetics, defuse noise, protect sensitive land uses, and soften hard edges along parking lots, driveways, and highways. These buffers can create a more unified character and address safety concerns. Ideal locations for the use of buffers include between incompatible uses, abrupt barriers and infrastructure, and at and around major intersections.

Combined Access and Parking

As noted previously, many automobile and pedestrian access issues along the Stockton Hill Road corridor stem from an overabundance of parking and access points to commercial properties. Site plan reviewers could promote shared access points and parking facilities between adjacent properties in order to prevent these issues in new developments or as part of redevelopment.

One strategy would be to adopt a formal policy that offers incentives to developers in exchange for sharing driveways and parking with neighboring properties. For instance, a new development could be incentivized to negotiate shared access and parking with an existing adjacent property through relaxed minimum frontage and parking requirements, or a streamlined review process.

Multiple shared parking strategies exist in other Arizona communities that can be adapted for the corridor parking policy. The Cities of Prescott[1] and Flagstaff,[1] Arizona for

[1] Shared Parking Standards from the City of Prescott Land Development Code (2011)

example, allow two or more uses with different peak parking periods to share the same spaces to meet their parking requirements. To increase shared parking opportunities, parking policies can allow for a greater distance between buildings and parking facilities. The City of Mesa,[2] Arizona for instance, allows shared facilities to be located 660 feet off-site. Another strategy to reduce the amount of parking spaces is to set a maximum for the number of required spaces. Mesa and Tempe[3] prohibit developments from having more than 125% of the minimum required spaces.

4.3.2 Street Network Policy

Modern commercial centers along major thoroughfares often evolve in strips, concentrating new activity centers and traffic generators in a linear pattern instead of distributing amongst an adequate local network of roads with the capacity to accommodate desired land development. This is apparent within the Stockton Hill Road corridor, where the majority of commercial development has occurred along Stockton Hill Road itself. Fragmented street networks force more traffic to use major roadways, even for short local trips, and can also impede emergency access and increase the length of automobile trips.

A network of secondary "backage" roads parallel to the principle thoroughfare, tertiary routes, and side streets improve the connectivity of the built environment and offset travel demand away from the principle road. Other benefits may include fewer automobile miles traveled, fewer access problems on major roadways, and greater opportunities for walking, bicycling, and transit use. The design of a local road network is not only crucial for access management and effective automobile, bicycle, and pedestrian circulation, but it is also a key component of community design that can improve visual quality and character.

Multiple strategies exist to convert a fragmented street network focused on a commercial thoroughfare into a more substantial road network in corridors with a previously existing principle commercial thoroughfare. More immediate strategies include targeting and reemphasizing existing secondary roads for new commercial developments, and ensuring that internal street systems within individual site development and subdivision proposals are designed to coordinate with the existing street layout. A longer term approach would be to plan for the construction of new local streets in strategic locations, building towards a complete grid street layout that allows for multiple alternative routes between two locations. The latter strategy could entail parcel reassembly and smaller block sizes, which would also promote walking and biking.

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[1] Shared Parking Standards from the City of Flagstaff Zoning Code (2011)
[2] On-Site Parking Standards from the City of Mesa Zoning Ordinance (2011)
[3] Parking Standards from the City of Tempe Zoning & Development Code (2006)

4.3.2.1 Preliminary Network Concept

The following describes a preliminary network concept for the Stockton Hill Road corridor that can be used to guide network policy development. This strategy represents one potential network concept that has not been fully evaluated, although it reflects input received to date from the public, stakeholders, and TAC. In order to implement a street network strategy within the corridor, community stakeholders must first complete a detailed network plan to identify specific goals and desired outcomes for the corridor.

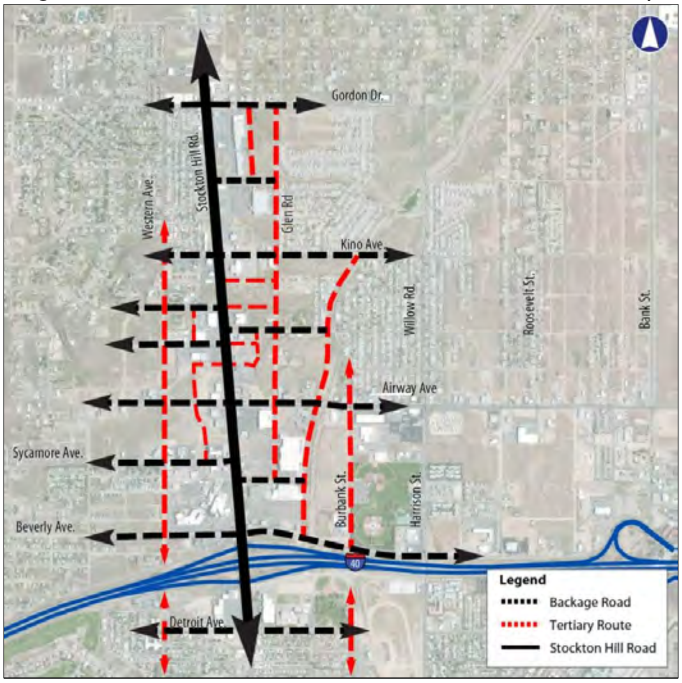
__Western Avenue and Glen Road__

Western Avenue and Glen Road already exist as parallel routes to Stockton Hill Road close to major concentrations of commercial uses. City development staff could target planned developments along those streets within existing commercial zones, and emphasize those locations to developers.

__"Backage" Roads and Tertiary Routes__

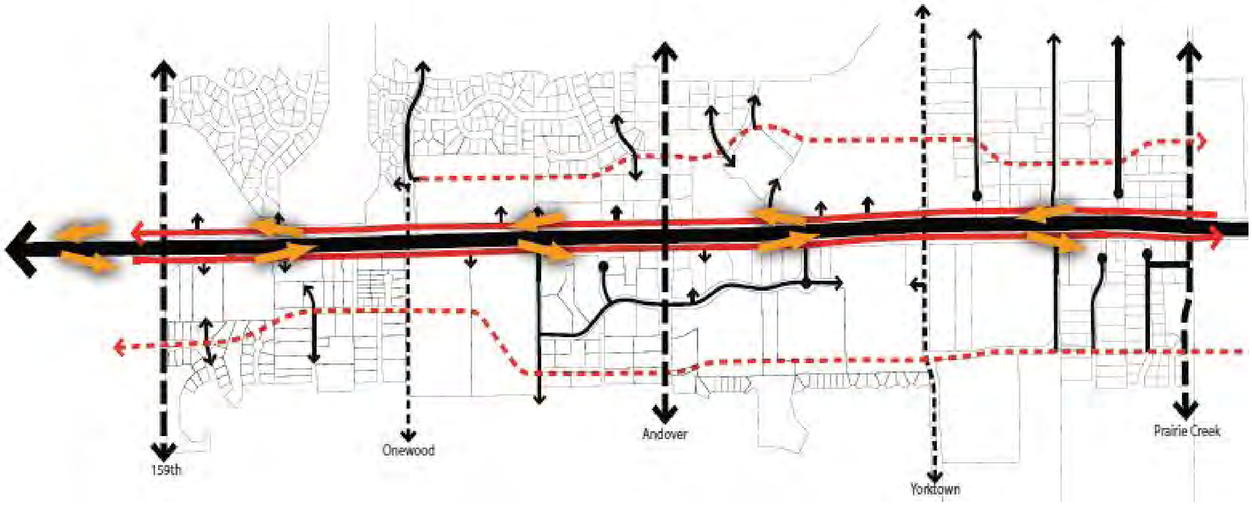
Over the long term, additional "backage roads" and tertiary routes could be identified and developed in order to create a grid street pattern. Figure 60 below shows one possible concept, involving extending Glen Road to the south, and reassembling several parcels between Kino Avenue and Sycamore Avenue to create new collector streets.

Figure 60: Stockton Hill Corridor - Network Concept



The development of a fully connected grid street network would require the creation of new collector streets, or the extension of existing collector streets secondary to Stockton Hill Road itself. This process is complex and can require parcel assembly, reassembly, or public acquisition of land. Figure 61 shows an example of a network concept adopted by the City of Andover Kansas. In this scenario, new collector streets were targeted mostly along existing lot lines. The City of Andover established a policy whereby right-of-way property adjacent to identified collector routes was obtained through exaction or purchased outright from property owners over time. Parcels requiring reassembly were also purchased individually by the City over the long term, reassembled and then reintroduced into the private market.

Figure 61: Andover Kansas - Network Concept



4.3.3 Multimodal Policy

A strategic policy for multimodal mobility is crucial in promoting a sustainable, pedestrian- and bicycle-friendly environment. Development in the Stockton Hill Road corridor, however, has been centered on automobiles while the needs of pedestrians and bicyclists have been given lesser priority. Existing pedestrian and bicycle facilities are limited and disconnected within the focus area, lacking an adequate network of sidewalks, bicycle lanes, bicycle parking, and midblock crossings. The *Kingman Pedestrian and Bikeway Plan (2000)* identified the Stockton Hill Road corridor as a specific area in need of additional pedestrian and bikeway improvements.

The Stockton Hill Road corridor houses many key commercial and medical destinations. Due to its clustering of services and increasing residential and employment densities, the corridor experiences severe congestion and could benefit from multimodal improvements. High capacity automobile corridors such as Stockton Hill Road can alleviate traffic congestion and improve traffic flow by encouraging alternative modes of transportation. Well-designed pedestrian and bicycle facilities integrated with nearby land uses have the potential to provide social, economic, environmental, and aesthetic benefits to the overall community.

The following approaches represent policies for pedestrian and bicycle amenities that would help to address multimodal safety and access concerns within the corridor. These should serve as a basis for the formation of a strategic policy for the provision of non-motorized facilities within the corridor.

Midblock Crossings

Midblock crossings provide designated pathways for pedestrians to travel across busy roadways at locations other than signalized intersections. They are essential along corridors with few or far apart intersections. Stockton Hill Road, however, lacks east-west midblock crossings. Because many accessible crossing points are not clearly identified or accessible, pedestrians often unsafely cross at unmarked locations resulting in increased automobile-pedestrian conflicts. The addition of safe, visible, and evenly distributed midblock crossings on Stockton Hill Road could reduce conflicts and promote a safer environment, particularly in the vicinity of the KRMC, which is identified as a specific improvement project in Section 4.2.5. To implement midblock crossings, elements could be integrated into the non-motorized policy to identify strategic problem areas for targeted investments, followed by a longer term strategy of including midblock crossings as part of future roadway projects.

Bicycle Parking

Adding secure bicycle parking facilities to commercial parking lots along Stockton Hill Road would encourage bicycling throughout the corridor. Local zoning ordinances should have provisions for bicycle parking facilities to be located in a safe, convenient, and clearly designated location. Bicycle parking facilities could encourage bicyclists to lock their bicycles. Ideal locations for bicycle parking would be located nearby store entrances, away from pedestrian walkways and automobile traffic.

Currently, the City of Kingman Zoning Ordinance requires commercial uses to have bicycle parking spaces equal to five percent of the required automobile parking spaces, with a minimum of two bicycle parking spaces. One strategy to make bicycling more desirable is to simply increase the standard number of bicycle parking spaces required. Gilbert, Arizona, for example, requires all land uses to have one bicycle space per every ten required automobile space. For uses with less than 40 automobile spaces, the bicycle requirement is still four spaces. A similar requirement can be adapted to the City of Kingman's bicycle parking policy.

Sidewalk Improvements

Within the focus area, several sidewalks are disconnected, missing, or too narrow. The installation of adequate sidewalks in these locations would provide a continuous network, furthering pedestrian mobility and enhancing corridor aesthetics. A targeted sidewalk policy should be developed to separate pedestrians from the roadway, allow

American with Disabilities Act (ADA) accessibility, encourage pedestrian activity, and improve pedestrian safety. One method would be to incorporate sidewalk improvements as a part of future roadway projects where feasible. Sidewalks should be separated by a landscaped buffer, clearly differentiated from parking lots and roadways, include adequate pedestrian crossing signals, preferably audible, and insure facilities are up to ADA standards.

Bicycle Lane Improvements

Currently, the Stockton Hill Road corridor lacks bicycle lanes, thereby discouraging bicycling and making cyclists more susceptible to collisions. Bicycle lanes serve to reduce conflict between cyclists and motorists by separating the two users and making travel movements more predictable. Bicycle lanes located on busy arterial and collector streets could help minimize this conflict. One strategy to introduce a bicycle lane policy would be to include bicycle lane provisions in future roadway projects.

Transit Amenities

Kingman Area Regional Transit vehicles (KART) are currently equipped with front mounted bicycle racks to serve bicyclists. However, several bus stops within the study area lack amenities such as benches, adequate shading, or shelters. Upgrading bus stop amenities within the corridor could result in greater pedestrian mobility and increased transit ridership, without necessarily augmenting KART service routes or schedules. One element of a comprehensive non-motorized policy could be to include bus stop upgrades as part of future roadway projects.

The multimodal policy strategies described above can be used as a guide for non-motorized development in the Stockton Hill Road corridor. These approaches are intended to encourage pedestrian and bicycle activity in the Stockton Hill Road corridor and can be included as corridor specific elements in an update to the *Kingman Bicycle and Pedestrian Plan (2000).*

5.0 EVALUATION OF PRELIMINARY IMPROVEMENT APPROACHES

An evaluation of the preliminary improvement approaches is essential in identifying the potential benefits, impacts, and constraints of each improvement. To do so, evaluation criteria were developed with input from stakeholders and the public, who shared a vision of enhancing the corridor and creating a safe, efficient, and economically feasible transportation network. The evaluation process is based on both qualitative and quantitative assessments established by the criteria listed in Section 5.1, and agreed upon by TAC members. Mobility and development framework recommendations are evaluated separately in Section 5.2 to determine how well each improvement addresses the identified deficiencies and goals of the corridor study.

5.1 Evaluation Criteria and Methodology

The evaluation criteria listed below were used to evaluate the specific approaches of each general category. Evaluations will consist of both quantitative and qualitative approaches. Qualitative evaluations will be ranked by categorical values (good, fair, and poor). Quantitative evaluations will be ranked numerically, when possible, or by higher level comparative costs ($, $$, $$$).

The preliminary improvement approaches evaluated as part of this project covered a wide range of solutions, both technical and policy based. Because of the varying range of solutions introduced, and in order to ensure a transparent and clear evaluation of approaches, individual criteria were not weighted. In addition, the elements included within each improvement approach were kept separate.

5.1.1 Improvement Cost

The improvement cost is an estimate of the total capital project costs of each improvement. This includes construction and estimated right-of-way costs, but not maintenance, operation, or planning costs. Where possible, ranges of dollar values were calculated based on comparable unit costs.

Improvements will be ranked as follows:

- $$$: High cost
- $$: Medium cost
- $: Low cost

5.1.2 Right-of-Way Impact

Public projects often require the acquisition of private property by the responsible public entity. The right-of-way (ROW) impact is a qualitative measure of the magnitude of right-of-way acquisition required for each improvement.

Impacts will be ranked as follows:

- Poor: Substantial ROW impact; project encroaches on a relatively significant amount of private property.
- Fair: Limited ROW impacts; project encroaches on some amount of private property.
- Good: No ROW impacts; project does not encroach on private property.

5.1.3 Funding Availability

Funding availability is a qualitative measure of funding sources, including grants and local funding opportunities, available for each improvement. This will help determine the financial feasibility of each improvement.

Improvements will be ranked as follows:

- Poor: Low funding likelihood; no potential sources available.
- Fair: Fair funding likelihood; some potential sources available.
- Good: High funding potential; realistic funding sources identified.

5.1.4 Safety Improvement

Safety improvement is a measure of the potential safety issues associated with each improvement. This includes the safety of drivers, pedestrians, and bicyclists. Rankings will be assessed based on whether the improvement can be expected to have a positive, neutral, or negative impact on safety.

Improvements will be ranked as follows:

- Poor: Improvement includes elements which can detract from the safety of one or more travel modes.
- Fair: Limited or neutral safety impact; improvement expected to have little to no impact on safety for any travel mode.
- Good: Positive safety impact; improvement Includes substantial traffic calming or conflict prevention elements, or evaluation of the improvement using the FHWA safety evaluation tool for crash-reduction-factors (CRF) resulted in a positive score.

5.1.5 Automobile Mobility

Automobile mobility is a measure of how well each improvement reduces automobile congestion and increases automobile connectivity within the transportation network. Automobile mobility will be assessed based on the improvement’s potential impact on congestion (measured by both LOS and connectivity).

Improvements will be ranked as follows:

- Poor: Improvement results in a reduction in LOS and connectivity.
- Fair: Improvement increases LOS and reduces connectivity or vice versa; or the Improvement has little to no impact on LOS and connectivity.

- Good: Improvement results in an increase in LOS and connectivity.

5.1.6 Pedestrian Mobility

Pedestrian mobility is a measure of how well each project improves the conditions for walking within the corridor. Pedestrian mobility will be assessed based on the impact on pedestrian mobility, as well as the inclusion of specific facilities such as sidewalks, crosswalks, or other pedestrian amenities.

Improvements will be ranked as follows:

- Poor: Improvement could potentially reduce pedestrian mobility, and no specific pedestrian facilities are included.
- Fair: Improvement expected to have little to no effect on pedestrian mobility, and no specific pedestrian facilities are included.
- Good: Improvement expected to increase pedestrian mobility, or specific pedestrian elements are included.

5.1.7 Bicycle Mobility

Bicycle mobility is a qualitative measure of how well each project improves the conditions for bicycling within the corridor. Bicycle mobility will be assessed based on the impact on bicycle connectivity, as well as the inclusion of specific facilities such as bicycle lanes, bicycle routes, or wide curb lanes.

Improvements will be ranked as follows:

- Poor: Improvement could potentially reduce bicycle mobility, and no specific bicycle facilities are included.
- Fair: Improvement expected to have little to no effect on bicycle mobility, and no specific bicycle facilities are included.
- Good: Improvement expected to increase bicycle mobility, or specific bicycle elements are included.

5.1.8 Environmental Impact

Environmental impact is a qualitative measure of the potential impact that each improvement has on the environment. This includes near term physical impacts on the natural environment, wildlife, and adjacent properties. Environmental impacts due to the construction, operations, and maintenance of the improvement will also be taken into consideration.

Improvements will be ranked as follows:

- Poor: Potential negative impact to the environment.
- Fair: Minimal impact to the environment.
- Good: No impact to the environment.

5.1.9 Visual Quality

Visual quality is a qualitative measure of the aesthetic value of each improvement. Visual quality will be assessed based on the level of aesthetic impact or aesthetic potential each improvement would have on either adjacent properties or the corridor as a whole.

Improvements will be ranked as follows:

- Poor: Potential for negative aesthetic impact on adjacent properties and overall corridor.
- Fair: Little to no aesthetic impact on adjacent properties and overall corridor.
- Good: Positive aesthetic impact to adjacent properties and overall corridor.

5.1.10 Public Acceptance

Public acceptance is a measure of the level of support each improvement or strategy would have from community stakeholders and the general public. Levels of public acceptance for each alternative will be assessed based on input gleaned from stakeholder interviews, open house meetings, public comments, and typical public reactions from comparable improvements in other similar corridors.

Improvements will be ranked as follows:

- Poor: Little to no public acceptance expected.
- Fair: Moderate public acceptance expected.
- Good: Significant public acceptance expected.

5.1.11 City Support

City support is a qualitative measure of the level of potential acceptance each improvement would have from the TAC and City officials. City support will be assessed based on input from TAC members.

Improvements will be ranked as follows:

- Poor: Little to no City support expected.
- Fair: Moderate City support expected.
- Good: Significant City support expected.

5.2 Evaluation of Approaches

The following section describes the evaluation of the preliminary improvement approaches discussed in Section 4.0. Each improvement approach was screened against the accepted evaluation criteria described in Section 5.1. Although both quantitative and qualitative criteria were utilized, the evaluation of mobility approaches was more technical in nature, as described in Section 5.2.1, while the evaluation of development framework approaches was less technical.

5.2.1 Mobility Approaches

The following section describes the evaluation of the mobility approaches discussed in Section 4.2, including Traffic Operations, Access Control, Beverly Intersection Improvements, and Non-motorized Improvements.

5.2.1.1 Traffic Operations

The preliminary traffic operations improvements were evaluated using Synchro to evaluate if improvements to segment travel times and LOS could be realized. A screening level analysis was completed to identify operational improvements, assuming a base year of 2013. The benefits from using technological enhancements to ensure optimal performance of the signal system was evaluated using the ITS Benefits Database hosted by the US Department of Transportation (USDOT), ITS Joint Program Office (www.itsbenefits.its.dot.gov).

Traffic Signal Timing and Synchronization

The traffic signal timings for the existing AM, Midday, and PM peak periods were optimized. A cycle length of 120 seconds was used for all intersections. No changes to phasing or lead-lag optimization for signalized left turns were done. Table 54 and Table 55 present the segment LOS for the northbound and southbound corridors for the existing and the optimized signal timings. Table 56 and Table 57 present the segment speeds for both cases. Even this simple optimization effort results in a slight increase in corridor travel speeds in most cases. A full re-optimization effort will involve several additional tasks including evaluating various cycle lengths, phase sequencing, timing parameters, and model calibration using travel time runs and manual fine tuning of signal timings.

Although overall corridor LOS and speeds were shown to improve after signal optimization, the analysis revealed some challenging segments where the optimized LOS or speed was shown to decline compared to existing. In particular, the split phasing of the eastbound and westbound phases for the intersection of Stockton Hill Road with Airway Avenue was shown to be particularly problematic. This demonstrates the limitations of implementing signal optimization alone. The greatest benefits to traffic flow within the corridor would result from additional complementary approaches such as an ITS program.

Table 54: LOS for Northbound Stockton Hill Road Segments.

Segment - Stockton Hill Road NB	LOS*								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	E	D	+	D	C	+	C	C	
I-40 EB - I-40 WB	C	C		C	C		C	C	
I-40 WB - KRMC	C	C		D	C	+	D	B	+
KRMC - Sycamore	D	C	+	D	C	+	D	D	
Sycamore - Airway	E	E		E	F	-	E	F	-
Airway - Kino	B	B		B	B		B	B	
Kino - Home Depot	B	B		C	C		B	B	
Home Depot - Gordon	B	B		B	B		B	B	
Gordon - Northern	A	A		A	A		A	A	
Corridor	C	B	+	C	C		C	C	

Segment LOS measures include +/- if applicable

Table 55: LOS for Southbound Stockton Hill Road Segments

Segment - Stockton Hill Road NB	LOS*								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	A	A		A	A		A	A	
I-40 EB - I-40 WB	B	B		B	B		B	B	
I-40 WB - KRMC	B	B		C	C		B	B	
KRMC - Sycamore	C	C		C	C		C	C	
Sycamore - Airway	C	B	+	C	B	+	C	B	+
Airway - Kino	C	B	+	D	C	+	C	D	-
Kino - Home Depot	C	C		C	D	-	D	C	+
Home Depot - Gordon	B	B		B	B		B	B	
Gordon - Northern	C	C		B	B		C	B	+
Corridor	B	B		B	B		B	B	

Segment LOS measures include +/- if applicable

Table 56: Speed for Northbound Stockton Hill Road Segments

Segment - Stockton Hill Road NB	SPEED* (MPH)								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	12.7	14.5	+	17	18	+	18.1	18.7	+
I-40 EB - I-40 WB	18.3	18	-	20.7	20.7		21.7	21.6	-
I-40 WB - KRMC	21.6	19.3	-	16.8	21.1	+	17	24	+
KRMC - Sycamore	14.1	22.6	+	14.8	20.5	+	16.9	16.6	-
Sycamore - Airway	13.5	12.8	-	10.7	9.6	-	13.8	9	-
Airway - Kino	25.7	29.4	+	27.9	29.6	+	24.7	29.6	+
Kino - Home Depot	26.2	25.5	-	18.9	23.6	+	25.8	24.7	-
Home Depot - Gordon	28.3	28.5	+	26.5	28.9	+	27.2	28	+
Gordon - Northern	34	33.8	-	33.8	34.3	+	33.4	34.5	+
Corridor	23.1	24.3	+	22.6	23.8	+	23.5	23.5	

**Segment speed measures include +/- if applicable*

Table 57: Speed for Southbound Stockton Hill Road Segments

Segment - Stockton Hill Road NB	SPEED* (MPH)								
	AM			Midday			PM		
	Existing	Optimized		Existing	Optimized		Existing	Optimized	
Detroit - I-40 EB	32.4	32.4		32	33.7	+	31.6	32.6	+
I-40 EB - I-40 WB	24.5	27.6	+	24.8	24.6	-	25.3	26.1	+
I-40 WB - KRMC	24.2	24.4	+	19.7	23.5	+	24.5	24.5	
KRMC - Sycamore	21.7	20.8	-	20.7	21.1	+	22.2	20.3	-
Sycamore - Airway	23.8	24.9	+	21.6	26.9	+	20.1	25.2	+
Airway - Kino	23.9	25.2	+	17.2	20.5	+	19.7	15.5	-
Kino - Home Depot	19.8	20.2	+	19.4	14.5	-	14.2	19.6	+
Home Depot - Gordon	24.4	24.4		24.9	24.9		25.1	25.1	
Gordon - Northern	23.3	18.5	-	25	25.6	+	20.3	25.3	+
Corridor	25.4	25.3	-	24.4	25.1	+	24.1	24.9	+

**Segment speed measures include +/- if applicable*

Intelligent Transportation Systems

ITS can provide a very high benefit to cost ratio. Table 58 provides the benefits reported by agencies in the United States which implemented the ITS alternatives presented in this report. Implementation of its techniques beyond the previously discussed signal optimization would yield greater common improvements beyond those shown in Table 54 through Table 57.

Table 58: Benefits from Arterial ITS improvements

ITS Technology	Benefits
Signal Coordination	Virginia: Coordinated Actuated traffic signal systems produced a 30 percent reduction in Corridor travel times compared to actuated isolated systems, resulting in benefit-cost ratio of 461:1
Signal Coordination	Pennsylvania: An optimized traffic signal timing project in Alleghany County, PA resulted in a benefit -cost ratio of 57:1 along the corridor
Traffic Management System	New Mexico: In Espana, New Mexico the implementation of a traffic management system on NM 68 provided a decrease in total crashes of 27.5 percent
Traffic Management System	Colorado: In the City of Fort Collins, Colorado, the installation of an advanced Traffic management System reduced travel times up to 36 percent.
Adaptive Signal Control	Colorado: Installation of adaptive signal control systems on two corridors in Colorado improved travel times by 9 to 19 percent, increased average speed by 7 to 22 percent and maintained or improved LOS at the studied intersections
Source: www.itsbenefits.its.dot.gov *US Department of Transportation, Research and Innovative Technology Administration (2013)*	

Initial Vehicular Capacity Improvements

The initial vehicular capacity improvement measures described in Section 4.2.1.3, which involve the addition of intersection right turn lanes on Stockton Hill Road, were also evaluated. However, these measures did not result in any improvement in segment LOS or speeds based on VISSIM modeling, indicating their limitation to improve vehicular circulation in the near term without other complimentary improvements. In this way, the addition of right turn lanes on Stockton Hill Road alone would not meet the immediate purpose and need of the corridor study. However, this conclusion is based on the initial concept of adding Stockton Hill Road turn lanes in isolation, without coordinated intersection improvements on cross street approaches. Therefore, this finding in no way conflicts with the micro-level intersection improvements described in Section 4.2.2 and shown evaluated in Section 5.2.1.2.

Table 59 provides a qualitative comparison of the various traffic operations improvement alternatives considered.

Table 59: Evaluation of Traffic Operations Alternatives

Criteria	Traffic Operations Alternatives				
	Signal Optimization	ITS: GPS/Interconnect	ITS: Central System	ITS: Adaptive System	Vehicular Capacity Improvements
Improvement Cost	$	$	$$	$$	$$$
ROW Impact	Good	Good	Good	Good	Fair
Funding Availability	Good	Good	Good	Good	Fair
Safety Impact	Good	Good	Good	Good	Good
Automobile Mobility	Good	Good	Good	Good	Fair
Pedestrian Mobility	Fair	N/A	N/A	N/A	Fair
Bicycle Mobility	Fair	N/A	N/A	N/A	Poor
Environmental Impact	Good	Fair	Fair	Fair	Fair
Visual Quality	N/A	N/A	N/A	N/A	Good

5.2.1.2 Micro-level Intersection Improvements

The geometric improvements to Airway Avenue discussed in Section 4.2.2 were evaluated based on criteria described in Section 5.1, as shown in Table 61. The improvement cost of each option was determined using planning-level estimates of the preliminary design concept. Major items associated with the work were estimated, including removal of existing sidewalk, pavement, and curbs, installation of new roadway pavement and median paving, curb and gutter, sidewalk, on-site drainage improvements, traffic control, right-of-way acquisition, and contingency. Impacts to underground items such as utilities and drainage facilities are unknown at this time and would require additional analyses to determine a more refined cost estimate of the improvements. Table 60 shows the assumed unit prices for the improvements, based on recent construction bid costs. These prices assumed 2013 costs and were not inflated to accommodate the costs in a particular year. The cost of right-of-way is extremely variable due to the changing economic conditions and changing land values. The assumed right-of-way cost was based on historic purchases in the region and is meant to be used as a comparison value only.

Table 60: Airway Avenue Improvement Estimate Unit Costs

Item	Unit	Unit Cost
Remove Signal Pole	EA	$20,000
Remove Sidewalk/Pavement	SF	$3
Remove Curb/Gutter	LF	$5
New Median Pavement	SF	$5
New Pavement	SF	$6
New Sidewalk	SF	$5
New Curb/Gutter	LF	$15
Site Grading	SF	$5
Signing/Striping	LF	$5
Relocate Catch Basin	EA	$3,000
Relocate Fire Hydrant	EA	$2,000
Relocate Power Pole	EA	$10,000
Traffic Control	-	25%
Contingency	-	10%
Design/Construction Engineering	-	10%
Right-of-way/Easement	SF	$2

Source: ADOT E2C2 Historical Price Index (Accessed July 2013)

Right-of-way impacts were evaluated based on the approximate acquisition area required to construct the improvements. Funding availability was evaluated by comparing the planning-level cost estimate of the improvement with funding sources available. The Airway Avenue geometric improvements are higher cost design solutions compared to other recommendations. However, each option could be implemented in phases if funding for the total project is not available.

The two options were also evaluated to determine the safety of automobiles and other road users such as bicyclists and pedestrians. If navigation would be impacted negatively, the item was rated "Poor." Also, using the FHWA safety evaluation tool for crash-reduction-factors (CRF) for implementing typical intersection improvements, the three options were evaluated on their ability to reduce crashes. If the CRF for the improvement type was a positive value, the item was rated "Good".

Automobile mobility for both options would increase with the implementation of improvements, as capacity is increased through the intersection. Mobility would benefit especially by providing raised medians, which allows for greater free-flow at the intersection approaches and focuses left-turning movements to only designated channelization locations.

Public feedback for the Airway Avenue Improvement options specifically has not been received. However, one can assume the expected mobility benefits to be well received, with the exception of the property impacts included as part of Option 1.

Table 61: Evaluation of Airway Avenue Intersection Options

Criteria	Airway Avenue Improvement Options	
	Option 1	Option 2
Improvement Cost	$$	$$
ROW Impact	Poor	Fair
Funding Availability	Fair	Fair
Safety Impact	Good	Good
Automobile Mobility	Good	Good
Pedestrian Mobility	Good	Good
Bicycle Mobility	Good	Good
Environmental Impact	Fair	Fair
Visual Quality	Fair	Fair
Public Acceptance	Fair	Good
City Support	Good	Good

5.2.1.3 Access Control

The access control solutions discussed in Section 2.4.2 were evaluated based on the criteria described in Section 5.1 and shown in Table 63. They are categorized into three areas: Driveway Closure/Combination, Parcel Thru Access, and Raised Median/Channelization. The solution methods were evaluated as a whole, not by specific location along the corridor.

The improvement cost was determined using planning-level estimates of a typical application. Since the cost for each location will vary depending on surrounding factors, an average cost of the typical application was used. Table 62 shows the assumed unit prices for these improvements, based on recent construction bid costs.

Table 62: Access Control Estimate Unit Costs

Item	Unit	Unit Cost
Remove Sidewalk/Driveway	SF	$3
Remove Curb/Gutter	LF	$5
Remove Pavement	SF	$3
New Pavement	SF	$6
New Sidewalk	SF	$5
New Curb/Gutter	LF	$15
Site Grading	SF	$5
Traffic Control	-	25%
Contingency	-	10%
Design/Construction Engineering	-	10%
Right-of-way/Easement	SF	$2

Source: ADOT E2C2 Historical Price Index (Accessed July 2013)

Right-of-way impacts were evaluated based on whether additional acquisition would be required, on average, or if an access permit/easement would be required to construct the improvements.

Funding availability was evaluated by comparing the planning-level cost estimate of the improvement with funding sources available for that improvement. The driveway, parcel thru-access, and median improvements are lower-cost measures that can be implemented for minimal cost.

The three alternatives were evaluated to determine the safety of automobiles and other road users such as bicyclists and pedestrians. If navigation would be impacted negatively, the item was rated "Poor." Also, using the FHWA safety evaluation tool for crash-reduction-factors (CRF) for implementing typical countermeasures, the three alternatives were evaluated on their ability to reduce crashes at their respective locations along the corridor. If the CRF for the improvement was a positive value, the item was rated "Good".

Automobile mobility for all three access control solutions would be increased with implementation of these improvements along the Stockton Hill Road corridor. Reduction in the overall number of driveways along the corridor will reduce the amount of side friction experienced by the thru traffic movement on Stockton Hill Road. Providing raised medians allows for greater free-flow along the corridor and focuses left-turning movements to only designated channelization locations or at signalized intersections.

Public feedback received regarding driveway closure or consolidation and raised medians has been generally favorable. Feedback concerning parcel through access has been mixed, as some stakeholders showed concern with the required coordination between property owners. Discussions with City of Kingman staff have indicated some level of support for all three access control solutions. However, additional feedback will be collected at the next public meeting and incorporated into the final report.

Table 63: Evaluation of Access Control Solutions Alternative

Criteria	Access Control Solutions Alternative		
	Driveway Closure/Combination	Parcel Thru Access	Raised Medians / Channelization
Improvement Cost	$	$$	$$
ROW Impact	Good	Poor	Good
Funding Availability	Good	Poor	Good
Safety Impact	Good	Good	Good
Automobile Mobility	Good	Good	Good
Pedestrian Mobility	Good	Good	Good
Bicycle Mobility	Good	Good	Good
Environmental Impact	Fair	Fair	Good
Visual Quality	Fair	Fair	Fair
Public Acceptance	Good	Fair	Good
City Support	Good	Good	Good

5.2.1.4 Beverly Intersection Improvements

The evaluation of the Beverly Avenue intersection alternatives is shown in Table 65.

The improvement cost was determined using planning-level estimates prepared for each alternative. Major items associated with the work were estimated. These items include; roadway reconstruction, drainage provisions, design/construction engineering, right-of-way acquisition and contingency. Familiar items under roadway reconstruction include pavement, curb and gutter, sidewalk, and earthwork. Other items under roadway construction include traffic elements such as striping, lighting and traffic control.

Table 64 shows the assumed unit prices for the Beverly Avenue alternatives, based on recent construction bid costs. These prices were not inflated to accommodate the costs in a particular construction year. The cost of right-of-way is extremely variable due to the changing economic conditions and changing land values. The assumed right-of-way cost was based on historic purchases in the region and is meant to be used as a comparison value only.

Table 64: Beverly Avenue Alternatives Estimate Unit Costs

Item	Unit	Unit Cost
Remove Traffic Signal	EA	$5,000
Remove Sidewalk & Pavement	SF	$3
Remove Curb/Gutter	LF	$5
New Pavement	SF	$6
New Median Pavement	SF	$5
New Sidewalk	SF	$5
New Curb/Gutter	LF	$15
Site Grading	SF	$5
New Traffic Appurtenances	LF	$5
Traffic Control	-	25%
Contingency	-	10%
Design/Construction Engineering	-	10%
Right-of-way/Easement	SF	$2

Source: ADOT E2C2 Historical Price Index (Accessed July 2013)

Right-of-way impacts were evaluated based on whether additional acquisition would be required, or if an access permit/easement would be required to construct the improvements.

Funding availability was evaluated by comparing the planning-level cost estimate of the improvement with funding sources available for that improvement. The Beverly alternatives are solutions that are implemented at a higher cost.

The two alternatives were evaluated to determine the safety of automobiles and other road users such as bicyclists and pedestrians, as they would navigate the proposed alternatives. If navigation would be impacted negatively, the item was rated “Poor.” Also, using the FHWA safety evaluation tool for crash-reduction-factors (CRF) for implementing typical countermeasures, the two alternatives were evaluated on their ability to reduce crashes at the Beverly Avenue/Stockton Hill Road intersection. If the CRF for the intersection improvement was a positive value, the item was rated “Good”.

Automobile mobility for both Beverly alternatives would be increased with implementation of these concepts. Both alternatives would allow all movements at the Beverly Avenue/Stockton Hill Road intersection.

Public feedback received regarding both alternatives has been mixed, with different opinions on which option would be most successful. Ongoing discussions with the TAC have indicated some initial support for the elongated roundabout, which is also the preferred option of the regional ADOT district office.

Table 65: Evaluation of Beverly Avenue Improvements

Criteria	Beverly Avenue Improvements	
	Elongated Roundabout	J-Hook
Improvement Cost	$$$	$$
ROW Impact	Poor	Fair
Funding Availability	Poor	Fair
Safety Impact	Fair	Good
Automobile Mobility	Good	Good
Pedestrian Mobility	Poor	Fair
Bicycle Mobility	Poor	Fair
Environmental Impact	Fair	Fair
Visual Quality	Fair	Fair
Public Acceptance	Fair	Fair
City Support	Good	Fair

Source: ADOT E2C2 Historical Price Index

5.2.1.5 Non-motorized Improvements

The specific projects included in the non-motorized improvements of sidewalks, bicycle facilities, and midblock crossings are detailed in Section 4.2.5, and were screened against the evaluation criteria detailed in Section 5.1. The evaluation considered all improvements included in each approach. The evaluation results are shown in Table 67.

Improvement costs were determined using planning-level estimates on a per mile basis for the addition of sidewalks and bicycle facilities. Table 66 shows an estimated range of costs for each improvement, based on comparable improvements included in the *Kingman Area Transportation Study (2011).* Given the variability in the range of values associated with each improvement, costs were not inflated to represent construction year dollars.

Table 66: Non-motorized Improvements Estimate Costs

Item	Unit	Cost
Sidewalk Addition	Per mile	$250k-$500k
Bicycle Facility Addition	Per mile	$100k-$500k

Source: Kingman Area Transportation Study (KATS) 2011

The impact on ROW for sidewalk and bicycle lane additions was determined to be substantial, as both would most likely require additional ROW, while the upgrading of an existing wide curb lane and addition of midblock crossing would not require additional ROW. It was also determined that there would be a fair likelihood of funding availability for all strategies.

Sidewalk additions and midblock crossings could be expected to have a positive impact on pedestrian mobility and only limited effect on bicycle and automobile mobility. The bicycle facilities would have a similar impact on mobility, benefitting bicyclists greatly with only a limited impact on automobiles and pedestrians. All improvements would also have moderate environmental and visual quality impacts.

In terms of public acceptance and City support, it is assumed the sidewalk additions and midblock crossing would be generally supported by both City representatives and the public. Bicycle facility additions could be more difficult, as public feedback received has not represented the same level of support compared to the other approaches.

Table 67: Evaluation of Non-motorized Improvements

Criteria	Non-motorized Improvements			
	Sidewalk Addition	Bicycle Lane Addition	Upgrade wide curb lane	Midblock Crossing
Improvement Cost	$$	$$$	$	$
ROW Impact	Poor	Poor	Good	Good
Funding Availability	Fair	Fair	Fair	Fair
Safety Impact	Good	Good	Good	Good
Automobile Mobility	Fair	Fair	Fair	Fair
Pedestrian Mobility	Good	Fair	Fair	Good
Bicycle Mobility	Fair	Good	Good	Fair
Environmental Impact	Fair	Fair	Fair	Fair
Visual Quality	Fair	Fair	Fair	Fair
Public Acceptance	Good	Fair	Fair	Good
City Support	Good	Fair	Fair	Good

5.2.2 Development Framework Alternatives

The following section describes the evaluation of the Development Framework Alternatives discussed in Section 4.3, including Development Policy, Street Network Policy, and Multimodal Policy.

5.2.2.1 Development Policy

The specific strategies included in the development policy alternative, discussed in Section 4.3.1, were evaluated independently using the criteria in Section 5.1. Table 68 and Table 69 show the evaluation results of the Zoning Ordinance and Development Review strategies, respectively.

<u>Zoning Ordinance</u>

Frontage requirements, corner lot sizes, and outparcel access were determined to result in positive safety and mobility impacts due to their potential to reduce conflicts and improve circulation, while setback requirements would be expected to have little to no effect on the same factors. Overall visual quality would be expected to improve after the adoption of frontage and setback requirements, however corner lot sizes and outparcel access would have a neutral impact.

Table 68: Evaluation of Development Policy Alternatives – Zoning Ordinance

Criteria	Development Policy Alternatives: Zoning Ordinance			
	Frontage Requirements	Setback Requirements	Corner Lot Sizes	Outparcel Access
Improvement Cost	N/A	N/A	N/A	N/A
ROW Impact	N/A	N/A	N/A	N/A
Funding Availability	N/A	N/A	N/A	N/A
Safety Impact	Good	Fair	Good	Good
Automobile Mobility	Good	Fair	Good	Good
Pedestrian Mobility	Good	Fair	Good	Good
Bicycle Mobility	Good	Fair	Good	Good
Environmental Impact	N/A	N/A	N/A	N/A
Visual Quality	Good	Good	Fair	Fair
Public Acceptance	Good	Good	Good	Good
City Support	Fair	Fair	Fair	Fair

<u>Development Review</u>

Optimized access design, shared access, and shared parking were also determined to result in improved safety and mobility due to conflict reduction and better circulation. Landscape buffers, on the other hand, would be expected to have a positive impact on safety, but little to no effect on mobility.

Table 69: Evaluation of Development Policy Alternatives – Development Review

Criteria	Development Policy Alternatives: Development Review			
	Optimized Access Design	Shared Access	Shared Parking	Landscape Buffers
Improvement Cost	N/A	N/A	N/A	N/A
ROW Impact	N/A	N/A	N/A	N/A
Funding Availability	N/A	N/A	N/A	N/A
Safety Impact	Good	Good	Good	Good
Automobile Mobility	Good	Good	Good	Fair
Pedestrian Mobility	Good	Good	Good	Fair
Bicycle Mobility	Good	Good	Good	Fair
Environmental Impact	N/A	N/A	N/A	N/A
Visual Quality	Good	Good	Good	Good
Public Acceptance	Good	Good	Good	Good
City Support	Fair	Fair	Fair	Fair

All the included alternatives were determined to be generally accepted by the public, as they would result in improved access and ease of movement over the long term. This was based on input gleaned from stakeholder interviews and public meetings. The same alternatives scored as “fair” in terms of City support. This was a preliminary determination based on the reality that the results may be generally supported by City staff and officials, but that implementation could be complicated.

Improvement cost, ROW impact, funding availability, and environmental impact were determined to be not applicable. Each included strategy would be implemented as a City code amendment or as City staff functions without the costs, impacts, or funding needs associated with infrastructure based improvements.

5.2.2.2 Transportation Network

The two strategies included in the transportation network alternative are detailed in Section 4.3.2. These include targeting new commercial developments on secondary or “backage roads” as opposed to Stockton Hill Road itself, as well as completing the street grid within the corridor which would require some new road construction and parcel reassembly. Evaluation results are shown in Table 70.

The targeting of new developments away from Stockton Hill Road would be expected to disperse traffic throughout the corridor and decrease conflicts along the main thoroughfare, resulting in positive safety and mobility impacts for all modes. The strategy was also determined to have only moderate environmental and visual quality impacts from the resulting new construction on vacant lots. Based on feedback received, it is assumed this strategy would also be generally accepted by the public.

Targeting new developments away from Stockton Hill Road would be implemented as an internal City function without the costs or impacts associated with new infrastructure. Therefore, improvement cost, ROW impact, and funding availability were deemed not applicable to the strategy. However, the strategy could further complicate the development review process, thus receiving only a “fair” score in terms of City support.

Completing the street grid within the corridor could prove more difficult in terms of the improvement cost, ROW impact, and environmental impact of new construction, with only a fair likelihood of available funding. Also, although the fully realized network would benefit safety and mobility for all modes, implementation resulting in some parcel reassembly and increased traffic on roads closer to residential areas would not be expected to have substantial support from the public or City representatives.

Table 70: Evaluation of Transportation Network Alternatives

Criteria	Transportation Network Alternatives	
	Targeting New Developments	Completing Street Grid (Streets & Parcel Reassembly)
Improvement Cost	N/A	$$$
ROW Impact	N/A	Poor
Funding Availability	N/A	Fair
Safety Impact	Good	Good
Automobile Mobility	Good	Good
Pedestrian Mobility	Good	Good
Bicycle Mobility	Good	Good
Environmental Impact	Fair	Poor
Visual Quality	Fair	Good
Public Acceptance	Good	Poor
City Support	Fair	Poor

5.2.2.3 Multimodal policy

The evaluation of the multimodal policy alternatives is shown in Table 71.

Each included multimodal element would involve a visioning process and development of a strategic policy by corridor stakeholders without actual construction or installation, therefore improvement cost, ROW impact, and funding availability were considered not applicable.

Sidewalk, bicycle lane, and midblock crossing policies were determined to have a positive impact on safety for all modes, while bicycle parking specifically would be expected to have little to no effect. A sidewalk policy would benefit the mobility for all travel modes, while a bicycle lane policy and bicycle parking policy would substantially benefit bicycle mobility with only minimal effects on automobile or pedestrian mobility. A midblock crossing policy would be similar in that it would greatly benefit pedestrians, with only moderate impacts on automobiles or cyclists.

All the included policies were also considered beneficial in terms of environmental impact and visual quality, as well as generally acceptable by the public and City based on feedback received.

Table 71: Evaluation of Transportation Network Alternatives

Criteria	Multimodal Policy Alternatives				
	Sidewalk Policy	Bicycle Lane Policy	Bicycle Parking Policy	Midblock Crossing Policy	Transit Amenity Policy
Improvement Cost	N/A	N/A	N/A	N/A	N/A
ROW Impact	N/A	N/A	N/A	N/A	N/A
Funding Availability	N/A	N/A	N/A	N/A	N/A
Safety Impact	Good	Good	Fair	Good	Good
Automobile Mobility	Fair	Fair	Fair	fair	fair
Pedestrian Mobility	Good	Fair	Fair	Good	Good
Bicycle Mobility	Good	Good	Good	Fair	Good
Environmental Impact	Good	Good	Good	Good	Good
Visual Quality	Good	Good	Good	Good	Good
Public Acceptance	Good	Good	Good	Good	Good
City Support	Good	Good	Good	Good	Good

6.0 IMPLEMENTATION STRATEGY

The previous sections have presented a number of approaches for improving the mobility and development framework of the Stockton Hill Road corridor, with specific strategies documented and evaluated in Section 5.0. Based on the evaluation elements of each approach were selected as optimal improvement projects and policy recommendations for the corridor.

This section identifies and prioritizes corridor recommendations for implementation. Each set of recommendations has been grouped into near term, mid term, and long term actions, representing time frames of 5, 10, and 15 years. These recommendations are explained in Sections 6.1 through 6.8 and summarized in Table 72 and Table 73. In addition, location specific near term and mid term recommendations are displayed where possible in Figure 62 and Figure 63.

6.1 Traffic Operations

Concerning the traffic operations approaches discussed in Section 4.2.1, it is recommended that near term traffic operation improvements focus on optimizing traffic signal timing. After initial optimization, next steps would include verifying the operational effectiveness of existing signal control hardware, and the installation of an interconnect system for maintaining signal coordination. Mid term actions would focus on the development and implementation of an ITS system to address any limitations of signal prioritization, including developing performance measurement metrics to analyze data from the central system. A longer term goal would be to design and construct a traffic management center to better manage operations throughout Kingman.

6.2 Airway Avenue Intersection Improvements

Immediate recommendations for the Airway Avenue and Stockton Hill Road intersection are to select a preferred design concept from among the improvement options discussed in Section 4.2.2, begin the processes of identifying funding sources and stakeholder coordination, and begin preliminary design. In the mid term, it is recommended that plans are finalized, and the actual development of the preferred improvement be carried out, including preparing the environmental document, final design, and construction. Maintenance and monitoring of the project would take place in the long term.

6.3 Access Control

The initial recommended action regarding access control is the development of a comprehensive access control plan for the corridor, which would coincide with improvements of driveway locations with the most immediate need and benefit for the lowest cost (locations 4, 5, 12, 13 and 14 discussed in Section 4.2.3). Property owner coordination would be required for all through access improvements, which is a process that would also have to begin during the near term, followed by the planning and improvement of through access locations 3, 6, and 9, as well as median locations 1, 2, and 11. Tasks most appropriate for the mid term timeframe are the improvement of driveway locations 7 and 15, as well as through access locations 8 and 10. All recommended access improvements would require maintenance and monitoring over the long term.

6.4 Beverly Avenue Intersection Improvements

Immediate recommendations for the Beverly Avenue and Stockton Hill Road intersection are to conduct a more detailed feasibility study of the elongated roundabout design concept, as well as to begin the processes of identifying funding sources and stakeholder coordination. In the mid term, it is recommended that the actual development of the preferred improvement be carried out, including the preparation of the environmental document, final design, and construction. Maintenance and monitoring of the project would take place in the long term.

6.5 Non-motorized Improvements

Recommended near term actions for corridor non-motorized improvements include continuing with the programmed bicycle and pedestrian improvements on Gordon Drive, planning and constructing a midblock pedestrian crossing at KRMC, and evaluating of the feasibility of upgrading the Stockton Hill Road wide curb lane to a marked bicycle lane for improved bicycle mobility and safety. Other near term recommendations are to begin to identify and secure funding sources for other non-motorized improvements, and to begin property owner coordination. It is also recommended to begin to develop a network of pedestrian and bicycle facilities in the near term by finalizing plans and constructing sidewalk improvements and bicycle lanes on Western Avenue and Glen Road while coordinating with other roadway improvements.

Mid term actions would involve continuing to develop the non--motorized network by planning and constructing sidewalk improvements on Airway Avenue, Sycamore Avenue, Beverly Avenue, and Burbank Street to address existing sidewalk gaps. This would be followed by the planning and construction of bicycle lanes on Burbank Street/ Fairgrounds Avenue, Harrison Street/ Willow Road, Sycamore Avenue, and Airway Avenue. All mid term improvements would also be coordinated with other roadway improvement projects. Maintenance and monitoring of the project would take place in the long term.

Table 72: Implementation Strategy for Mobility Alternatives

Improvement Approach	Implementation Strategy		
	Near Term Action	Mid Term Action	Long Term Action
Mobility Approaches			
Traffic Operations	1. Optimize traffic signal timing for the corridor 2. Verify operational effectiveness of existing signal control hardware 3. Install an Interconnect system for maintaining signal coordination	1. Develop and implement ITS system based to compliment limitations of signal optimization 2. Develop performance measurement metrics for Central System data 3. Evaluate need for capacity improvement after incorporating access control	1. Design and construct a traffic management center
Airway Avenue Intersection Improvements	1. Identify funding sources 2. Begin property owner coordination and preliminary design for preferred improvement option	1. Finalize plans for and implement preferred Airway improvement option	1. Maintain and monitor improvements
Access Control	1. Develop access control plan 2. Improve driveway locations 4, 5, 12, 13, and 14 3. Begin property owner coordination for all thru-access improvements 4. Finalize plans and improve thru-access locations 6, 9, and 3, and median locations 1, 2, and 11	1. Improve driveway locations 7 and 15 2. Finalize plans and improve thru-access locations 8 and10	1. Maintain and monitor improvements
Beverly Avenue Intersection	1. Conduct more detailed feasibility study 2. Identify funding sources 3. Begin stakeholder coordination	1. Prepare Environmental document 2. Design Improvements 3. Construct improvements	1. Maintain and monitor improvements
Non-motorized improvements	1. Continue with programmed improvements 2. Finalize plans and construct midblock crossing at KRMC 3. Evaluate feasibility of upgrading the Stockton Hill Road wide curb lane to bicycle lane 4. Identify and secure funding sources improvements 5. Begin property owner coordination 6. Finalize plans and construct sidewalk improvements and bicycle lanes on Western Avenue and Glen Road, coordinated with roadway improvements	1. Construct sidewalk improvements on Airway Avenue, Sycamore Avenue, Beverly Avenue, and Burbank Street / Fairgrounds Avenue, coordinated with roadway improvements 2. Finalize plans and construct bicycle lanes on Burbank Street/ Fairgrounds Avenue, Harrison Street/ Willow Road, Sycamore Avenue, and Airway Avenue, coordinated with roadway improvements	1. Maintain and monitor improvements

6.6 Development Policy

As with all recommendations associated with development framework approaches, the initial recommended action for City staff to conduct a visioning process with stakeholders to establish long term development goals for the corridor. Other recommended actions in the near term are for development review staff to emphasize and encourage optimized driveway location and access design, landscape buffers, and combined access and parking during the site plan review process. The establishment of a maximum parking requirement, and the development of corridor polices for desired building frontage and setback requirements, corner lot size minimums, and outparcel access would also be appropriate in the near term.

In the mid term City staff should work to amend the City of Kingman zoning ordinance to include new standards for lot size and access that were established as part of the previous development policy visioning process. Staff should also develop a shared parking and access incentive program to encourage adjacent property owners to better utilize facilities without affecting corridor mobility or visual quality. Over the long term it is recommended that the desired development goals and vision for the corridor are continually reviewed and updated. Specific standards and strategies to augment development policy are detailed in Section 4.3.1.

6.7 Street Network Policy

For street network policy development, a visioning process to establish goals is the primary recommendation. The targeting of new commercial developments within existing commercial zones on Western Avenue and Glen Road can also begin in the near term, as well as beginning outreach with existing property owners on the long term vision of the corridor network concept. A preliminary network concept is described in Section 4.3.2.

Recommended mid term actions include identifying priority parcels in need of reassembly based on the established network vision. In the long term, the network vision and goals should be continually reviewed and updated, and planning and constructing new collector streets take place where feasible, building towards a fully realized redundant street network.

6.8 Multimodal Policy

The initial recommended actions for multimodal policy are to conduct a visioning process to establish multimodal transportation goals for the corridor, followed by the development of specific corridor policies for midblock crossings, sidewalk improvements, bicycle lane improvements, and bicycle parking.

Recommendations most appropriate for mid term implementation include the prioritizing target locations and constructing midblock pedestrian crossings in the areas of most immediate need, as well as developing a policy requiring the inclusion of feasible bicycle and pedestrian facilities as part of future roadway projects. Over the

long term it is recommended that the desired development goals and vision for the corridor are continually reviewed and updated.

Table 73: Implementation Strategy for Development Framework Alternatives

Improvement Alternative	Implementation Strategy		
	Near Term Action	Mid Term Action	Long Term Action
Development Framework Approaches			
Development Policy	1. Conduct visioning process to establish long term development goals 2. Emphasize and encourage optimized driveway location and access design, landscape buffers, and combined access and parking during the development review process 3. Establish maximum parking requirement 4. Develop policies for desired frontage and setback requirements, corner lot sizes, and outparcel access 5. Utilize PUD zone to apply standards on a preliminary basis	1. Amend City of Kingman zoning ordinance to include new standards for lot size and access established during the visioning process 2. Develop shared parking and access incentive program	1. Continually review and update development vision and goals
Street Network Policy	1. Conduct visioning process to establish goals for corridor street network strategy 2. Targeting of commercial developments on Western Avenue and Glen Road during the development review process 3. Begin property owner coordination	1. Identify priority parcels in need of reassembly based on network vision	1. Review and update network vision and goals 2. Plan for and construct new collector streets where feasible to complete a fully realized redundant street network
Multimodal Policy	1. Conduct visioning process to establish multimodal transportation goals for the corridor 2. Develop corridor policies for midblock crossings, sidewalk improvements, bicycle lane improvements, and bicycle parking	1. Prioritize target areas for midblock crossings and construct crossings at problem locations 2. Implement policy of including bicycle and pedestrian facilities as part of future roadway projects within the corridor	1. Continually review and update multimodal vision and goals

Figure 62: Near Term Improvements

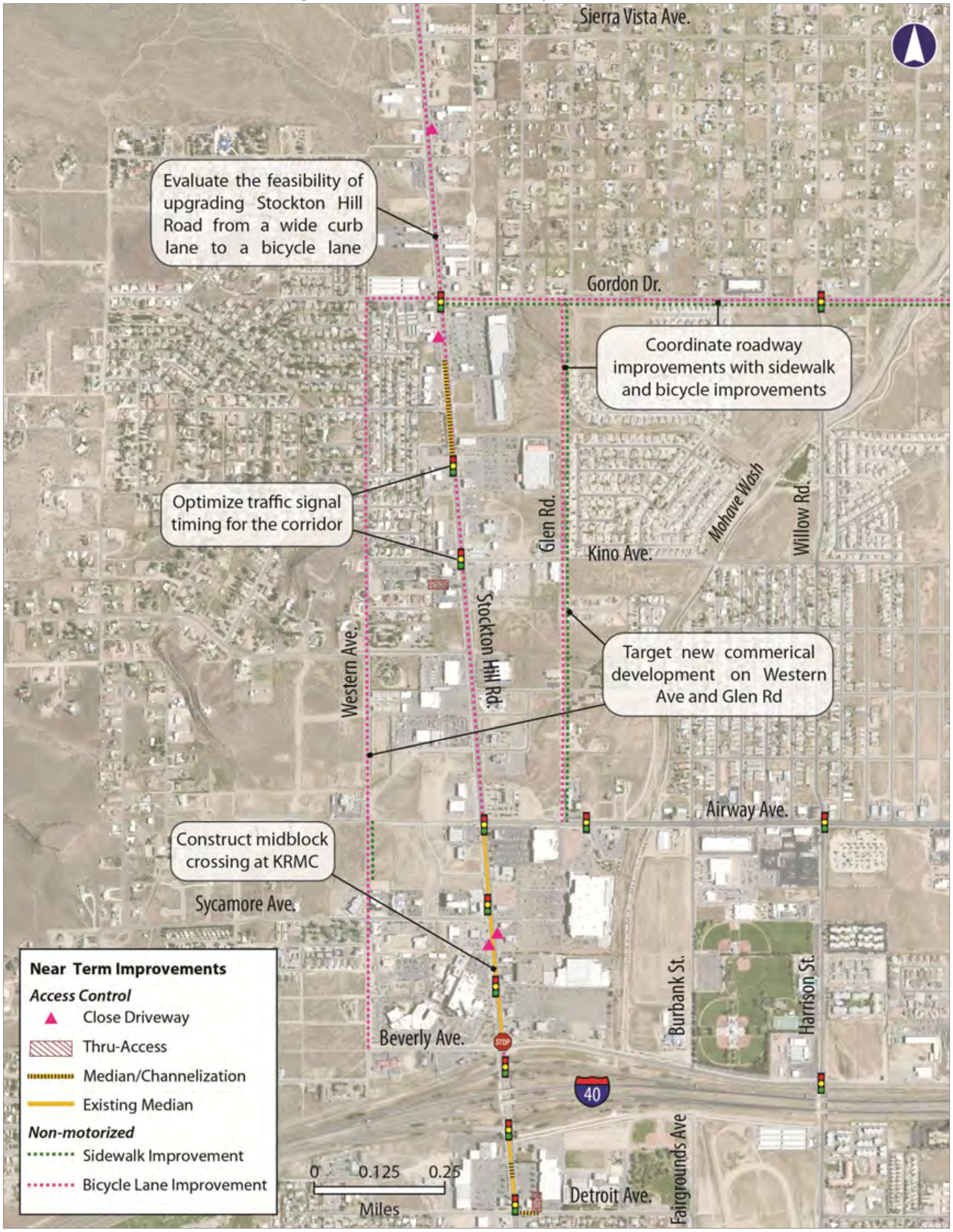


Figure 63: Mid Term Improvements

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