Old Town Peoria Traffic Study

Final Report

Prepared for:

CITY OF PEORIA

Prepared by:

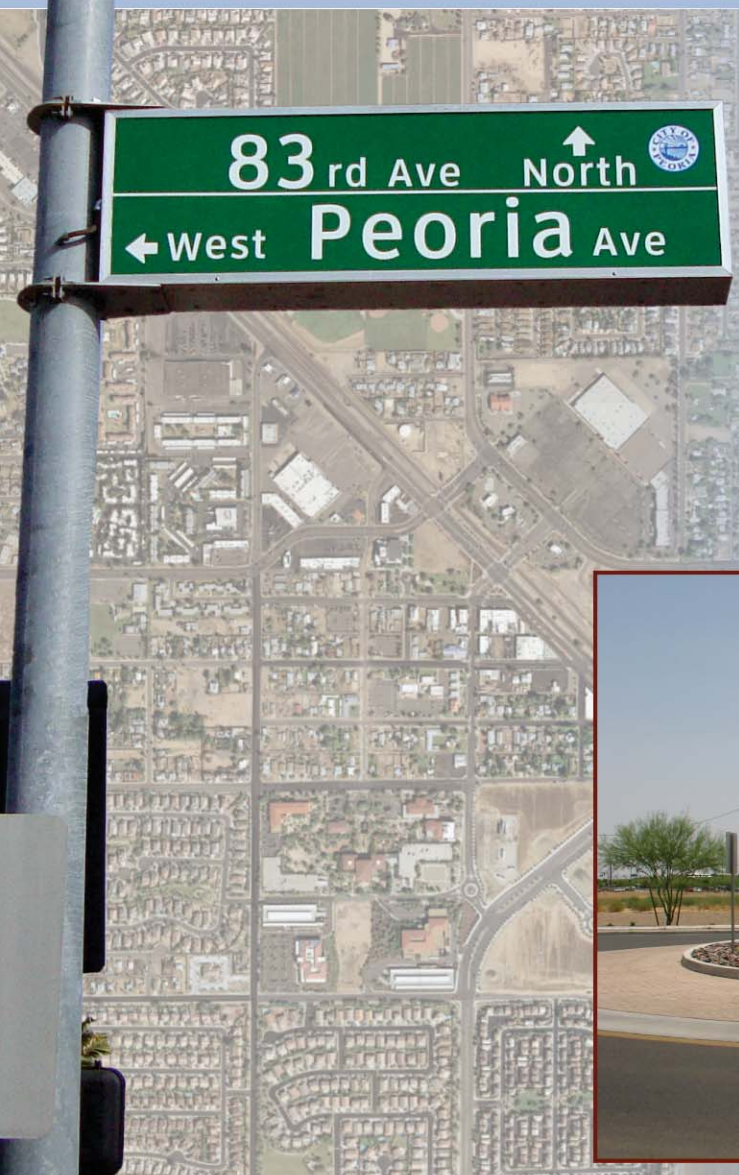
BURGESS & NIPLE
Engineers ■ Planners

In association with:

PMC

NELSON NYGAARD

December 2013



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Contract No.: ACON49711

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EXECUTIVE SUMMARY

The purpose of the City of Peoria Old Town Traffic Study is to develop and evaluate short-term and long-term transportation improvements that will assist the City of Peoria in implementing its vision for the Old Town area as set forth in the 2009 Old Town Peoria Revitalization Plan. This Study also incorporates the recommendations of the completed 2011 Peoria Multi-Modal Transportation Plan.

Through a series of City staff meetings, Technical Advisory Committee meetings, and a public meeting, input was received and direction was provided to the study team for the expectations and evaluations necessary for this Study. Ultimately, it was determined that a 20-year forecast evaluation would not be prudent at this time due to the economic uncertainty, but rather two scenarios should be evaluated for the 10-year forecast using the vision and land use assumptions as described in the OTPRP.

Scenario 1 Roadway network with 83rd Avenue **OPEN** between Grand Avenue and Peoria Avenue

Scenario 2 Roadway network with 83rd Avenue **CLOSED** between Grand Avenue and Peoria Avenue to all traffic, including transit services

Multimodal transportation recommendations were developed and then categorized as short-term (5-year) and long-term (10-year) that include the following:

Roadway – Includes right-in right-out intersection conversions, a new right-turn lane, new traffic signals and/or new roundabouts, and a new roadway connection.

Transit – Elements carried forward from the Peoria Multi-Modal Transportation Plan include a new transit center, relocated park-and-ride lot, new north-south transit route along 83rd Avenue, and improved bus stops. The new transit center and park-and-ride option recommended in the Peoria Multi-Modal Transportation Plan was based on transit only access along 83rd Avenue, between Grand Avenue and Peoria Avenue. Scenario 2 does not permit this connection, and input from City staff eliminated the other transit center options from the PMTP. A new transit center concept was drafted, and a detailed evaluation will need to be conducted.

Bicycle and Pedestrian – Includes new bike lanes, new sidewalks, two new pedestrian bridges, streetscape improvements, and pedestrian lighting.

Additional Improvements – Includes a new entry feature at Washington Street and 83rd Avenue, time limited parking, and undergrounding utilities.

1.0 INTRODUCTION

The Old Town Peoria Revitalization Plan (OTPRP), concluded in late 2009, provided a vision for Old Town's transformation into a vibrant, multimodal hub in the City of Peoria's (City) historic community core. The OTPRP lays the foundation for development changes that should take place to catalyze improvement in historic downtown and can infuse public and private investment. OTPRP's Action Plan calls out a list of short and long-term projects, and programs and policies that are necessary to achieve the community-based vision for this area. Among the action listed in the short-term plan is to execute a traffic study for the Old Town.

1.1 Scope of Work

The purpose of the Old Town Peoria Traffic Study (Study) is to develop and evaluate short and long-term transportation and parking improvements. This study will complement the OTPRP's goal to "strengthen Old Town's pedestrian, bicycle and transit-oriented characteristics while maintaining the appropriate vehicular access to Old Town destinations."

1.2 Study Area

The overall study area, shown in ***Figure 1***, is approximately 1.5 square miles bounded by Varney Road/Cholla Street to the north, Olive Avenue to the south, 87th Avenue to the west, and 79th Avenue to the east. The Focused Planning Area, identified in the OTPRP, is also shown in ***Figure 1***. As identified in the OTPRP, "this area represents the key Old Town business area and residential neighborhoods that will form the core of a redefined and integrated downtown setting."

Old Town is poised for development as an urban community. Existing development includes the City's municipal complex, the Peoria Center for Performing Arts, Peoria High School, Osuna Park, and various shopping and restaurants.

1.3 Vision, Goals and Objectives

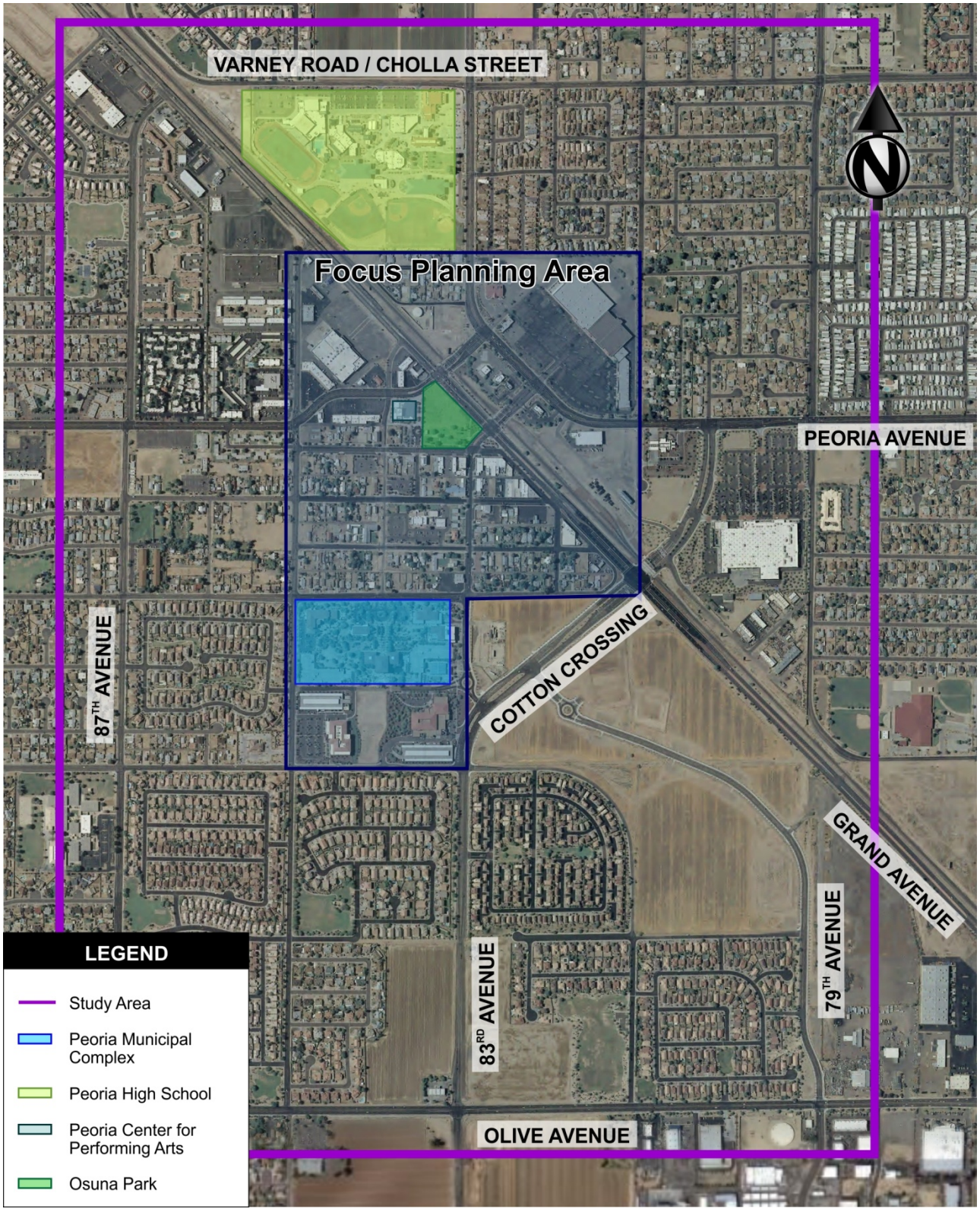
"Old Town is a uniquely identifiable area for Peoria that is economically healthy and vibrant, pedestrian-friendly, and brings investment, activity and life back into the historic core of the community."

This community vision was crystallized as part of an engaging public process for the OTPRP. A similar workshop with this Study's Technical Advisory Committee (TAC) was held on February 9, 2012. The TAC meeting was a collaboration of representatives from various departments within the City along with a Peoria Unified School District representative to brainstorm and establish the vision, goals and objectives for this Study.

Through a group exercise a Vision Statement was established:

> ***"A multimodal transportation network for the Old Town that is people-centric. The future system is safe, efficient & effective, and creates a vital business and residential environment."***

Figure 1
Study Area



2.0 STUDY PROCESS & OUTREACH

Along with building upon the foundation laid by prior efforts, including the OTPRP and the Peoria Multi-Modal Transportation Plan (PMTP), critical to the success of this Study is integrating the vision of the future of the City with input and guidance from City staff as well as from City residents and business owners. A series of City staff meetings, TAC meetings, and a public meeting were integrated into the Study process to discuss Study findings, obtain feedback, and solicit direction.

Kick-Off Meeting – November 15, 2011
An initial Kick-Off Meeting was held with City staff, Arizona Department of Transportation (ADOT) staff, and the consultant team to kick-off the Study. This meeting outlined the scope and schedule, as well as roles and responsibilities of all participants.

Modeling Workshop – November 15, 2011
A Modeling Workshop was held to establish the preferred methodology for forecasting for the future conditions. This workshop included City staff, Maricopa Association of Governments (MAG) staff, and the consultant team. Existing data included traffic counts, the City's TRAFFIX model, the City's Synchro model, and MAG's TransCAD model. Several modeling methods were discussed before determining the preferred methodology.

Technical Advisory Committee Meeting #1 – February 9, 2012
The TAC Meeting #1 was held to introduce the project team, and discuss past and present efforts, including the OTPRP and the PMTP. Through a workshop type format a vision statement for this Study was developed, and existing conditions and trends analysis were presented. As part of TAC Meeting #1, the consultant team gathered input and direction from the TAC with respect to formulating evaluation criteria (to be used to assist with determining the appropriateness and/or feasibility of future scenarios), developing modeling and trip generation assumptions, and identifying initial improvement concepts.

Technical Advisory Committee Meeting #2 – May 29, 2012
As a result of the input, feedback and discussion at TAC Meeting #1, a set of evaluation criteria was formed for vehicles, bicycling, pedestrians, public transportation and parking. This evaluation criteria was presented to the TAC for comment.

Additionally, prior to TAC Meeting #2, the OTPRP and PMTP strategies and recommendations were utilized to formulate improvement concepts. These improvement concepts were then "screened" by asking three questions:

1. Does it align with the Study vision?
2. Does it support the OTPRP and PMTP goals and objectives?
3. Is it feasible and within the focus of this Study?

A total of 18 feasible concepts were then logically packages into three Initial Scenarios (Scenarios A, B and C) that bundled sets of network options together for analysis, modeling and sensitivity analysis.

At this meeting the TAC was given an opportunity to provide input and comment on the three Initial Scenarios. Red and green stickers were passed out to each TAC member to place on the three

Scenario maps. The red stickers were placed next to concepts that were unfavorable, and the green stickers were placed next to concepts that were favorable. After all stickers were in place the TAC members shared their reasons behind their choices. This process resulted in valuable input and discussion.

Public Meeting – May 29, 2012

The public meeting was held in the evening to encourage City resident and business owner participation. The meeting introduced the project to the public. At the meeting a power point presentation ran in a continuous loop that:

- Explained the Study background, vision and purpose
- Described the activities and tasks completed to date including an existing conditions report, development of evaluation criteria, and concept screening of OTPRP and PMTP strategies and recommendations.
- Presented the Scenarios A, B and C
- Described the next steps effort for the Study

Residents and business owners were provided an opportunity to mark on the Scenario A, B and C maps; complete a comment card; and engage in conversation, ask questions and provide their inputs, reaction and feedback with City and consultant staff.

City Staff Meeting – December 19, 2012

On December 19, 2012, a City staff meeting was held as a result of the potential Burlington Northern Santa Fe (BNSF) required closure of 83rd Avenue between Grand Avenue and Peoria Avenue. The closure of this segment of roadway required revisitation of the recommended PMTP option. The preferred transit center and park-and-ride option were based on transit only access allowed along this segment of roadway. Based on input from City staff, the two other transit center options evaluated as part of the PMTP were eliminated from further evaluation. Therefore, a potential concept was drafted that took into account the potential roadway closure. A detailed evaluation of this concept will still need to be performed.

Potential Concept to Accommodate 83rd Avenue Closure between Grand Avenue and Peoria Avenue

Additionally, the land use projections as presented in the OTPRP were discussed. As a result of the economic downturn and more detailed consideration of the size and density of development presented in the OTPRP, the consultant team and City staff concluded that the initially assumed full build-out projections were ambitious; therefore, land use projections were revised to reflect a more realistic, but still optimistic development scenario.

While the study's original purpose was to evaluate the "full" vision expressed in the OTPRP, it was determined at this meeting that a shorter term, and more pragmatic approach would be needed to address the most pressing issues for the City. Ultimately the following approach was agreed upon:

- Maintain the Old Town Peoria Traffic Study Vision for the longer term (20+ years)
- Continue to build upon the foundation of the OTPRP and PMTP
- Reduce land use projections with guidance from the City's Economic Development Group
- Focus the remaining study effort on determining 5 to10-year capital improvement needs based on the revised land use assumptions.
- Explore the two roadway network scenarios:

Scenario 1 Roadway network with 83rd Avenue **OPEN** between Grand Avenue and Peoria Avenue

Scenario 2 Roadway network with 83rd Avenue **CLOSED** between Grand Avenue and Peoria Avenue to all traffic, including transit services

3.0 EXISTING CONDITIONS

This section summarizes the analysis of existing transportation conditions in the study area. The analysis includes operations and conditions related to the multimodal transportation system (vehicles, pedestrians, bicyclists, and transit), and serves as a base comparison for improvement concepts.

3.1 Existing Roadway System

The June 2, 2011 Amendment to the Peoria General Plan (PGP Amendment) identifies five functional categories used to classify roadways. This includes freeway, arterial, collector, local and rural roadways. The following are the definitions of the various roadway classifications found within the study area:

An ***arterial*** is a roadway that is of regional importance and is intended to serve high volumes of traffic traveling relatively long distances. It is intended to primarily serve through traffic and is access controlled.

A ***collector*** is a roadway that provides for traffic movement between arterials and local streets and carries moderate traffic volumes over moderate distances.

A ***local*** roadway is intended to provide access to abutting properties, tends to accommodate lower traffic volumes, serves short trips, and provides connection to collector streets.

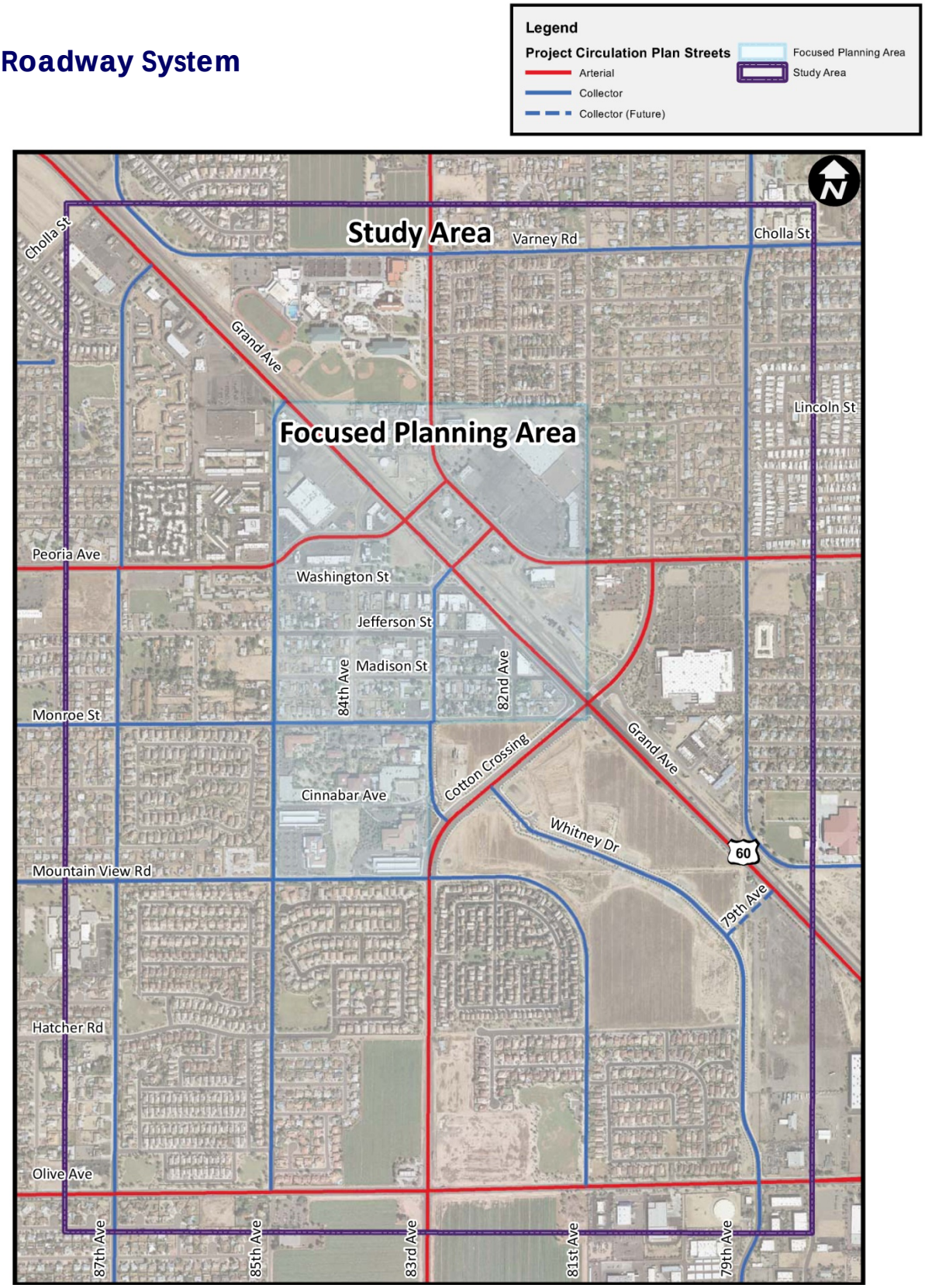
The 2011 PGP Amendment identifies five arterials within the study area, also shown in ***Figure 2***:

- **Grand Avenue (US 60)** current exists with three through lanes in each direction and runs northwest/ southeast through the study area. A raised median controls access on Grand Avenue in the study area and turn lanes exist at major intersections. Outside the study area, Grand Avenue extends from Wickenburg to downtown Phoenix. The posted speed limit on Grand Avenue is 45 mph, with the exception of the segment between 87th Avenue and Cotton Crossing which has a posted speed limit of 35 mph. A Burlington Northern-Santa Fe (BNSF) rail corridor runs along the north side of Grand Avenue and creates vehicular/train crossings in close proximity to intersections along Grand Avenue, including Peoria Avenue, 83rd Avenue, and Cotton Crossing.

- **Peoria Avenue** currently has two through lanes in each direction and runs east/west through the study area. This roadway has a center two-way left turn lane for its length, which becomes an exclusive left turn lane at major intersections. Outside the study area, Peoria Avenue extends from the White Tank Mountains to just east of I-17 in Phoenix.

- **Olive Avenue** currently has two through lanes in each direction and runs east/west through the study area. This roadway has a center two-way left turn lane for its length, which becomes an exclusive left turn lane at major intersections. Outside the study area Olive Avenue extends from the White Tank Mountains to 43rd Avenue where it becomes Dunlap Avenue extending in to Phoenix.

Figure 2
Existing Roadway System



- **83rd Avenue** between Olive Avenue and Mountain View Road runs north/south currently providing one lane in each direction at the southern end and widening to provide two through lanes in each direction with a center two-way left turn lane. This 5-lane cross-section picks up again at Peoria Avenue and continues to the north.

- **Cotton Crossing** is a recently constructed arterial within the City rerouting 83rd Avenue, which runs north/south, from Mountain View Road to Peoria Avenue with a major intersection at Grand Avenue. This roadway currently has three northbound through lanes and two southbound through lanes with turn lanes at major intersections.

The Classification Map identifies eight collectors within the study area, also shown in:

- **Varney Road/Cholla Street** currently consists of a through lane for each direction of travel and runs east/west. A center two-way left turn lane, bike lanes, and westbound on-street parallel parking is provided between 83rd Avenue and 79th Avenue.

- **Monroe Street** between 87th Avenue and 83rd Avenue runs east/west with one lane for each direction of travel. Turn lanes are provided at 85th Avenue, 84th Avenue and 83rd Avenue. In the original 2010 Peoria General Plan it was classified as a local street and with the 2011 Amendment was changed to a collector street as it provides access for business and multi-family properties along its frontage.

- **Mountain View Road** runs east/west and currently provides one lane for each direction of travel. From 87th Avenue to 85th Avenue, on-street parking is provided. From 85th Avenue to Cotton Crossing/83rd Avenue bike lanes and a center two-way left turn lane is provided. Just east of Cotton Crossing, Mountain View Road curves south and becomes a north/south road with no pavement markings.

- **87th Avenue** runs north/south, and currently has one lane for each direction of travel with a center two-way left turn lane. Bike lanes are provided just south of Peoria Avenue to Olive Avenue.

- **85th Avenue** runs north/south between Olive Avenue and Grand Avenue and currently has one lane for each direction of travel with a center two-way left turn lane. Bike lanes are provided from Olive Avenue to Peoria Avenue. In the original 2010 Peoria General Plan it was classified as a local street and with the 2011 Amendment was changed to a collector street as it provides access for business and multi-family properties along its frontage.

- **83rd Avenue** between Cotton Crossing and Grand Avenue runs north/south and currently provides one lane for each direction of travel. From Cotton Crossing to Monroe Street, bike lanes and a center two-way left turn lane is provided. From Monroe Street to Washington Street, angled on-street parking is provided.

- **79st Avenue/Whitney Drive** runs north/south from Olive Avenue to Cotton Crossing. One lane is provided for each direction of travel along with bike lanes and a center two-way left turn lane.

- **79st Avenue** north of Grand Avenue runs north/south, currently providing one lane in each direction of travel, bike lanes, a center two-way left turn lane, and on-street parallel parking from Varney Road/Cholla Street to Peoria Avenue. The roadway then narrows from Peoria Avenue then turns east/west and becomes Mountain View Road to the east providing one lane in each direction of travel.

The June 2, 2011 Amendment to the Peoria General Plan also adds a proposed future 79th Avenue collector between Whitney Drive and Grand Avenue. The roadway is planned to have a right-in and right-out intersection with Grand Avenue in the future.

There are also key *local roadways* within the study area. **Washington Street, Jefferson Street, Madison Street, Cinnabar Avenue, 84th Avenue** and **82nd Avenue** create a grid of local two-lane streets in the heart of the Focused Planning Area. Most of these roadways serve a variety of land uses, have no pavement markings, and include on-street parking.

3.2 Existing Bikeway System

Locations where there are signed and marked bikes lanes are graphically shown in ***Figure 3***. Segments of roadway with wide shoulders that could be utilized by a bicyclist are also presented. There are no off-street multi-use path facilities within the study area.

3.3 Existing Pedestrian System

Except for some missing sections of sidewalks, the majority of the street system in the study area is served by continuous sidewalks, as shown in ***Figure 4***. Pedestrian circulation challenges do exist due to the heavy traffic volumes on Grand Avenue and Peoria Avenue, and the required crossing distances. Additionally, most sidewalks in the City are located at the back of curb with no distance or barrier to the adjacent vehicle travel lane.

3.4 Existing Transit System

The City is located near the northwestern edges of Valley Metro's service area. The City operates a Dial-a-Ride service for elderly and disabled residents. At the present time, the only major transit facility in the City is the Peoria Park and Ride, which is located in Old Town. This facility consists of two lots (East and West) that are located in Old Town on 84th Avenue between Jefferson Street and Washington Street. These lots, which offer free parking, provide a total of 74 spaces, and are served by Valley Metro's route Grand Avenue Limited.

Currently, two Valley Metro routes provide service within the City, Route 106 Peoria/Cactus and Grand Avenue Limited. Both of these routes provide service to Old Town and are illustrated in ***Figure 5***. Route 106 Peoria/Cactus service operates seven days per week and runs approximately every 30 minutes on all days (with a few exceptions where short service gaps exist). The Grand Avenue Limited route provides weekday peak period commuter service to and from downtown Phoenix.

Figure 3
Existing Bike Facility

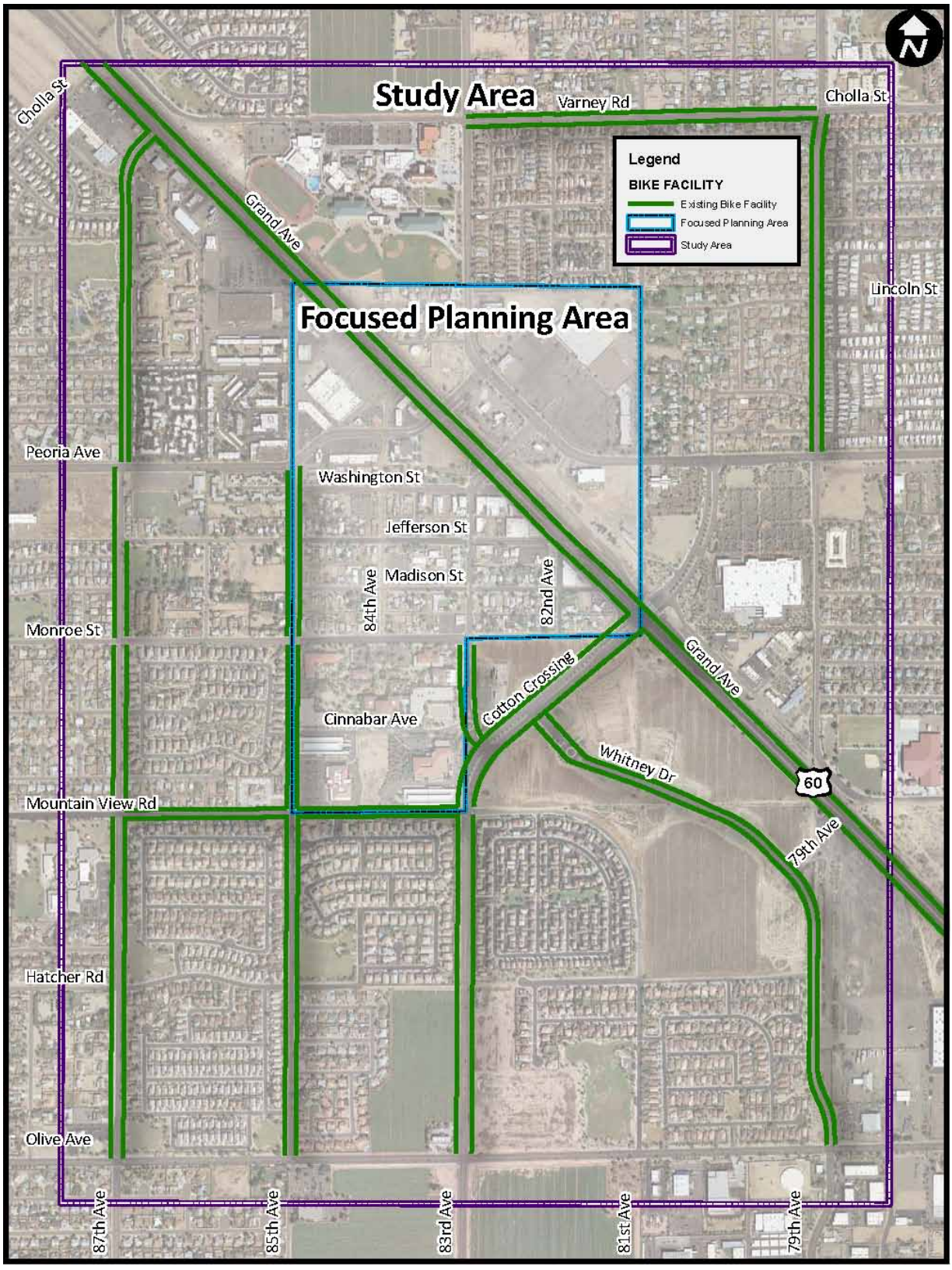


Figure 4
Existing Sidewalks

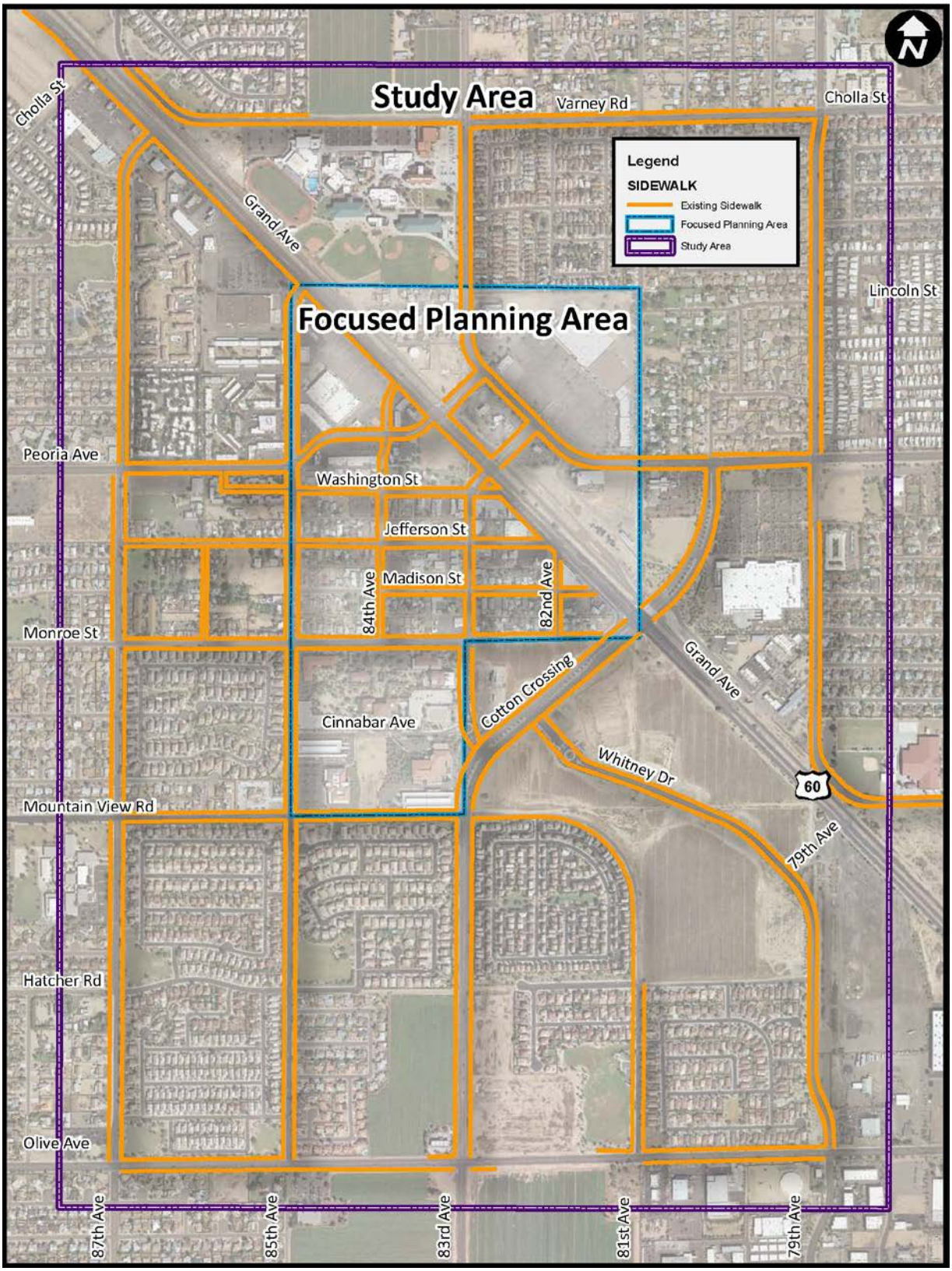
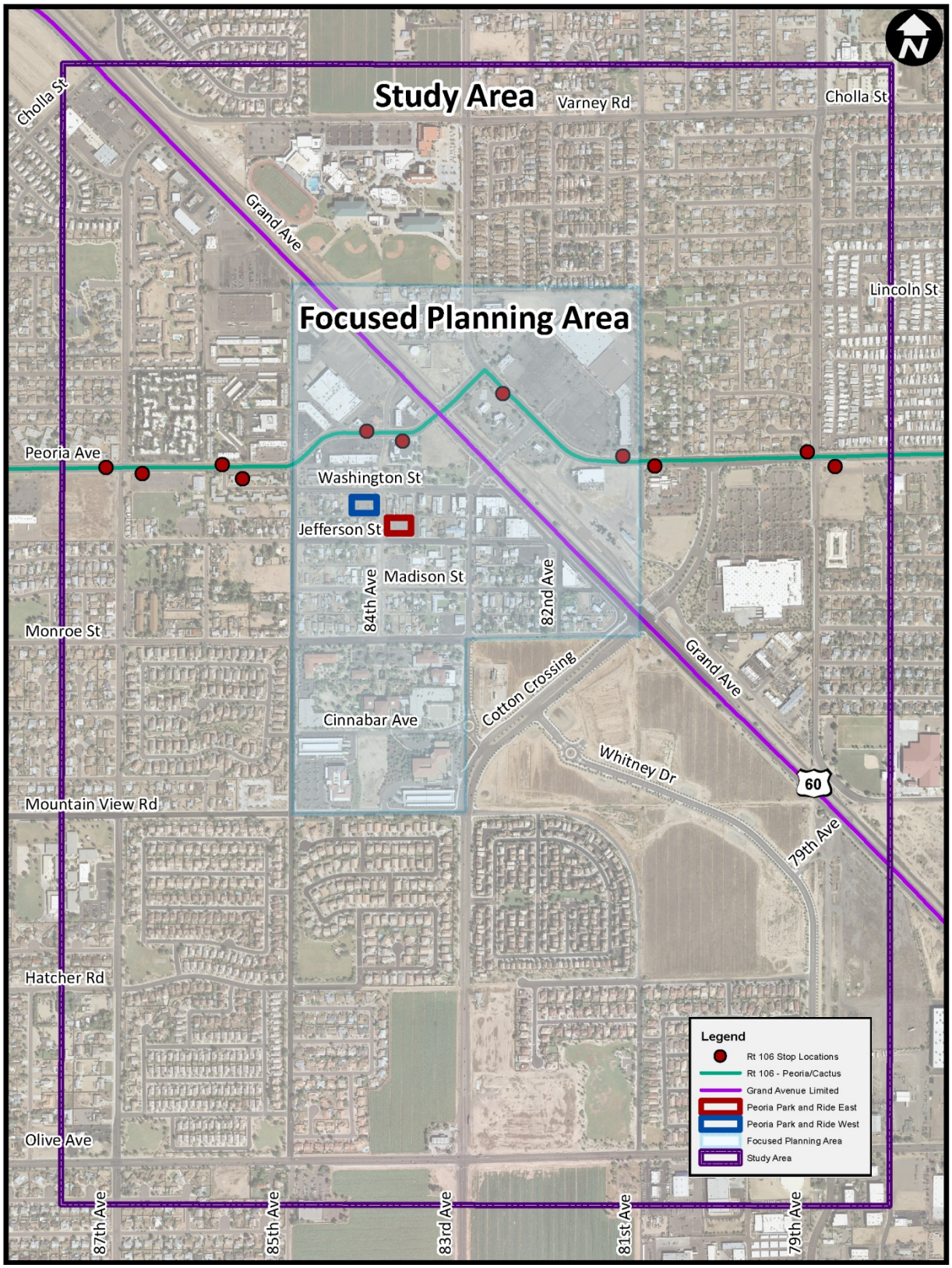


Figure 5
Existing Transit System



3.5 Existing On-Street Parking

Figure 6 illustrates the location of existing on-street parking within the study area. A significant number of on-street spaces are present on many of the lower volume and lower speed streets south of Peoria Avenue and Grand Avenue in the heart of the Old Town. Most on-street parking is parallel parking, but some areas of head-in angle parking exist on Washington Street, Jefferson Street, 84th Avenue and 83rd Avenue.

3.6 Crash Analysis

Table 1 and ***Figure 7*** show the number of crashes, severity, and most frequent crash type at each of the study intersections from 2009-2011 (from City records). Of the 221 crashes, 67 involved an injury. The most frequent crash type was rear end crashes, which are typically caused by congestion, and accounted for 34% of the total crashes. ***Table 1*** also includes the crash rate for each intersection.

TABLE 1 – CRASH ANALYSIS

Intersection	Total Crashes	Injury Crashes	Most Frequent Crash Type	Crash Rate (crashes per million entering vehicles)
Grand Avenue & 87TH Avenue	11	5	Angle	0.32
Grand Avenue & 85TH Avenue	15	4	Rear End	0.44
Grand Avenue & Peoria Avenue	25	7	Rear End & Angle	0.48
Grand Avenue & 83rd Avenue	18	10	Rear End	0.50
Cholla St & 83rd Avenue	2	0	Angle	0.11
Peoria Avenue & 87th Avenue	24	13	Rear End	1.11
Peoria Avenue & 85th Avenue	18	4	Rear End	0.81
Peoria Avenue & 83rd Avenue	53	10	Sideswipe	1.08
Peoria Avenue & 83rd Avenue Connector				
Peoria Avenue & Cotton Crossing	2	0	Sideswipe & Left Turn	0.09
Peoria Avenue & 79th Avenue	9	1	Rear End & Left Turn	0.39
Monroe St & 87th Avenue	1	0	Sideswipe	0.28
Mountain View Rd & Cotton Crossing	1	0	Single Vehicle	0.11
Olive Avenue & 87th Avenue	11	2	Rear End	0.31
Olive Avenue & 83rd Avenue	31	11	Rear End	0.75

Crash rates at the intersections of Peoria Avenue and 87th Avenue, and Peoria Avenue and 83rd Avenue are slightly above what would be considered average for urban intersections. The locations with the highest percentage of injury crashes are the intersections of Peoria Avenue and 87th Avenue, and Grand Avenue and 83rd Avenue.

Figure 6
Existing On-Street Parking

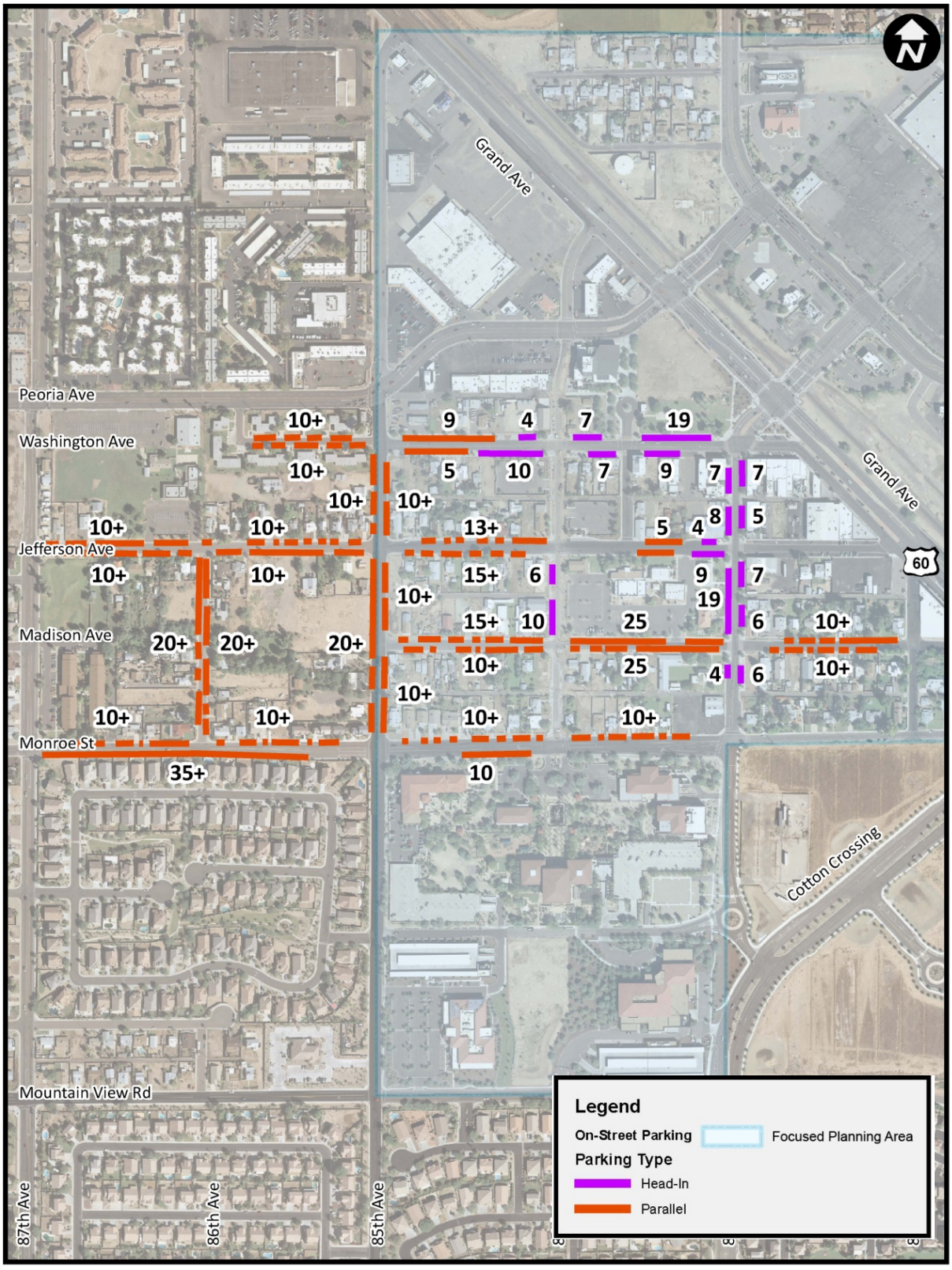


Figure 7
Study Area Crashes

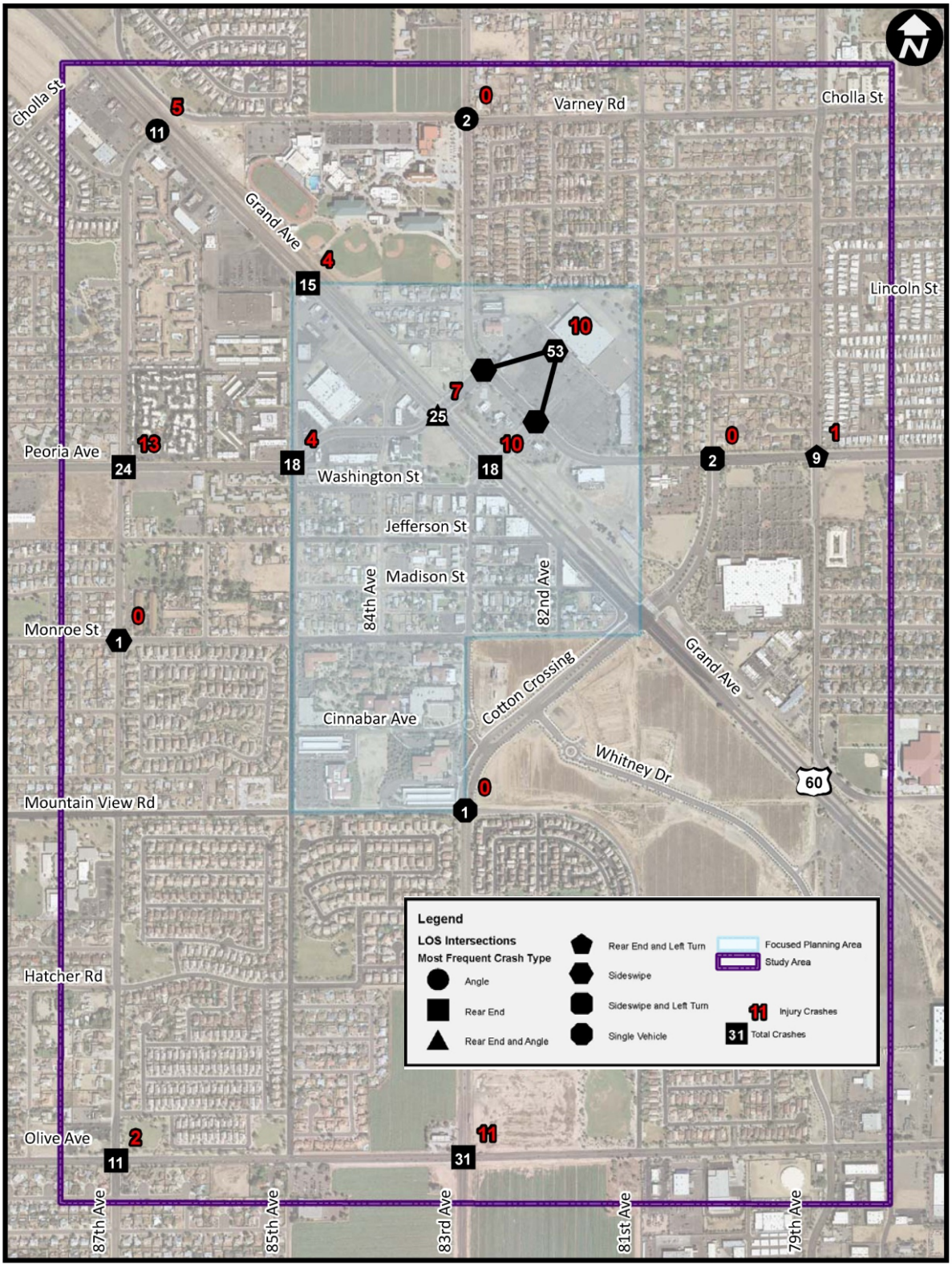


Table 2 shows the number of bicycle and pedestrian related crashes at each of the study intersections from 2009-2011.

TABLE 2 – BICYCLE AND PEDESTRIAN CRASHES		
Intersection	**Bicycle Crashes**	**Pedestrian Crashes**
Grand Avenue & 87th Avenue		1
Grand Avenue & Peoria Avenue	1	
Peoria Avenue & 87th Avenue	1	1
Peoria Avenue & 85th Avenue	1	
Peoria Avenue & 83rd Avenue	4	
Peoria Avenue & 79th Avenue	1	
Mountain View Rd & 87th Avenue		1
Olive Avenue & 83rd Avenue	1	

Detailed crash data can be found in ***Appendix A***.

3.7 Existing Level of Service Analysis

To establish the state of current multimodal traffic service conditions in the study area, a series of analyses were undertaken. The capacity analyses were conducted for existing AM and PM peak hours at intersections and along roadway segments within the study area. Analyses for the non-vehicular modes (pedestrian, bicycle, and transit) were performed for the intersections and roadway segments within the Focused Planning Area only. All traffic volumes used were derived from counts taken in 2010 or 2011 (see ***Appendix B***), and the analysis methods used were in accordance with the recently published *2010 Highway Capacity Manual*, which includes methodologies for multimodal level of service (LOS) analysis. Detailed existing level of service capacity analysis information is provided in ***Appendix C***. Detailed existing level of service capacity analysis with optimized signal timing information is provided in ***Appendix D***.

3.7.1 Existing Vehicular LOS Analysis

Two types of vehicular LOS analyses were performed: 1) intersection LOS analysis, and 2) roadway segment LOS analysis. Level of Service (LOS) is the measurement used to assess how well a transportation facility operates, with a LOS A representing the best operation, to a LOS F representing the worst operation.

Intersection LOS Analysis

The intersection LOS analysis for was performed using the *Synchro* software, which incorporates the methods of the *Highway Capacity Manual (HCM)*. A base *Synchro* model, which included current signal timings, was provided by the City. Traffic volumes provided in the model were updated with the 2010 and 2011 counts and signal green times were optimized for updated volumes keeping the existing signal phasing and cycle lengths as included in the City's *Synchro* model.

Segment LOS Analysis

Analysis for each roadway segment was also performed using *HCM* methods to determine a segment LOS. The segment LOS is impacted by both the downstream intersection volume-to-

capacity ratio, and an estimated travel speed along a segment as a percentage of the base free-flow speed (the speed traffic would naturally want to travel) for that segment. The analysis is based on several factors including segment speed limit, median type, number of access points, segment length, vehicular volume, number of through lanes, and traffic control type and delay at the adjacent intersections

Vehicular LOS capacity analysis for both the intersection and the roadway segments using existing signal timing are illustrated in ***Figure 8*** and ***Figure 9*** for the AM and PM peak hours, respectively. During the AM peak hour all of the intersections operate at a LOS C or better with the exception of the intersection of Cholla Street and 83rd Avenue, and Grand Avenue and 85th Avenue, which were shown to operate at a LOS F and E, respectively. During the PM peak hour all of the intersections operate at a LOS C or better. An important distinction to note is that the intersection LOS (from *Synchro*) is based on an overall average of traffic on all approaches, so an intersection can be shown to operate well overall, but a specific approach or movement can be performing poorly, which can result in a poor segment LOS.

For both AM and PM peak hours, a number of roadway segments were shown to operate at a LOS E or F. The performance of the downstream intersection approach, specifically the delay of the through movement drastically affects the segment LOS.

A PM peak hour LOS capacity analysis with optimized signal timings are illustrated in ***Figure 10***. This optimized analysis was conducted to provide better comparison with future scenarios. This version incorporates signal timing and peak hour factors identical to the future analyses. This optimized analysis shows the PM peak hour with all intersections operating at a LOS C or better and three segments of roadway operating at a LOS E or F. This includes 87th Avenue from Grand Avenue to Peoria Avenue, 87th Avenue from Peoria Avenue to Monroe Street, and 79th Avenue from Hatcher Road to Olive Avenue.

3.7.2 Existing Pedestrian LOS Analysis

Pedestrian LOS analysis was performed in the Focused Planning Area. The methodology for pedestrian LOS is more qualitative than the methodology for vehicular LOS. It is based on the perception of the user with respect to the quality of service at an intersection or along a segment of roadway based on their travel experience. Factors that affect the quality of service for pedestrians are listed below:

- Vehicular turning movement flows – permitted left and right turn on-red
- Vehicular travel speed
- Walkway and crosswalk widths
- Crosswalk lengths
- Pedestrian signal heads at intersections
- Pedestrian and vehicular volumes
- Signal phasing and cycle lengths
- Crossing wait times
- Proximity of pedestrian way to travel lane and existence of a barrier

Figure 8
Existing AM Peak Hour
Vehicular Level of Service

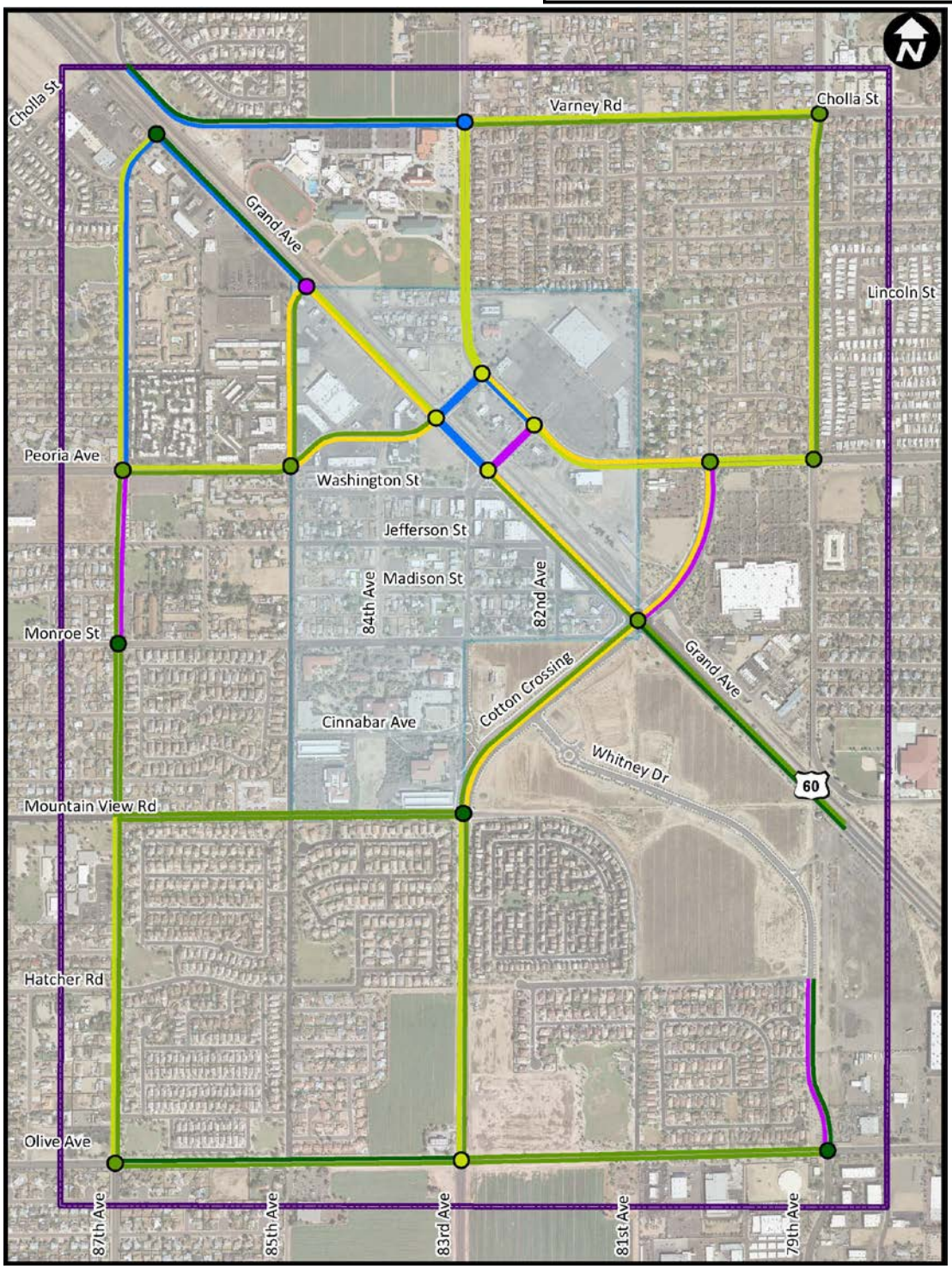


Figure 9
Existing PM Peak Hour
Vehicular Level of Service

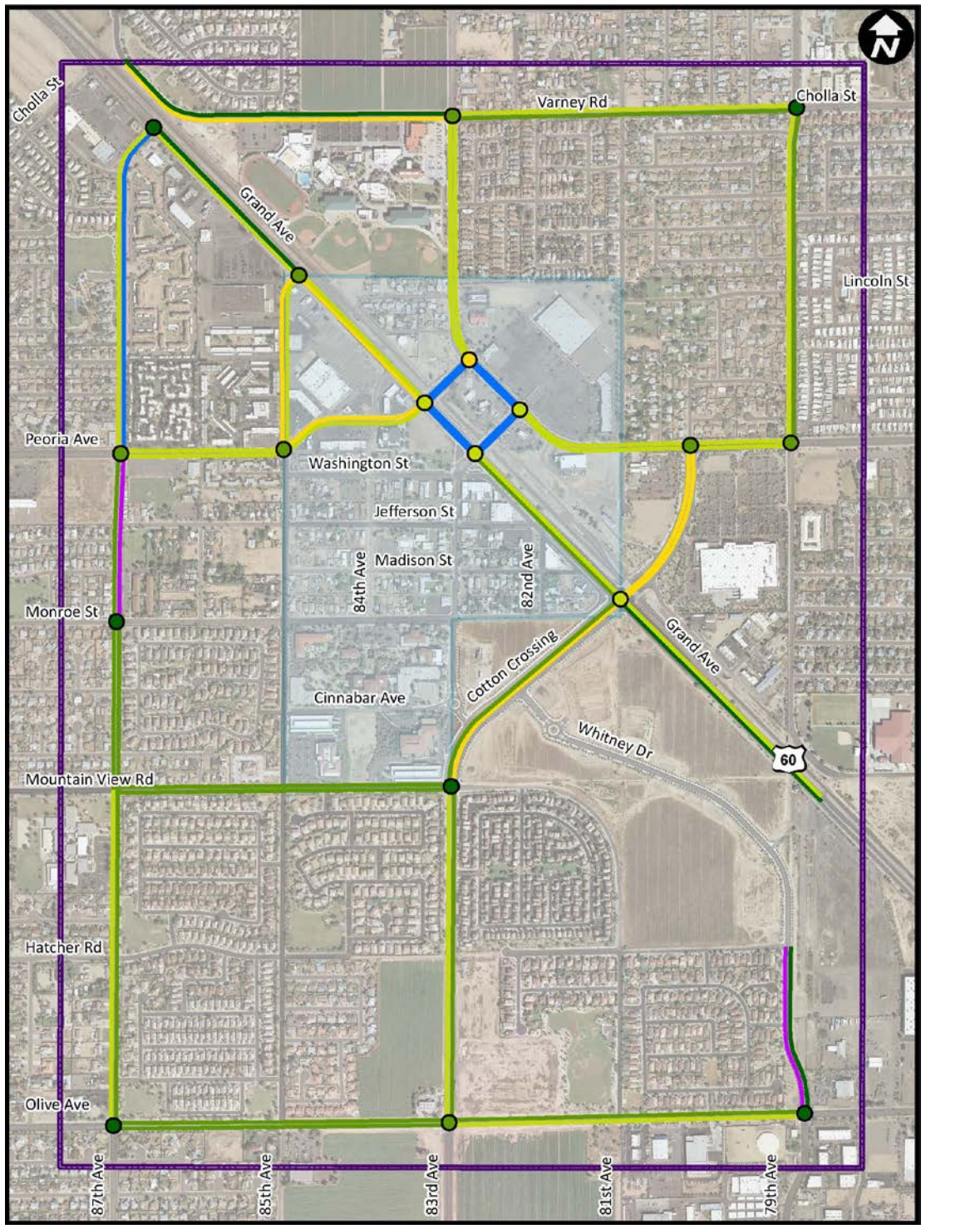


Figure 10
Existing PM Peak Hour Optimized Signals
Vehicular Level of Service

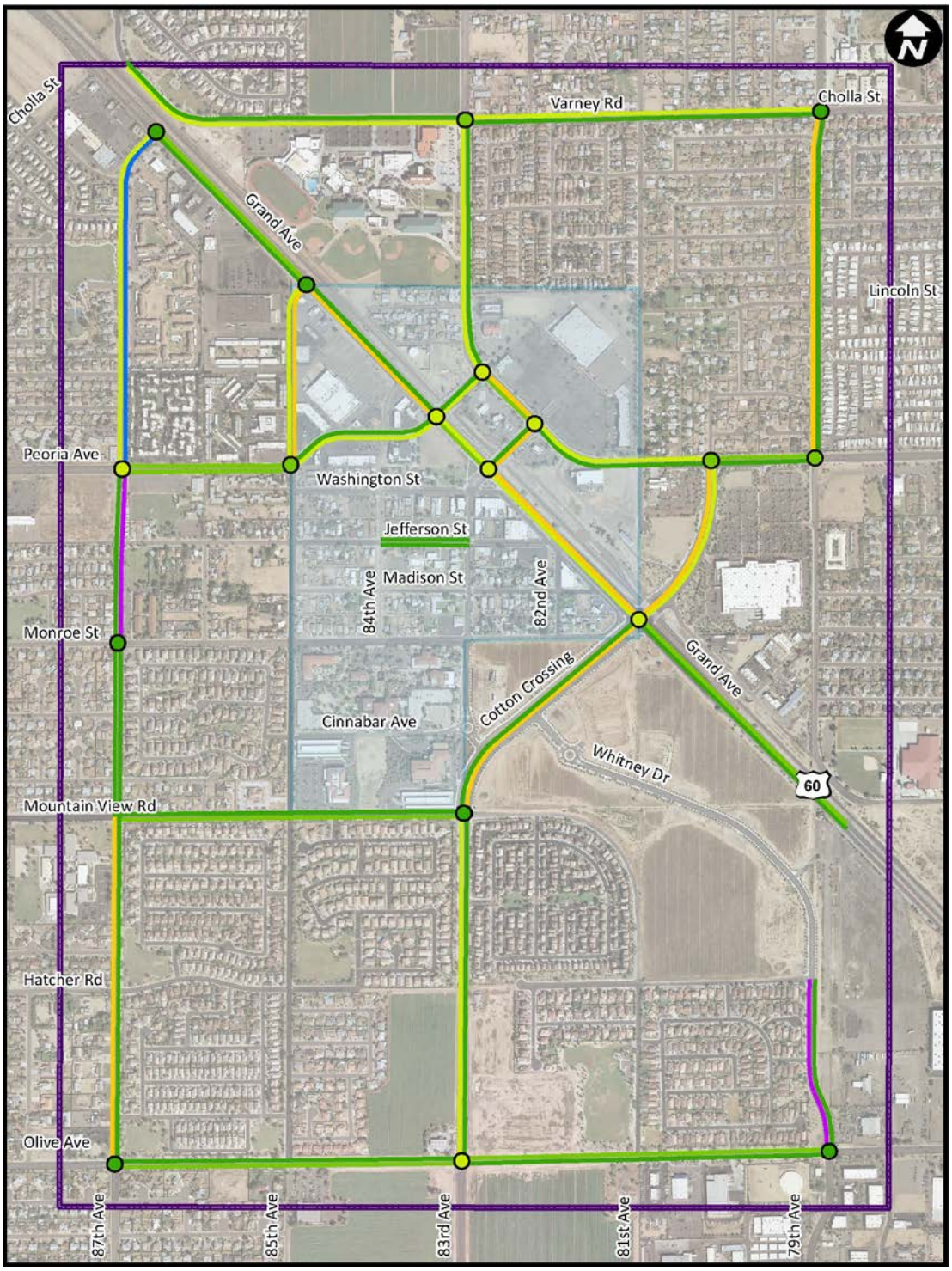


Figure 11 and ***Figure 12*** illustrate the results of the pedestrian AM and PM peak hour LOS capacity analysis. The analysis is limited to just a few intersections and street segments due to limited available data. Key factors influencing the pedestrian LOS include:

- Long wait times for pedestrians to cross intersections.
- Lack of a space and/or barrier between the sidewalk and the vehicle lanes. Most of the sidewalks are located at the back of curb in the study area
- Vehicle speeds adjacent to the pedestrian way
- High vehicular volumes in the subject direction
- Long intersection crossing distances

LOS B was calculated along a section of Mountain View Road. The key differences that lead to the better pedestrian LOS on this roadway segment are:

- Stop-controlled instead of signalized (less delay)
- Bike lane provides a greater buffer distance between the vehicles and pedestrians
- Sidewalk is located beyond the back of curb for most of the roadway segment

3.7.3 Existing Bicycle LOS Analysis

Bicycle LOS capacity analysis was performed in the Focused Planning Area. The methodology for bicycle LOS is based on the perception of the user on the quality of service at an intersection or along a section based on their travel experience. Factors that affect the quality of service for bicycles are listed below:

- Vehicular turning movement flows – permitted left and right-on-red
- Vehicular travel speed
- Presence of on-street parking or bike lanes
- Cross street, outside through lane, and shoulder widths
- Signalized intersection delay
- Pavement condition
- Access management along sections

Figure 13 and ***Figure 14*** illustrate the results of the bicycle AM and PM peak hour LOS capacity analysis. The analysis is limited to just a few intersections and street segments due to limited available data. Several intersections and roadway segments were found to operate at LOS D and E. Some specific factors that influence this include:

- Signal delay times to cyclists at intersections
- Number of access points along the corridor. The conflicts created by numerous driveways affect the speed and comfort of cycling.
- No extra (greater than 12 feet) width of the outside through lane and/or dedicated bike lane
- High volume and speed of adjacent vehicular traffic

The best bicycle LOS of the segments analyzed was on Mountain View Road (LOS C), where bike lanes are provided along with pavement in good condition, few access points, and stop-controlled intersections rather than signalized intersections.

Figure 11
Existing AM Peak Hour
Pedestrian Level of Service

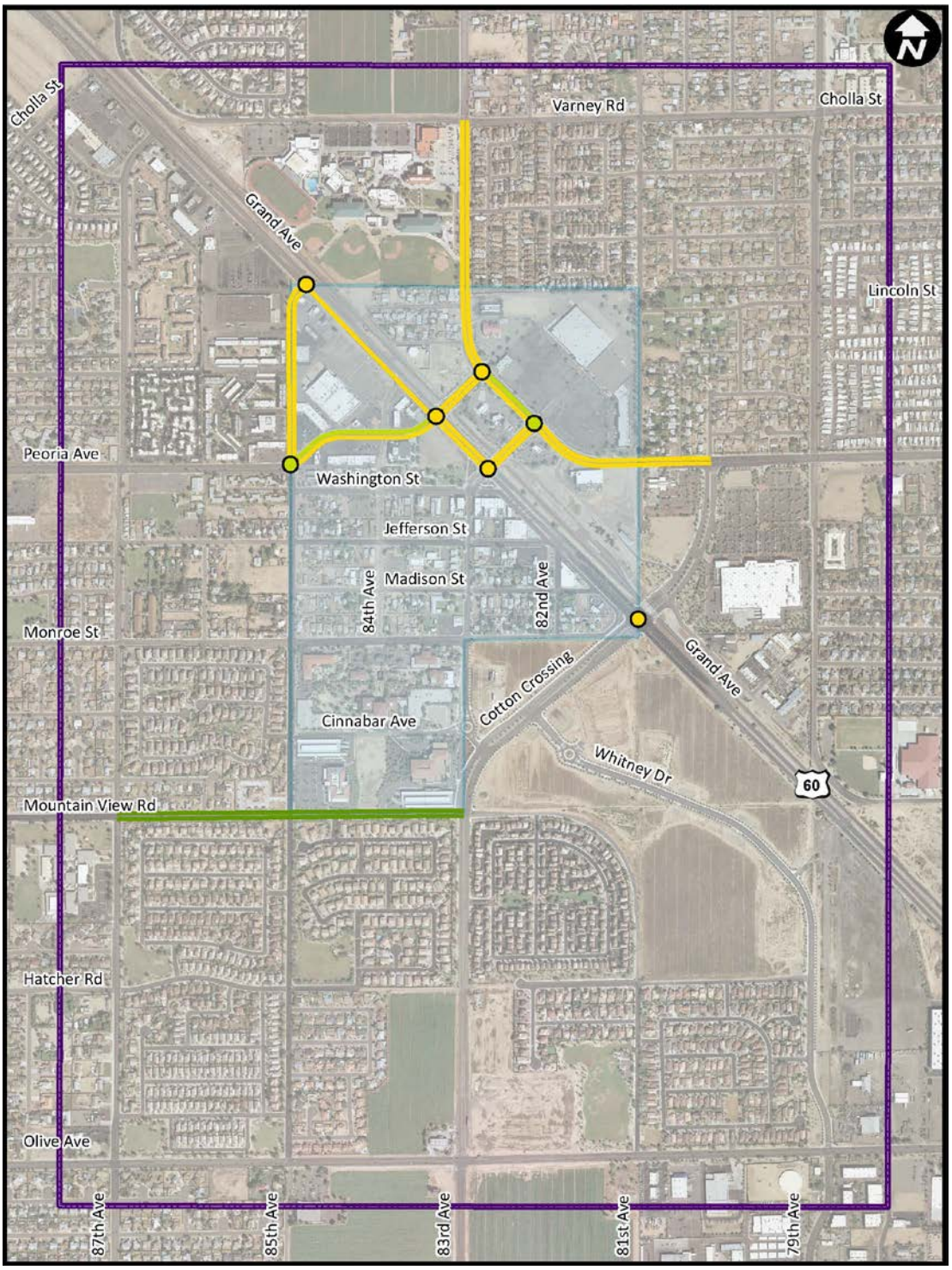


Figure 12
Existing PM Peak Hour
Pedestrian Level of Service

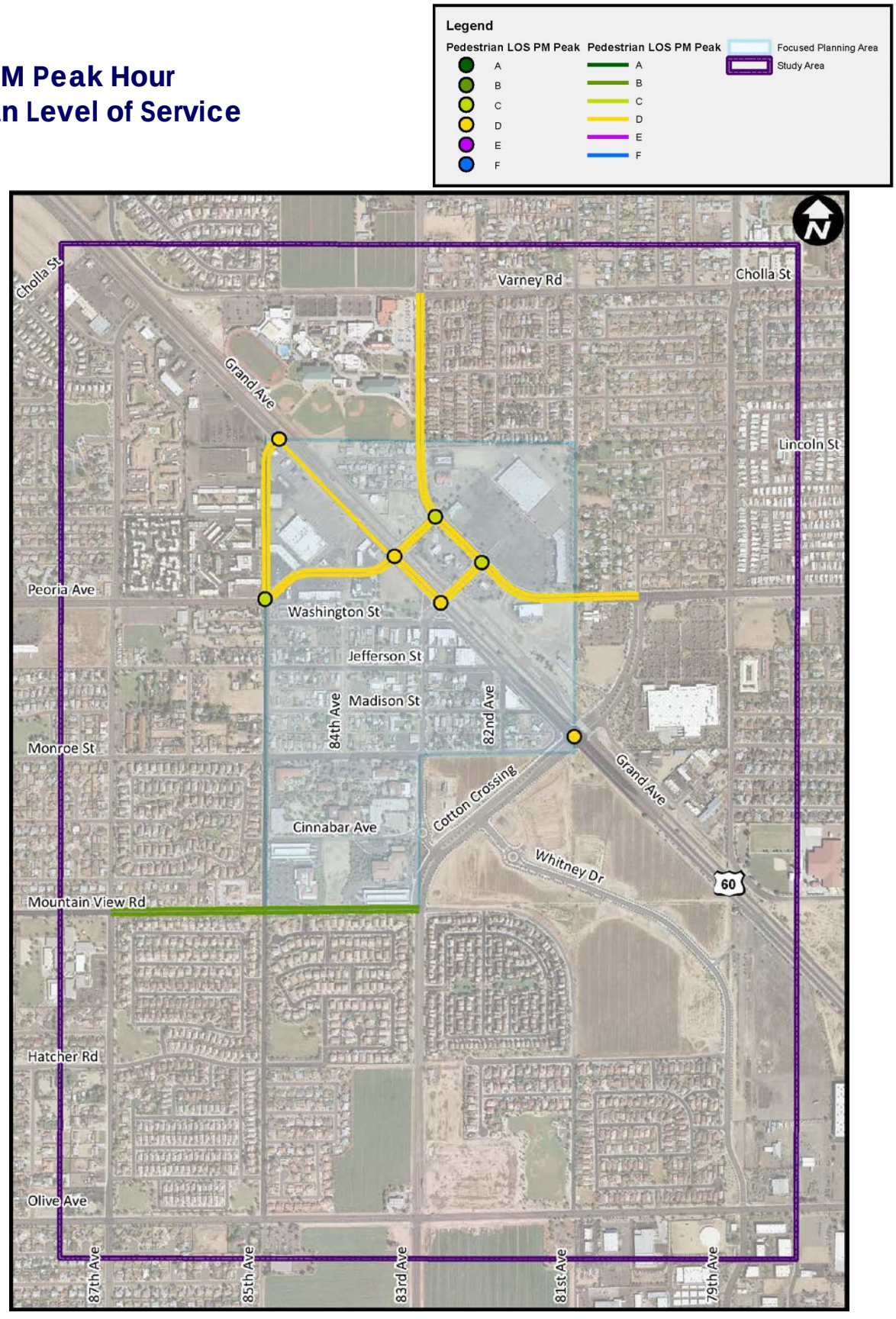


Figure 13
Existing AM Peak Hour
Bicycle Level of Service

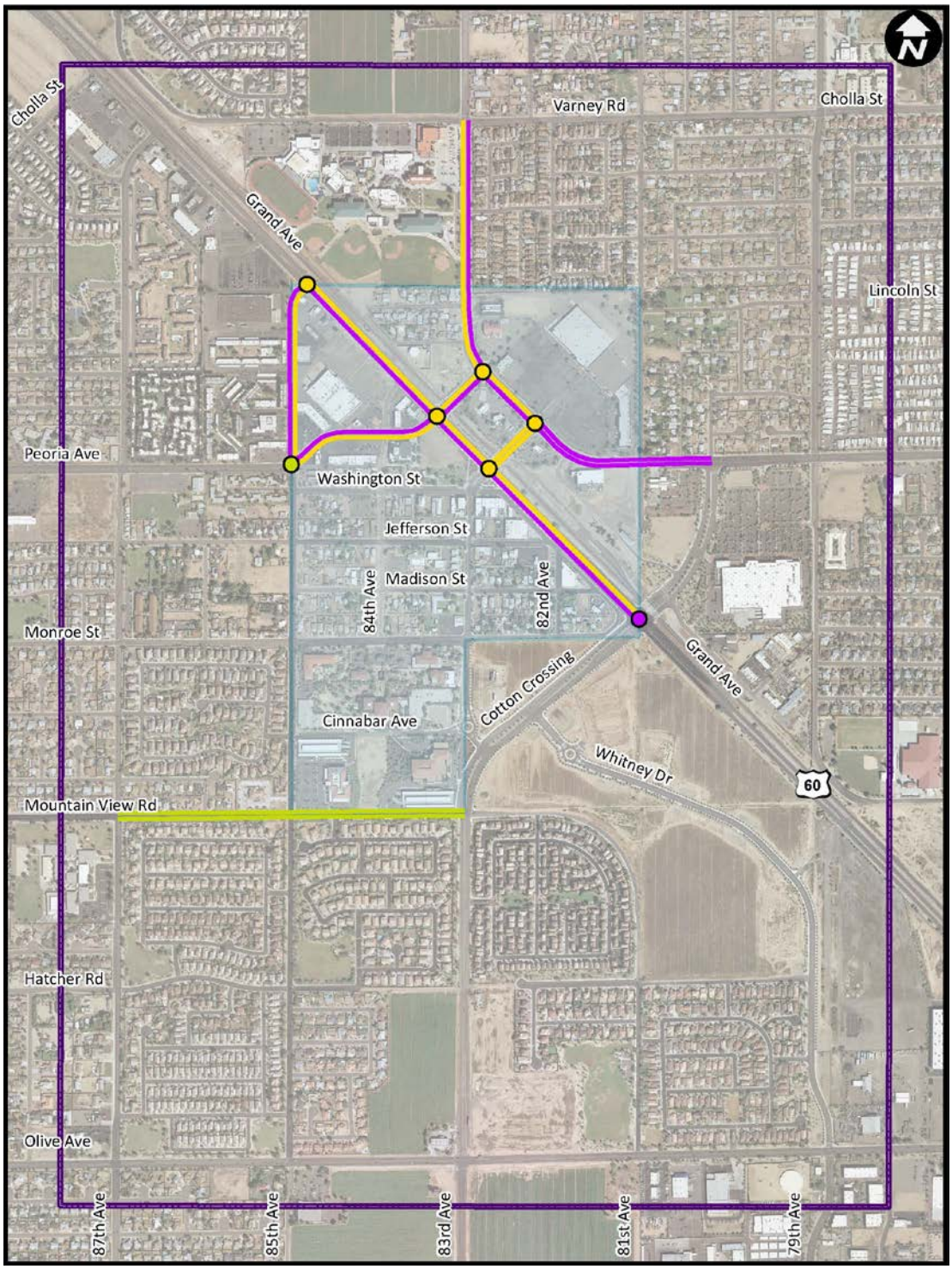
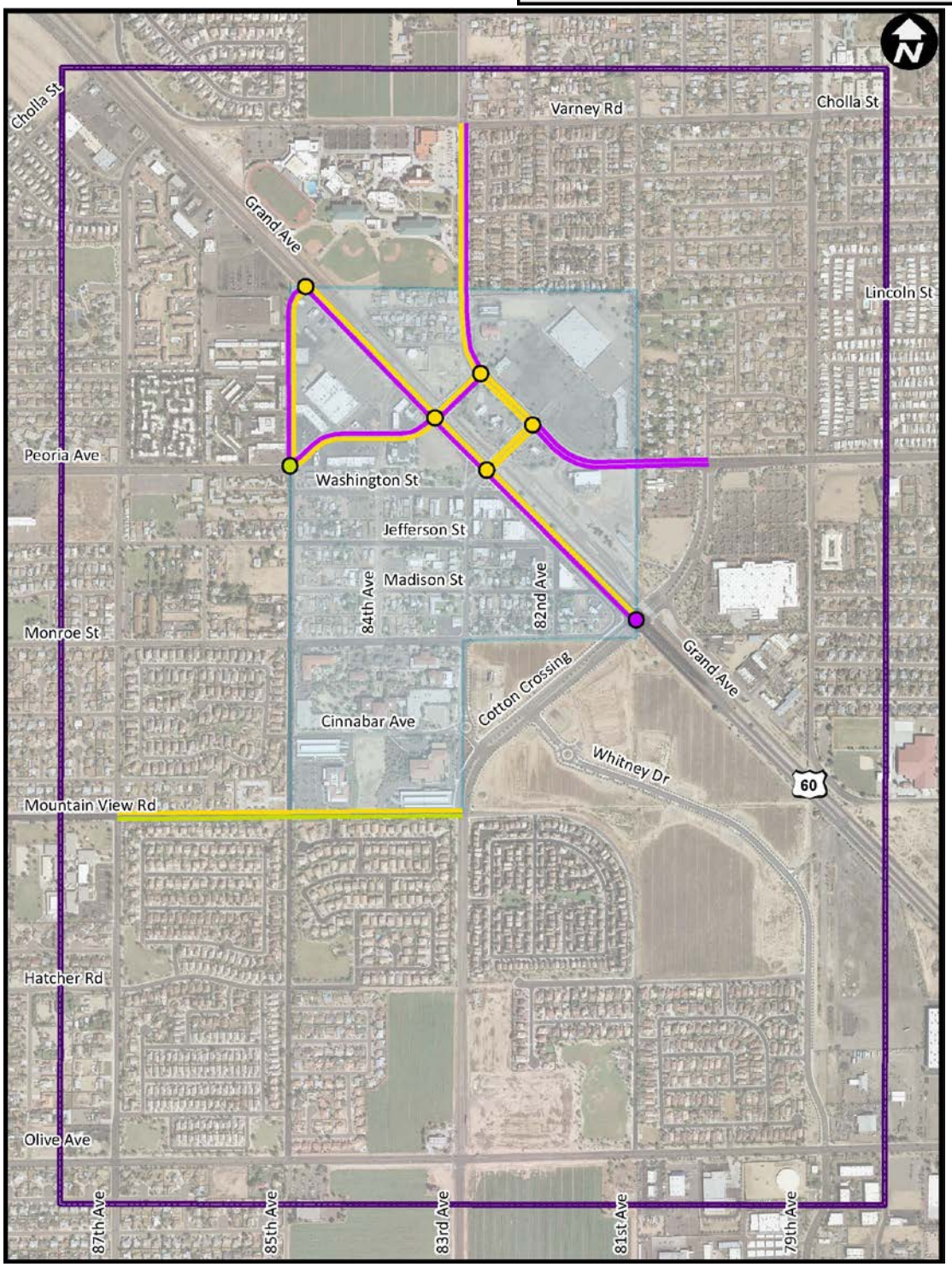


Figure 14
Existing PM Peak Hour
Bicycle Level of Service



3.7.4 Existing Transit LOS Analysis

Transit LOS capacity analysis was performed in the Focused Planning Area. The methodology for transit LOS is based on the perception of the user on the quality of service based on their travel experience. Factors that influence transit LOS are:

- Travel time for passengers
- Bus stop amenities (benches, shelters, etc.)
- Pedestrian LOS adjacent to the transit stop
- Transit frequency (headways)
- Transit vehicle amenities
- Transit vehicle running speed (affected by "on-line" versus "pull-off" stops)
- Exclusive transit lanes
- Transit stop location (near-side versus far-side)

Figure 15 and ***Figure 16*** show the results of the transit AM and PM peak hour LOS capacity analysis. The results indicate a LOS C and D exist in the Focused Study Area. Key factors that affect the transit LOS in the study area are:

- Low frequency of service. In this study area, the highest frequency is three buses per hour.
- Delay at the signalized intersections slowing the routes
- Bus "pull-offs" cause delay to buses that have to pull out into traffic after stopping (segment of Peoria Avenue between 83rd and 81st Avenues)
- LOS D pedestrian segments adjacent to stops

Figure 15
Existing AM Peak Hour
Transit Level of Service

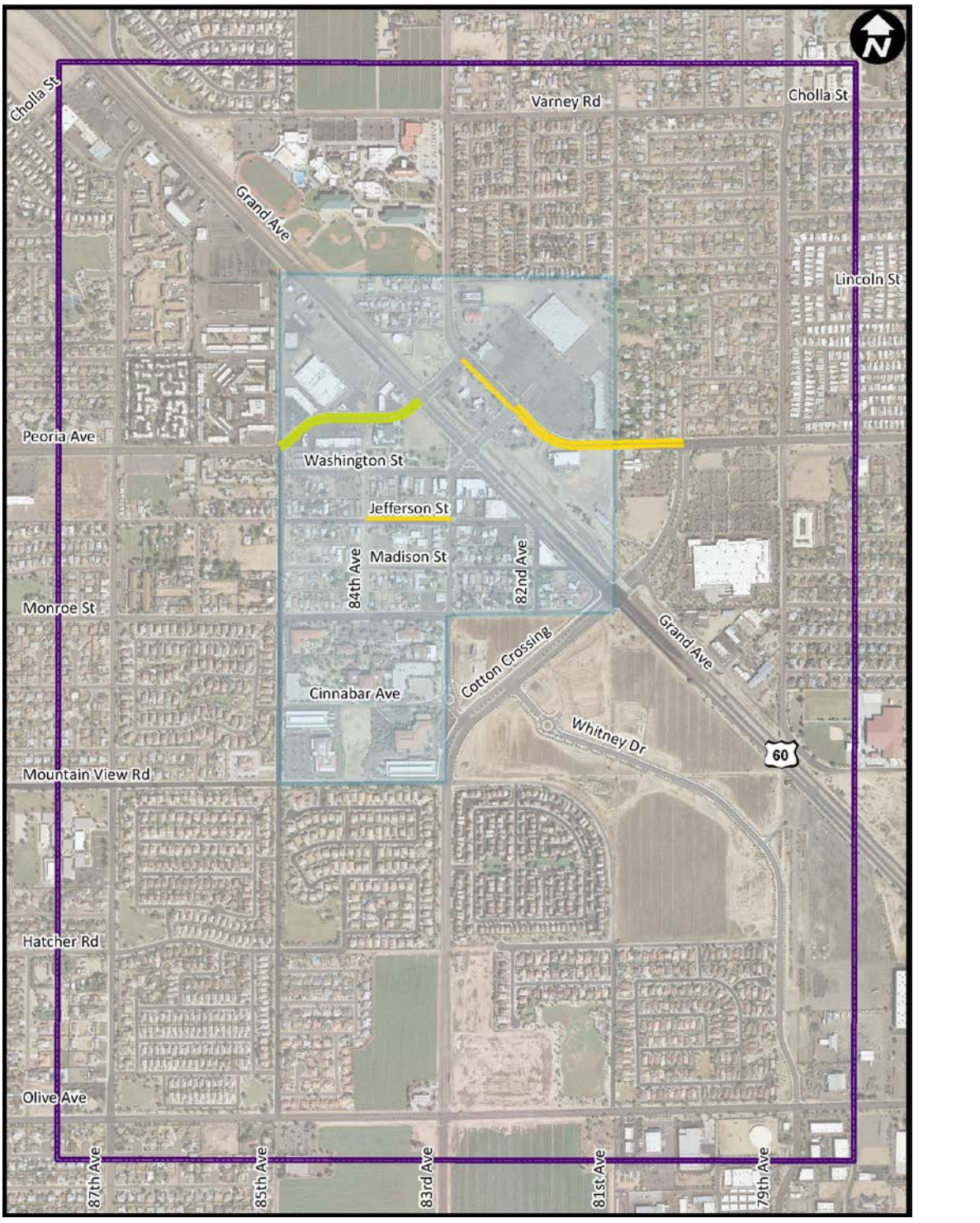
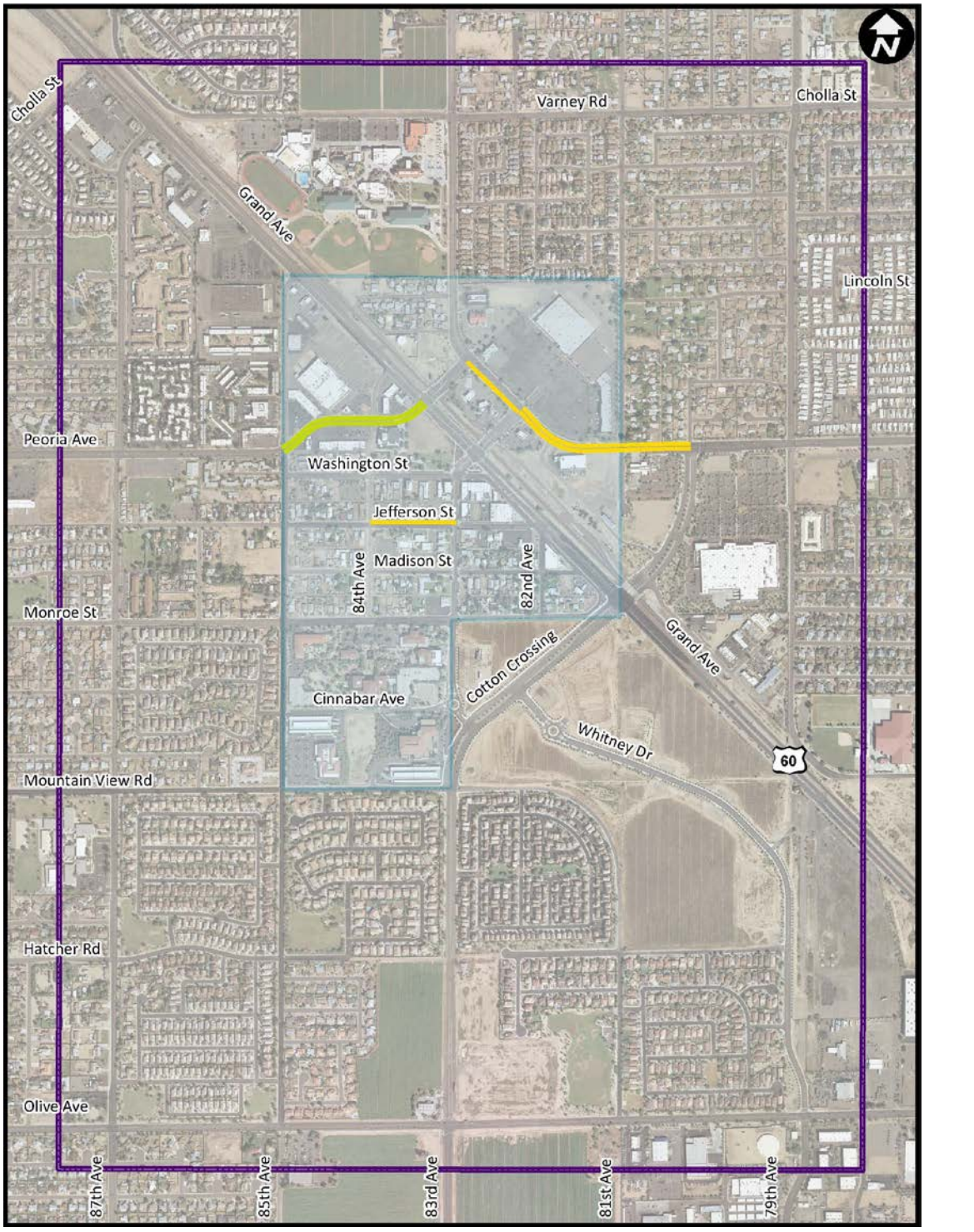


Figure 16
Existing PM Peak Hour
Transit Level of Service



4.0 FUTURE CONDITIONS

At the project outset, the purpose of this Study was to develop and evaluate short term (10-year) and long term (20-year) transportation improvements in the Old Town to create a multimodal plan to address access into and throughout the Old Town area for the next 20 years.

Based on input from City staff, input was received and direction was provided to the study team for the expectations and evaluations necessary for this Study. Ultimately, it was determined that a 20-year forecast evaluation would not be prudent at this time due to the economic uncertainty, but rather two scenarios for the 10-year forecast should be evaluated:

Scenario 1 Roadway network with 83rd Avenue **OPEN** between Grand Avenue and Peoria Avenue

Scenario 2 Roadway network with 83rd Avenue **CLOSED** between Grand Avenue and Peoria Avenue to all traffic, including transit services

The 10-year forecast was based on the vision and land use assumptions as described in the OTPRP. Further, the roadway network for both scenarios includes the new roadway connection of 79th Avenue between Whitney Drive and Grand Avenue.

Long-term was redefined as the 10-year forecast; short-term was redefined as the 10-year forecast recommendations with immediate need (5-year forecast). Given the initial 20-year planning horizon at the Study outset, substantial investigation of the 20-year horizon had already been initiated, including: vision, goals and objectives, evaluation criteria, and 3 Initial Scenarios (Scenario A, B and C) were developed. See ***Appendix E*** for a summary of the 20-year horizon information presented within the power point presented at the May 29, 2012 public meeting. It should be noted that the elements of the 20-year horizon planning efforts were considered and factored in the final recommendations of this Study.

4.1 Trip Generation

Trip generation for the Study was developed using the land use assumptions and the land use map from the OTPRP. *ITE Trip Generation Manual, 8th Edition* land use codes were assigned for each land use category and ITE methodology was used to determine the number of trips that would be generated in the Old Town under a full build scenario. An internal capture trip reduction was applied to the mixed-use development categories using NCHRP *Project 8-51: Enhancing Internal Trip Capture Estimation for Mixed-Use Developments.* Finally, a "pass-by" reduction was also applied where appropriate. Using the original land use assumptions for lot coverage and building stories, it was determined that under a full build condition, the study area would have 8.8 million square feet of retail space and 3.9 million square feet of office space.

Background traffic growth for the Study Area was computed using MAG's regional model. Traffic growth on the externals was computed using procedures outlined in the NCHRP 255 report. The external trips were then distributed through the Study Area using Fratar factoring methods. Internal growth computed, as described above, was superimposed onto this external growth.

Through interactive discussions with the City's Economic Development Group it was determined that the calculated retail and office space was much higher than could be supported in the Old Town. To reduce the office and retail space, several modifications were made to the land use assumptions. These include:

- Changes to the distribution of commercial, office and residential percentages for the Core Commercial Mixed Use, Old Town Commercial Mixed Use and Transit Oriented Development land uses.
- Reduction of the number of stories for the Old Town Commercial Mixed Use, Flex Mixed Use and Transit Oriented Development land uses
- Reduction of the lot coverage for all land uses

The land use assumptions were updated with the above changes on May 22, 2012, resulting in a full build condition with approximately 2.9 million square feet of retail space and 1.5 million square feet of office space.

In September 2012, the City's Economic Development Group determined that the full build scenario trip generation was "ambitious" based on new economic analysis. With the recent changes in the economy, the future beyond a 10-year horizon is appears to be too uncertain. Therefore, a 10-year horizon was selected for evaluation to determine necessary infrastructure improvements to address need in Old Town Peoria.

The 10-year horizon would contain 25% of the full build growth. The 20-year horizon would contain an additional 50% of the full build growth for a total of 75% of the full build total. The remaining 25% of the full build growth would occur more than 20 years in to the future. Trip generation calculations were recalculated taking into consideration this new projection.

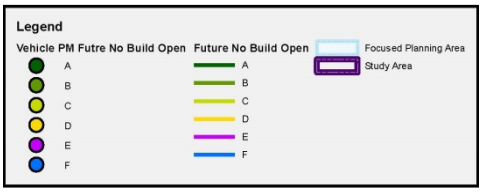
4.2 Future (10-Year) Level of Service Analysis – No Build

Using the 10-Year future trip generation as described above along with future background traffic growth projections, intersection and roadway segment LOS capacity analysis were conducted for the PM peak hour for Scenario 1 and Scenario 2 for the no build condition and are included in ***Appendix F***. The results are illustrated in ***Figure 17*** and ***Figure 18***, respectively.

Scenario 1, where 83rd Avenue is open between Grand Avenue and Peoria Avenue, shows all intersections operating at an overall intersection LOS D or better, with the exception of the intersection of Grand Avenue and 87th Avenue, which is shown to operate at a LOS F. Five roadway segments operate at a LOS E or F. This includes 87th Avenue from Grand Avenue to Peoria Avenue, 87th Avenue from Peoria Avenue to Monroe Street, 85th Avenue from Grand Avenue to Peoria Avenue, 83rd Avenue from Peoria Avenue to Grand Avenue, and 79th Avenue from Hatcher Road to Olive Avenue.

Scenario 2, where 83rd Avenue is closed between Grand Avenue and Peoria Avenue, shows the same intersection and roadway segments as in Scenario 1 operating at a LOS E or F.

Figure 17
10-Year PM Peak Hour
Scenario 1 – No Build (83rd Avenue OPEN)



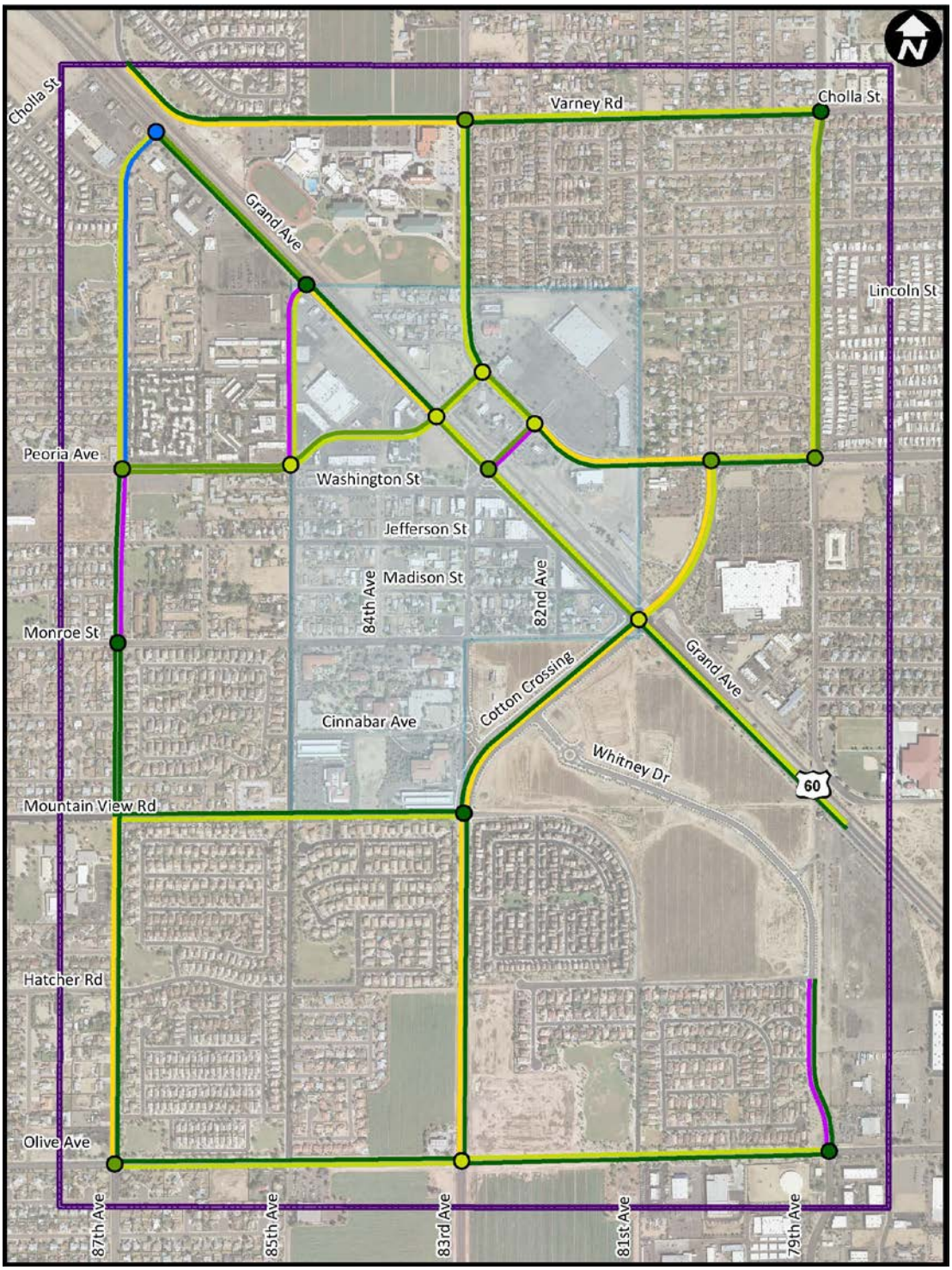
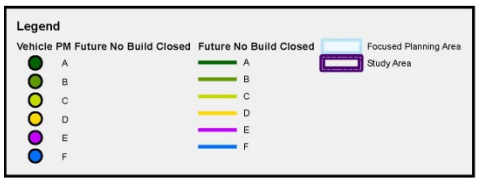
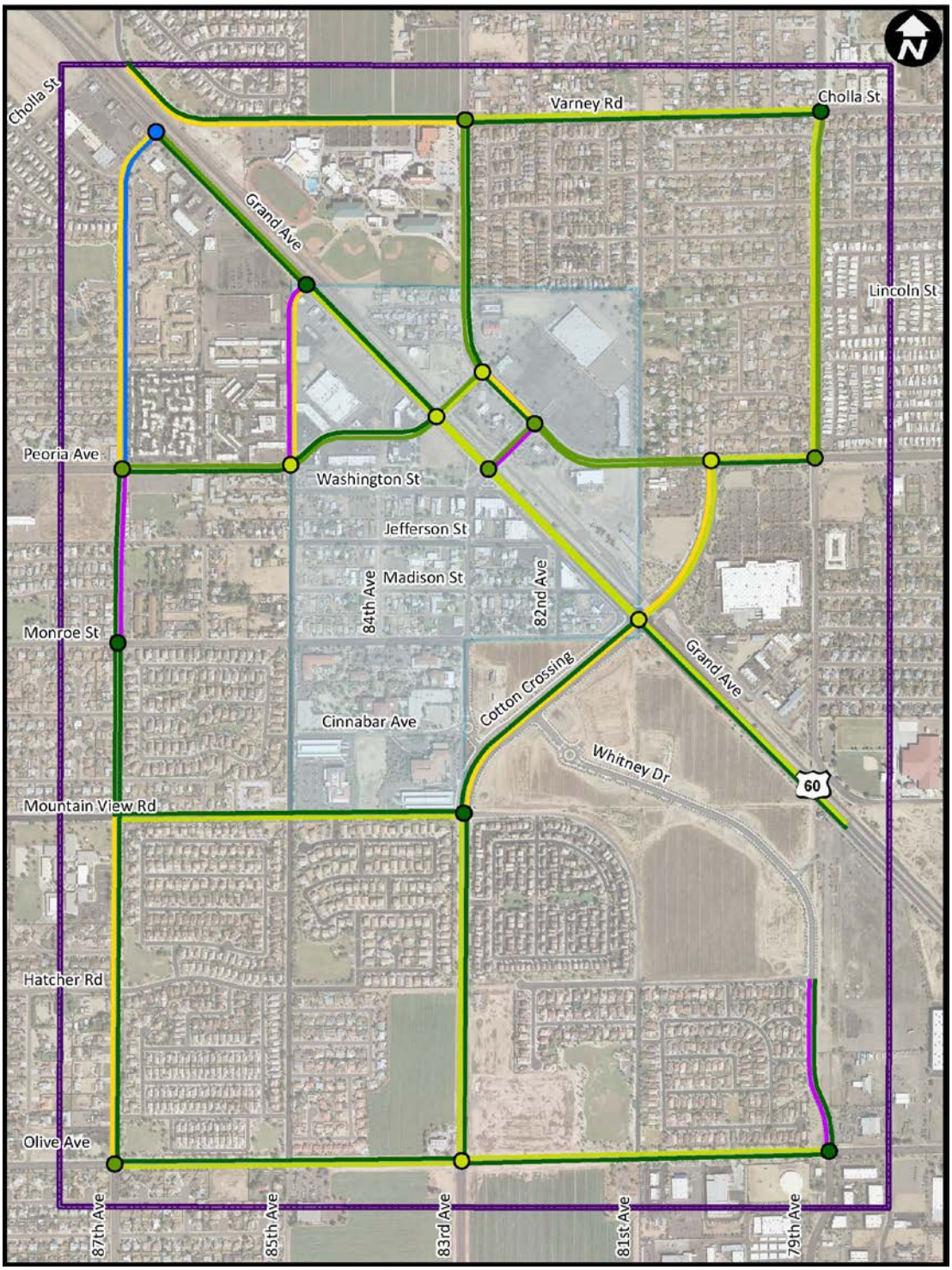


Figure 18
10-Year PM Peak Hour
Scenario 2 – No Build (83rd Avenue CLOSED)





5.0 IMPROVEMENT ALTERNATIVES

5.1 Roadway Improvements

An overall intersection operation of LOS D or better with no individual movement operating at LOS F or having a volume to capacity (V/C) more than 1.0, and a roadway segment operation of LOS E or better were established as the minimum acceptable level of operation.

5.1.1 Scenario 1 (83rd Avenue OPEN)

In order to meet acceptable intersection and roadway segment operational performance goals, the following roadway improvements are necessary for Scenario 1:

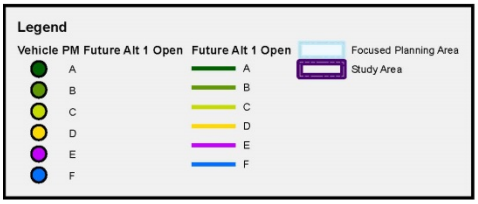
TABLE 3 – SCENARIO 1 (83RD AVENUE OPEN) ROADWAY IMPROVEMENTS		
Location	**Alternative 1**	**Alternative 2**
Grand Avenue & 87th Avenue	Install a new traffic signal	Convert to right-in and right-out configuration
Cotton Crossing & Whitney Drive	Install a new traffic signal	Install a new roundabout
83rd Avenue & Mountain View Road	Install a new traffic signal	Install a new roundabout
83rd Avenue & Olive Avenue	Install a westbound exclusive right-turn lane	

Two alternatives were analyzed with varying roadway improvements, both of which would provide acceptable roadway operations long-term (10-years). These two alternatives provide the City with roadway improvement choices to the select what best suits the City. The final decision between alternatives will likely require further detailed evaluation, additional conversations with City staff and potentially public outreach.

The purpose of a new traffic signal at the intersection of Grand Avenue and 87th Avenue is to address the northbound traffic movements (those leaving Old Town). ADOT owns and maintains Grand Avenue, which is US-60, and would need to approve and maintain the new traffic signal. ADOT staff has indicated a current preference to limit or remove traffic signals along Grand Avenue. An alternative option for the location is to convert the intersection to right-in and right-out operation using the current stop-control measure. This approach would satisfy acceptable intersection operational performance goals. The left-turn movements that are projected to occur at this intersection would likely shift to the intersection of Grand Avenue and 85th Avenue, which can accommodate the additional traffic volumes.

The intersection and roadway segment LOS for Alternative 1 and Alternative 2 is illustrated in ***Figure 19*** and ***Figure 20***. Detailed capacity analysis is provided in ***Appendix G***.

Figure 19
10-Year PM Peak Hour
Scenario 1 – Alternative 1 (83rd Avenue OPEN)



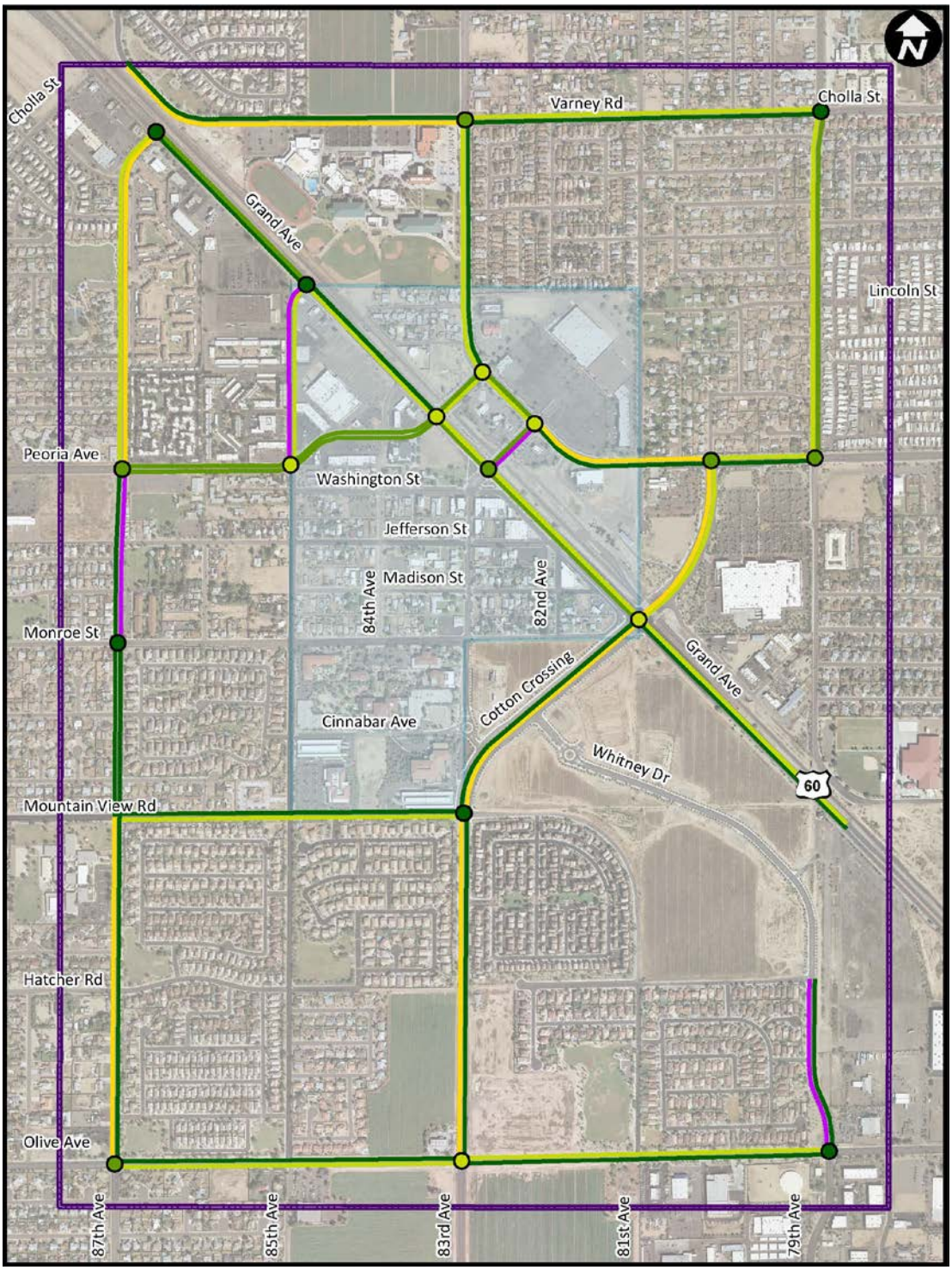
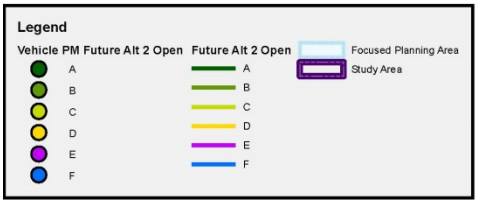
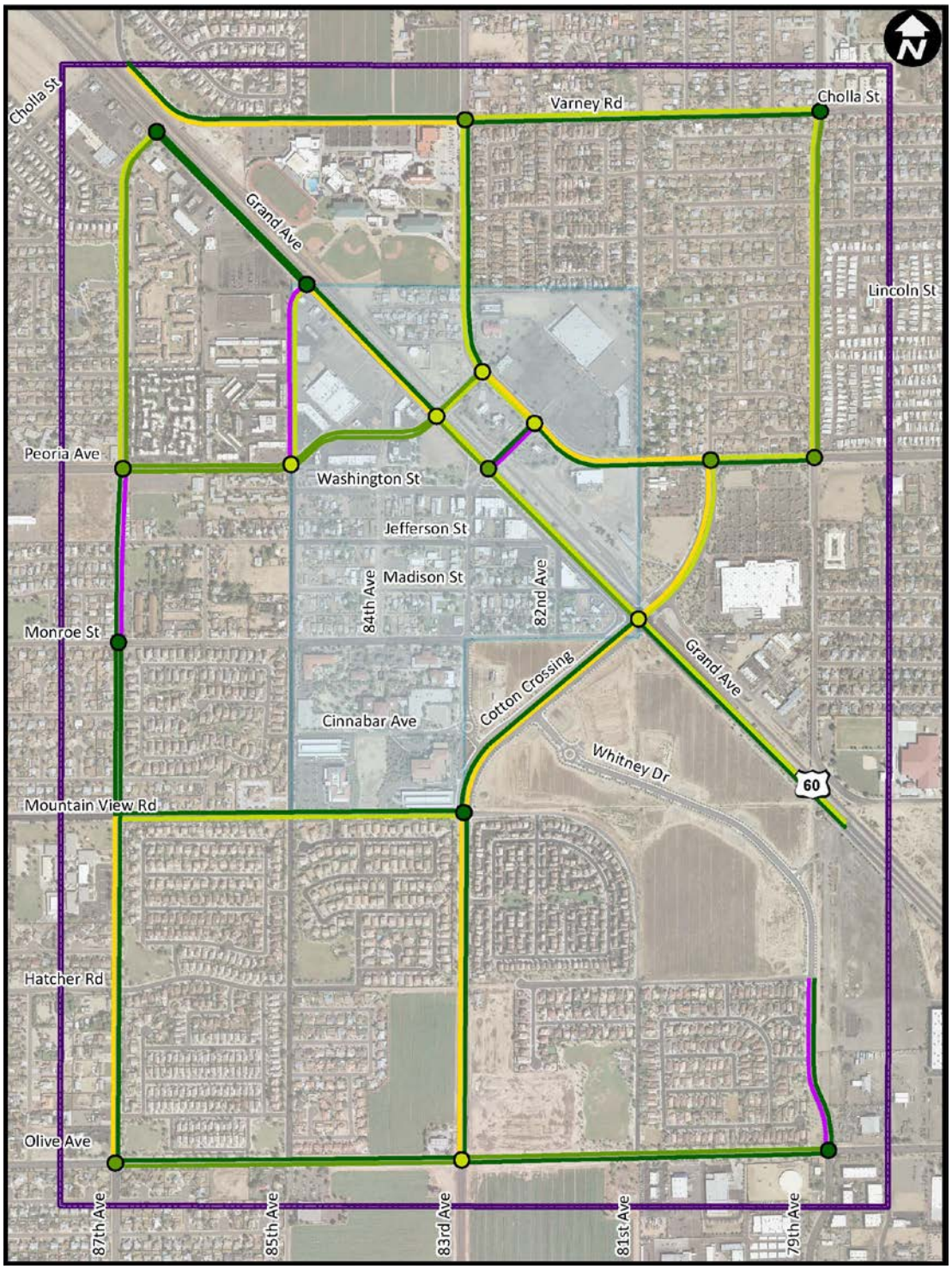


Figure 20
10-Year PM Peak Hour
Scenario 1 – Alternative 2 (83rd Avenue OPEN)





5.1.2 Scenario 2 (83rd Avenue is closed)

Similar to the Scenario 1, for Scenario 2 with 83rd Avenue closed between Grand Avenue and Peoria Avenue, in order to maintain an overall intersection operation of LOS D or better with no individual movement operating at LOS F or having a volume to capacity (V/C) more than 1.0, and a roadway segment operation of LOS E or better, the following roadway improvements are necessary:

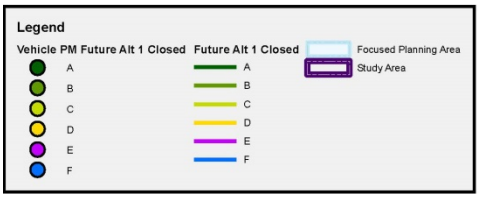
TABLE 4 – SCENARIO 2 (83RD AVENUE CLOSED) ROADWAY IMPROVEMENTS		
Location	**Alternative 1**	**Alternative 2**
Grand Avenue & 87th Avenue	Install a new traffic signal	Convert to right-in and right-out configuration
Grand Avenue & 83rd Avenue	Convert to right-in and right-out configuration	
Cotton Crossing & Whitney Drive	Install a new traffic signal	Install a new roundabout
83rd Avenue & Mountain View Road	Install a new traffic signal	Install a new roundabout
83rd Avenue & Olive Avenue	Install a westbound exclusive right-turn lane	
Peoria Avenue & 83rd Avenue	Convert to right-in and right-out configuration	

Two alternatives were analyzed with varying roadway improvements, both of which would provide acceptable roadway operations long-term (10-years). These two alternatives provide the City with roadway improvement choices to the select what best suits the City.

The existing traffic signals at the intersection of Grand Avenue and 83rd Avenue, and Peoria Avenue and 83rd Avenue Connector (old Wal-Mart entrance) can be removed if right-in and right-out operation is established. The left-turn movements projected to occur at the intersection of Grand Avenue and 83rd Avenue will likely shift to the intersections of Grand Avenue and Peoria Avenue, and Grand Avenue and Cotton Crossing, which can accommodate the additional traffic volumes. The left-turn movements projected to occur at the intersection of Peoria Avenue and 83rd Avenue Connector will likely shift to the intersection of Peoria Avenue and 83rd Avenue, which can accommodate the additional traffic volumes. Both Alternative analyses were run with the removal of the traffic signal at these two intersections. However, they would also operate with acceptable levels of service with the signals remaining in place.

The intersection and roadway segment LOS for Alternative 1 and Alternative 2 is illustrated in ***Figure 21*** and ***Figure 22***. Detailed capacity analysis is provided in ***Appendix H***.

Figure 21
10-Year PM Peak Hour
Scenario 2 – Alternative 1 (83rd Avenue CLOSED)



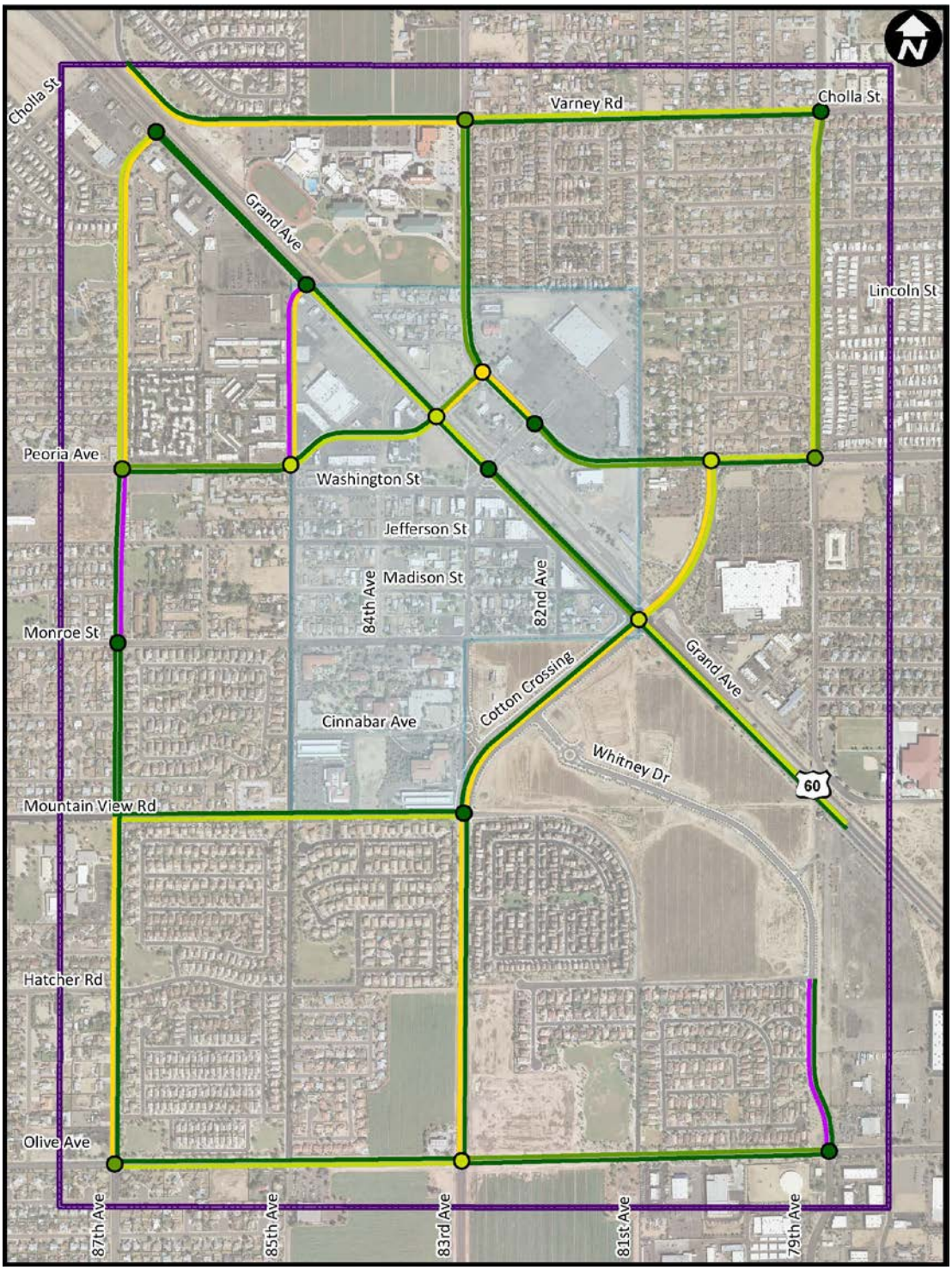
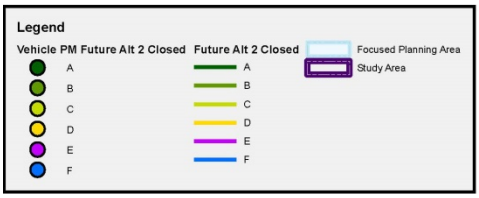
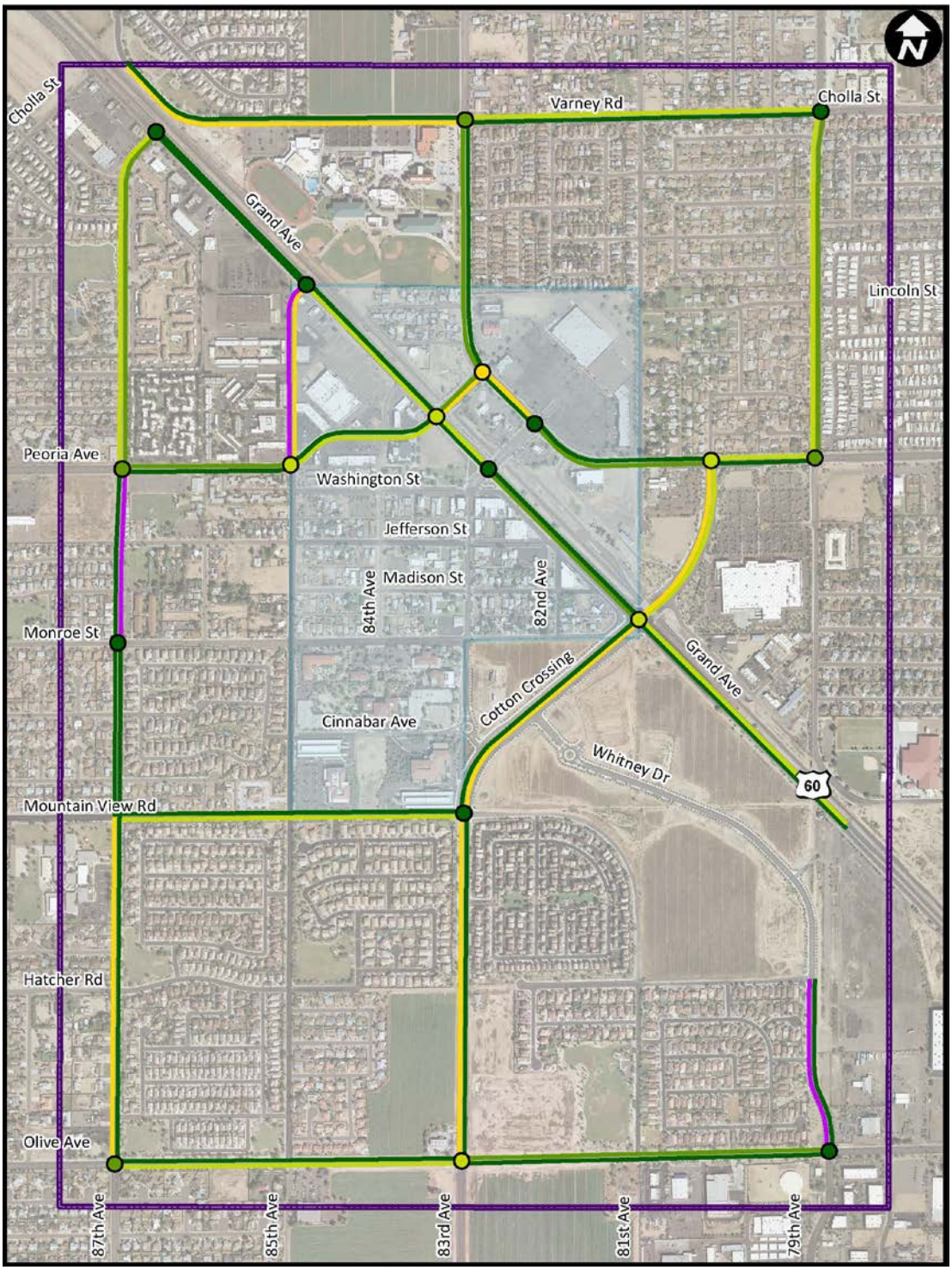


Figure 22
10-Year PM Peak Hour
Scenario 2 – Alternative 2 (83rd Avenue CLOSED)





5.2 Transit Improvements

5.2.1 Transit Center and Park-and-Ride

Scenario 2 of this Study considers the option of eliminating all vehicular traffic along 83rd Avenue between Grand Avenue and Peoria Avenue. Therefore, it became necessary to revisit the PMTP, as the preferred transit center and park-and-ride option were based on transit only access along 83rd Avenue, between Grand Avenue and Peoria Avenue.

Potential Concept to Accommodate 83rd Avenue Closure between Grand Avenue and Peoria Avenue

As described previously, based on input from City staff, the two other transit center options evaluated as part of the PMTP were eliminated from further evaluation. Therefore, a potential concept was drafted in order to evaluate Scenario 2. A detailed evaluation will still need to be performed, but for the purpose of this Study, this concept is sufficient.

Additional transit recommendations are based on the PMTP and include:

- ***Bus Routes*** - Implement new transit Route 83 along 83rd Avenue per the PMTP recommendations, which would provide a north-south local route. This route is intended to provide north-south service through the core of Peoria from Arrowhead Mall to Phoenix via the Peoria Sports Center, Old Town, and Glendale. The route may need to be revisited in the future, pending the potential closure of 83rd Avenue.

- ***Improve Bus Stops*** - Continue to support recommendations and guidelines detailed in the PMTP for providing a comfortable and inviting location for passengers to wait for transit vehicles.

5.3 Pedestrian and Bicyclist Related Improvements

Additional multimodal enhancements to convert the Old Town to a true, robust multimodal transportation network are outlined below:

- **Pedestrian Bridge** - Pedestrian bridges provide grade-separated connectivity across Grand Avenue. Two locations are recommended:
  - Between Peoria Avenue and 83rd Avenue to serve the Old Town core.
  - 87th Avenue to facilitate Peoria High School and Cheyenne Elementary School student crossing of Grand Avenue. Both of these schools have attendance boundaries that straddle Grand Avenue.

- **Streetscape** - Streetscaping increases the attractiveness of a roadway and promotes walkability by improving pedestrian safety, convenience, and comfort. The following streetscape improvements are recommended per the OTPRP:
    - Peoria Avenue from Loop 101 to the Old Town
    - Monroe Street from 85th Avenue to Grand Avenue

- **Pedestrian Lighting** - Continue to support the recommendations detailed in the OTPRP for pedestrian scale lighting, creating an inviting environment and increasing safety.

- **Sidewalks** - Nearly all of the major roadways within the Study Area provide sidewalks for pedestrians. Sidewalks are missing in a few locations along Olive Avenue, 81st Avenue, and 79th Avenue. These are areas where there is no abutting development. As development occurs, the sidewalk network in these areas should be linked.

- **Bike Lanes** - Expand the network of bike lanes in the Old Town area. The majority of the major roadway network within the Study Area provides bike facilities. However, Peoria Avenue, 83rd Avenue and Olive Avenue are key roadways that currently do not provide continuous bike lanes.

5.4 Additional Improvements

City staff and the TAC recommended additional improvements for the Study Area, which are summarized below:

- **Entry Feature** - Install an entry feature at the intersection of 83rd Avenue and Washington Street, such as a mini-roundabout with landscaping.

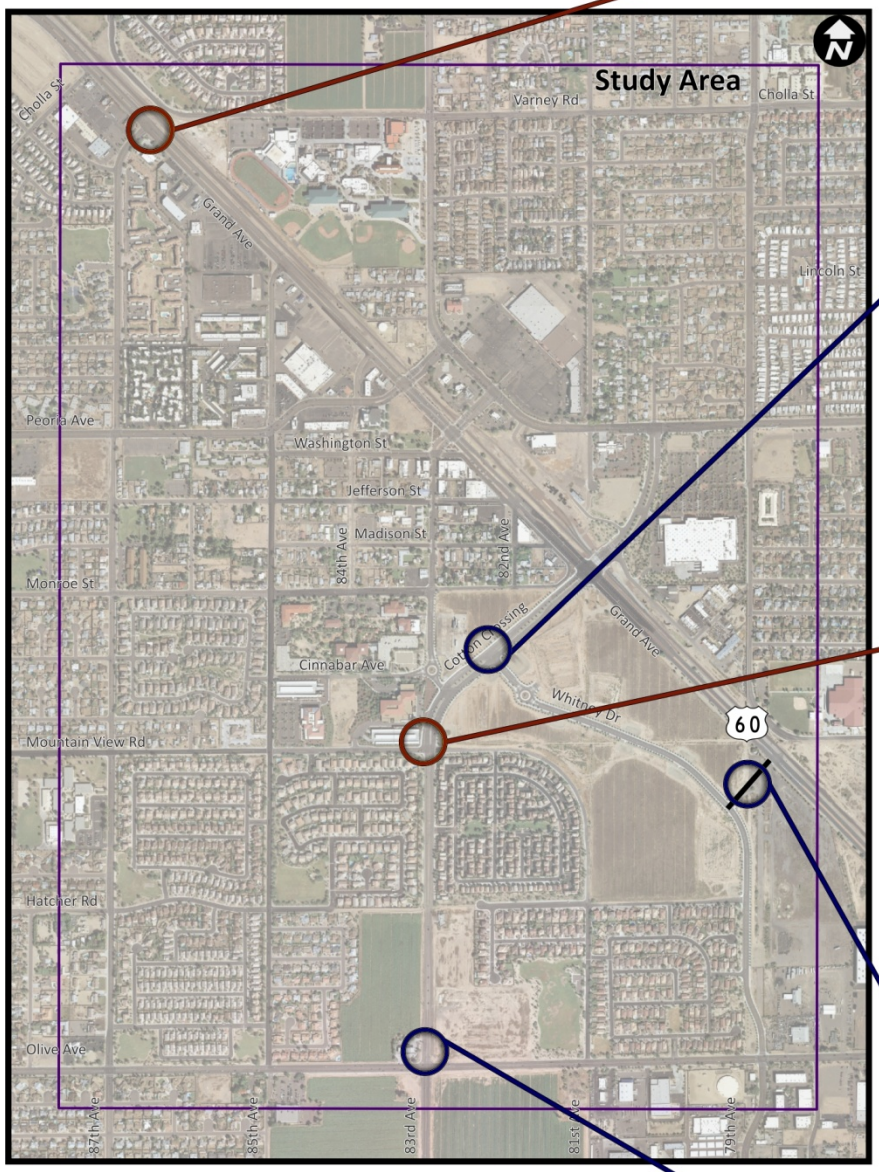
- **Time Limited Parking** - Explore locations where the installation of time limited parking would support and encourage the vitality of businesses and provide convenience to shoppers. Implementing time limited parking, near appropriate retail and commercial business, can improve short-term parking availability and turnover for customers while discouraging long-term parking. These time restrictions can vary from minutes to hours dependent on the type of business. For example, parking spaces dedicated to a dry cleaning business may only need 15 minutes for a customer to drop-off or pick-up clothes, while parking spaces for a movie theater may restrict parking to 3 hours.

- **Underground Utilities** - There is a Utility Master Plan Study currently underway. Undergrounding projects will be prioritized and implemented per master plan.

6.0 IMPLEMENTATION PLAN

The necessary and recommended improvements described in detail in ***Section 5.0*** were then divided into short-term (5-Year) and long-term (10-Year) improvements. The short-term improvements are projects that are intended to address current needs and the long-term projects are those that are improvements that are needed to address 10-Year needs. For the roadway improvements for Scenario 1, where 83rd Avenue remains open, ***Figure 23*** illustrates the short-term and long-term improvements. For Scenario 2, where 83rd Avenue is closed between Grand Avenue and Peoria Avenue, ***Figure 24*** illustrates the short-term and long-term improvements. The multimodal and additional improvement implementation plan is illustrated in ***Figure 25***. Some of the multimodal and additional improvements may be implemented when adjacent development or other roadway improvements occur, such as the installation of bike lanes, sidewalk, bus stop improvements, pedestrian lighting and undergrounding utilities. Therefore, these items were not designated for short-term or long-term improvements.

Figure 23
Short-Term and Long-Term Roadway Improvements
Scenario 1 (83rd Avenue OPEN)



Grand Ave & 87th Ave

Alt 1: Install new traffic signal

Alt 2: Convert to right-in and right-out operation

Cotton Crossing & Whitney Dr

Alt 1: Install new traffic signal

Alt 2: Install new roundabout

83rd Ave & Mountain View Rd

Alt 1: Install new traffic signal

Alt 2: Install new roundabout

79th Ave btwn Whitney Dr & Grand Ave

Roadway connection

83rd Ave & Olive Ave

Install a westbound exclusive right-turn lane

Legend

- Short-Term Improvement (5-Year)
- Long-Term Improvement (10-Year)

Figure 24
Short-Term and Long-Term Roadway Improvements
Scenario 2 (83rd Avenue CLOSED)

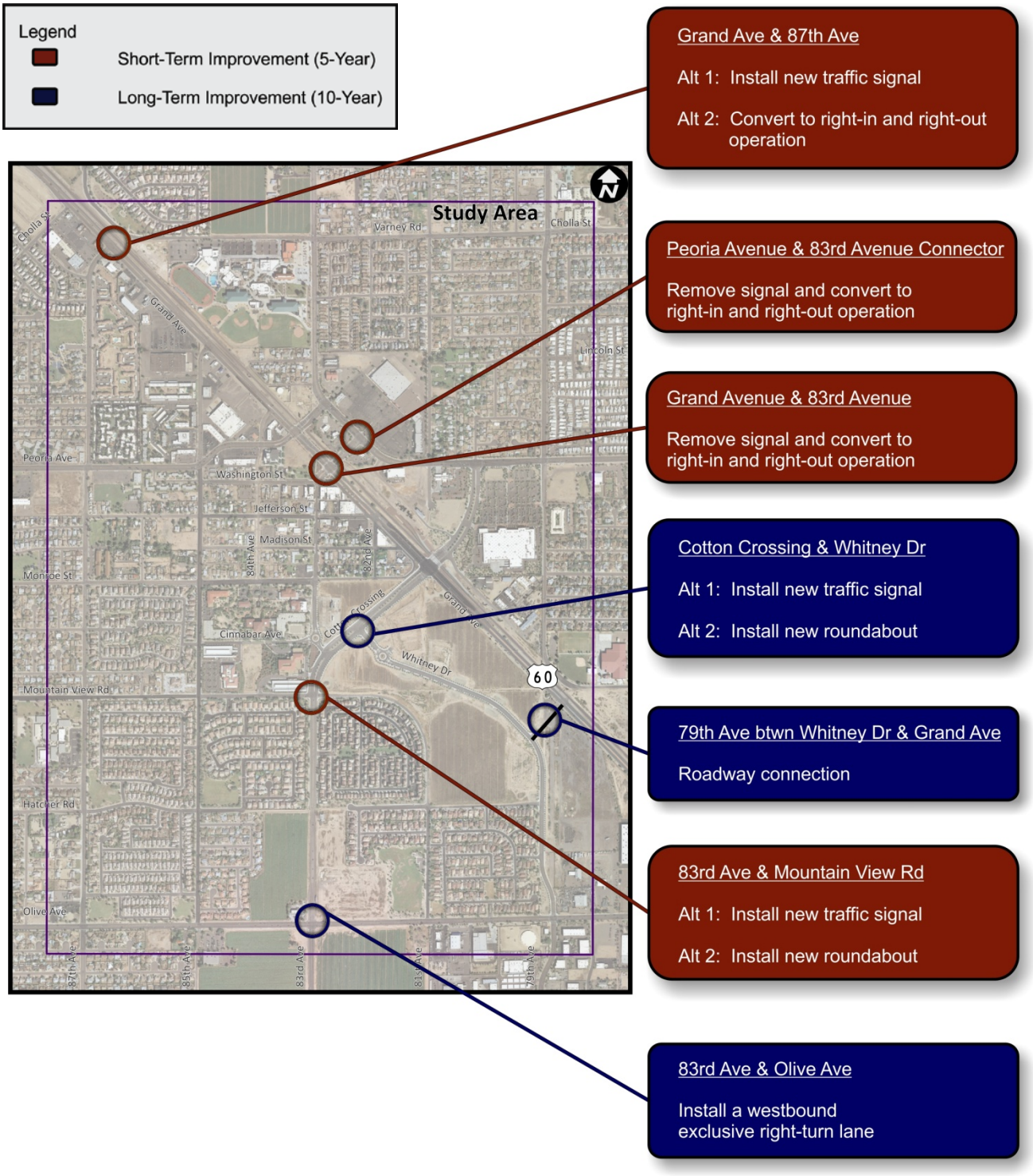
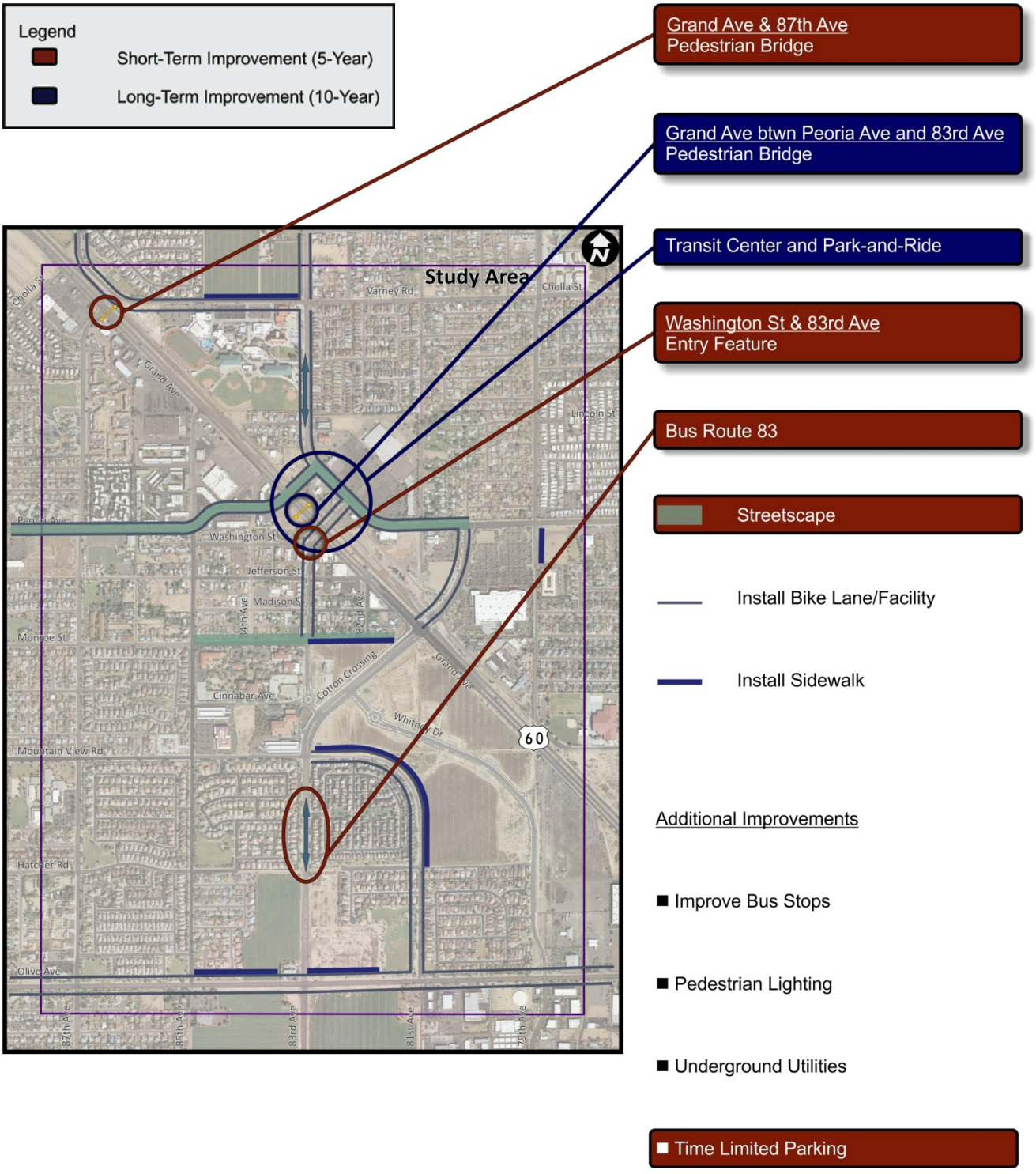


Figure 25
Short-Term and Long-Term Multimodal and Additional Improvements



7.0 ESTIMATE OF PROBABLE COSTS

Planning level estimates of probable costs were developed for new improvement concepts originating from this Study in 2013 dollars. Improvement concepts originating in the OTPRP and the PMTP were not re-estimated.

The estimates include items such as pavement, walks, traffic, landscaping, lighting, and drainage, as well as a contingency factor of 30% to account for unidentified items. Due to the preliminary nature of this study, right-of-way and utility relocation costs were not included. Assumptions were made in order to provide the order of magnitude costs, and depending on further detailed investigation and direction, could drastically affect the totals. A summary is provided below in ***Table 5***; detailed estimates are included in ***Appendix I***.

TABLE 5 – CAPITAL COSTS ($1,000)

Location	Improvement	Design	Construction	Total
Grand Avenue & 87th Avenue	Traffic Signal	$24	$237	$261
	RIRO	$20	$197	$217
83rd Avenue & Mountain View Rd	Traffic Signal	$24	$237	$261
	Roundabout	$118	$1,175	$1,293
83rd Avenue & Olive Avenue	Right-Turn Lane	$11	$113	$124
Cotton Crossing & Whitney Dr	Traffic Signal	$24	$237	$261
	Roundabout	$88	$881	$969
79th Avenue, Whitney to Grand	New Road			
Grand Avenue & 83rd Avenue	Remove Signal/RIRO	$48	$477	$525
Peoria Avenue & 83rd Avenue	Remove Signal/RIRO	$13	$127	$140
Grand Avenue & 87th Avenue	Pedestrian Bridge	$504	$5,039	$5,543
Grand Avenue, Peoria to 83rd	Pedestrian Bridge	$504	$5,039	$5,543
Grand Avenue	Transit Center & PnR*	-	-	$8,300*
83rd Avenue	Bus Route 83*	-	-	$1,000 O&M*

*Cost estimate from PMPT

New standalone bicycle lane and sidewalk recommended improvement concepts are not included in ***Table 5***, as policy decisions will be required that will drastically affect the total estimate of probable cost. For example, the location of sidewalk improvements is typically along incomplete half-streets, such as Mountain View Road between 83rd Avenue and Hatcher Road. A simple paved path could be provided during the interim period until a developer completes the half-street, or the half-street could be completed by the City.