Arizona Department of Transportation
SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements

Agua Fria Freeway

Final Feasibility Study

Project Number: 101 MA 018 F0489 01L

Prepared for:

Arizona Department of Transportation

ADOT

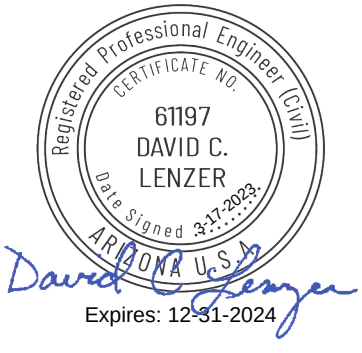
Prepared by:

BURGESS & NIPLE

With

Jacobs AZTEC TYPSA

March 2023



Expires: 12-31-2024

Table of Contents

List of Figures

List of Tables

Appendices

Project Leadership

Arizona Department of Transportation
205 S. 17th Avenue
Phoenix, AZ 85007

Rashidul Haque, P.E.
Email: rhaque@azdot.gov
Telephone: 602-712-7352

Study Consultants:

Jacobs Engineering Group, Inc.
1501 W. Fountainhead Parkway #401
Tempe, AZ 85282

Adrian Leon, PE
Email: Adrian.Leon@jacobs.com
Telephone: 602-530-1697

Burgess & Niple, Inc.
1500 N. Priest Drive, Suite 102
Tempe, AZ 85281

David Lenzer, P.E.
Email: david.lenzer@burgessniple.com
Telephone: 602-244-8100

AZTEC Engineering Group, Inc.
501 N. 44th Street, Suite 300
Phoenix, AZ 85008

Executive Summary

Arizona Department of Transportation (ADOT) Project 101 MA 018 F0489 01L titled SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements was initiated to evaluate alternatives at State Route (SR) 101L interchanges with 67th and 59th Avenues. The Study Planning Partners include ADOT, Federal Highway Administration (FHWA), the Maricopa Association of Governments (MAG), the City of Glendale (Glendale), and the City of Phoenix (Phoenix).

The project is located in the northern Phoenix metropolitan area within Maricopa County, Arizona, along SR 101L (Agua Fria Freeway) between mileposts 18 and 20 at the 67th Avenue and 59th Avenue service Traffic Interchanges (TIs). The study area is in ADOT's Phoenix Construction District; the western study limit is 75th Avenue and the eastern study limit is 51st Avenue. Glendale encompasses the entire study area, with Phoenix just east of the project limit.

This project was initiated in December 2021 and has a one-year term. It is not programmed in the ADOT 2022-2026 Five-Year Transportation Facilities Construction Program. The project is listed in the ADOT Design List for Fiscal Year 2022. The funding source is the federal Regional Area Road Fund (RARF).

This Feasibility Study outlines the proposed traffic operational and safety improvements at the 67th Avenue and 59th Avenue TIs. The project included the following aspects:

- Preparation of a traffic modeling and operational analysis for future no-build conditions and build alternatives at each TI location;
- Preparation of a crash analysis;
- Development of and multi-discipline evaluation of TI alternatives; and
- Cost estimate development.

An ADOT freeway general purpose lane (GPL) project titled SR 101L from 75th Avenue to I-17 Black Canyon, project number 101 MA 017 F0316 01D, is being developed within the study area. The primary purpose of the project is to widen the freeway by adding one GPL in each direction along SR 101L from 75th Avenue to I-17 and improvements to the 75th Avenue TI. For the purposes of this project, the base condition of SR 101L includes completion of this widening project.

1.0 Introduction

1.1. Foreword

Arizona Department of Transportation (ADOT) Project 101 MA 018 F0489 01L titled SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements was initiated to evaluate alternatives at State Route (SR) 101L interchanges with 67th and 59th Avenues. This Feasibility Study outlines the proposed traffic operational and safety improvements. The Study Planning Partners include ADOT, Federal Highway Administration (FHWA), the Maricopa Association of Governments (MAG), the City of Glendale (Glendale), and the City of Phoenix (Phoenix).

The project is located in the northern Phoenix metropolitan area within Maricopa County, Arizona, along SR 101L (Agua Fria Freeway) between mileposts (MP) 18 and 20 at the 67th Avenue and 59th Avenue service Traffic Interchanges (TIs). The study area is in ADOT's Phoenix Construction District; the western study limit is 75th Avenue and the eastern study limit is 51st Avenue. Glendale encompasses the entire study area, with Phoenix just east of the project limit.

This project was initiated in December 2021 and has a one-year term. It is not programmed in the ADOT 2022-2026 Five-Year Transportation Facilities Construction Program (Five-Year Program). The project is listed in the ADOT Design List for Fiscal Year 2022. The funding source is the federal Regional Area Road Fund (RARF) with a design amount of $50,000.

SR 101L is an urban freeway and part of the National Highway System (NHS). The posted speed limit is 65 mph. A frontage road, named Beardsley Road, is present along the north and south of SR 101L within the study area. The posted speed limit along Beardsley Road is 45 mph.

67th and 59th Avenues are functionally classified as arterials north of SR 101L and major arterials south of SR 101L according to the *COG 2018-2042 Transportation Plan*. Both 67th and 59th Avenues are underpass bridges and have a posted speed limit of 40 mph.

The surrounding areas are highly developed residential land with heavy retail uses in proximity of the freeway TIs. Other major traffic attractors include Midwestern University and the Honeywell campuses on 59th Avenue, south of SR 101L and Christ's Church of the Valley on 67th Avenue, north of SR 101L.

An ADOT freeway general purpose lane (GPL) project titled SR 101L from 75th Avenue to I-17 Black Canyon, project number 101 MA 017 F0316 01D (F0316), is being developed within the study area. The primary purpose of the project is to widen the freeway by adding one GPL in each direction along SR 101L from 75th Avenue to Interstate 17 (I-17) and improvements to the 75th Avenue TI. For the purposes of this project, the base condition of SR 101L includes completion of this widening project. Note that data obtained from F0316 was used for informational purposes only; there is no intent for improvements from this project to be incorporated into the F0316 project. Additional information is provided in ***Section 1.4.2***.

Maps of the project location and project vicinity are provided as ***Figure 1*** and ***Figure 2***, respectively.

Figure 1: Project Location Map

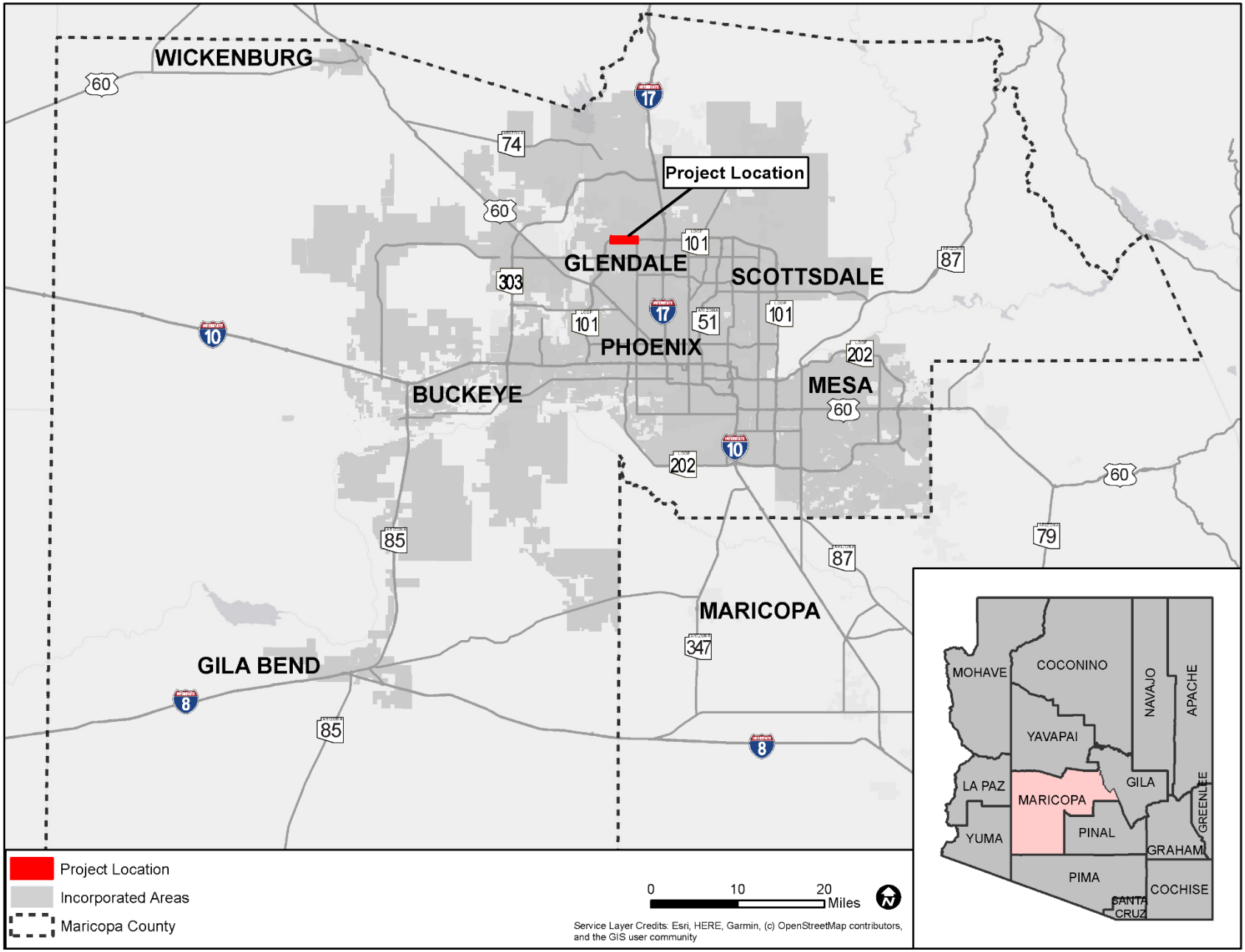
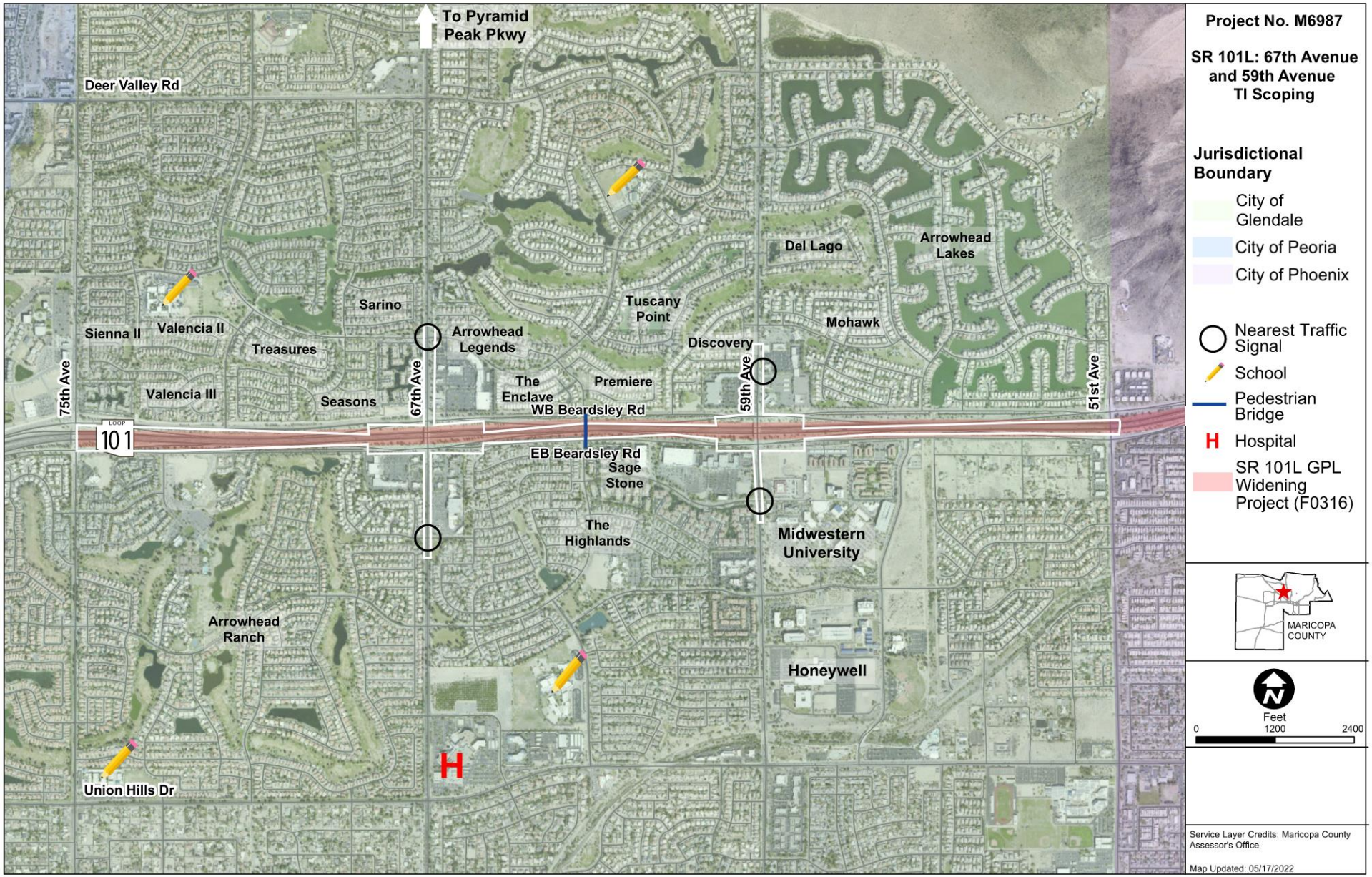


Figure 2: Project Vicinity Map



1.2. Need for Project

SR 101L is the primary freeway connection between Interstate 10 (I-10) and I-17 for many travelers in the northern Phoenix metropolitan area. It serves as a major loop freeway servicing Phoenix, Glendale, Peoria, Scottsdale, Salt River Pima Indian Community, Tempe, Mesa, and Chandler.

Currently, heavy traffic congestion is experienced traveling eastbound to I-17 in the morning hours and westbound from I-17 in the evening hours.

During public outreach for F0316, community members have communicated that improvements are needed at the SR 101L interchanges with 67th and 59th Avenues due to excessive congestion and queue lengths, prevalence of rear-end collisions, and road noise. Furthermore, studies associated with the project have cited that projected growth over the next 20 years will require improvements along 67th Avenue to reduce delays to an acceptable level.

Within the study area, the MAG travel demand model (TDM) estimates an average daily traffic (ADT) of approximately 159,500 vehicles in 2021 and an estimated 231,600 forecasted by 2045 along SR 101L. This growth is expected to cause exit ramp queuing, freeway congestion, and excessive weaving maneuvers.

1.3. Purpose/Description of the Project

The purpose of this project was to document service TI improvements at 67th and 59th Avenues. The western study limit is 75th Avenue and the eastern study limit is 51st Avenue. The project included establishing new traffic models and the development and evaluation of conceptual alternatives for the proposed TIs. The project included the following aspects:

- Preparation of a traffic modeling and operational analysis for future no-build conditions and build alternatives at each TI location;
- Preparation of a crash analysis;
- Development of and multi-discipline evaluation of TI alternatives; and
- Cost estimate development.

1.4. Characteristics of the Corridor

1.4.1. Roadway Characteristics and Right-of-Way

Within the study area, SR 101L is currently an eight-lane divided freeway with a concrete barrier separating east- and westbound traffic. After construction of F0316 is complete, it will be a 10-lane divided freeway. It is classified as a controlled-access urban principal freeway. There are three GPLs and a single high-occupancy vehicle (HOV) lane in each direction. The posted speed limit is 65 mph.

Beardsley Road is a single- to two-lane frontage road that is present in both the east- and westbound directions through the limits of the study area. It will be a two-lane facility each direction through the study area with completion of F0316. The posted speed limit is 45 mph.

67th Avenue is an underpass bridge, diamond configuration TI at SR 101L. It has a seven-lane cross section across the bridge: two southbound thru lanes, two southbound left-turn lanes, a single northbound left-turn lane, and two northbound thru lanes. The posted speed limit is 40 mph. The roadway characteristics and right-of-way associated with 67th Avenue are included in ***Table 1***.

Table 1: 67th Avenue Roadway Characteristics				
Segment	**Lane Widths (ft)**	**Sidewalk Width (ft)**	**Design Speed (mph)**	**Right-of-Way Width (ft)**
67th Avenue	11	Approx. 6	45	55-65**
SR 101L Exit Ramps at 67th Avenue	12	N/A	35 (min)	50-120**
SR 101L Entrance Ramps at 67th Avenue	12	N/A	55 (min)*	60-265**
Beardsley Road (East and West)	12	N/A	50	40-265**
*Design speed at the entrance gore. **Right-of-way is measured from roadway centerline to right-of-way boundary.				

59th Avenue is an underpass bridge, diamond configuration TI at SR 101L. It has a seven-lane cross section across the bridge: two southbound thru lanes, two southbound left-turn lanes, a single northbound left-turn lane, a single northbound left-turn/thru lane, and a single northbound thru lane. The shared left-turn/thru lane at the westbound Beardsley Road intersection requires the traffic signal to operate on a split phase, constraining available capacity. The posted speed limit is 40 mph. The roadway characteristics and right-of-way associated with 59th Avenue are included in ***Table 2***.

Table 2: 59th Avenue Roadway Characteristics				
Segment	**Lane Widths (ft)**	**Sidewalk Width (ft)**	**Design Speed (mph)**	**Right-of-Way Width (ft)**
59th Avenue	12	Approx. 6	45	55-70**
SR 101L Exit Ramps at 59th Avenue	12	N/A	35 (min)	60-105**
SR 101L Entrance Ramps at 59th Avenue	12	N/A	55 (min)*	75-110**
Beardsley Road (East and West)	12	N/A	50	30-110**
*Design speed at the entrance gore. **Right-of-way is measured from roadway centerline to right-of-way boundary.				

The *ADOT Existing Right-of-Way Plans Index* was used to locate ADOT right-of-way boundaries along the 67th Avenue and 59th Avenue arterials. Project No. BPM-600-0-704 (Drawing No. D-7-T-810) from 1986 was identified as the most recent project. The review of the drawings indicated that the limited access right-of-way generally extends 60 to 100 feet north of the 67th Avenue and 59th Avenue TIs, with the right-of-way outside of that extending up to approximately 280 feet; the limited access right-of-way generally extends 100 feet south of the 67th Avenue and 59th Avenue TIs, with the right-of-way outside of that extending up to approximately 300 feet. It is recommended that ADOT engage Glendale during final design to formalize operations and maintenance responsibilities along the arterials at the TI approaches.

1.4.2. Existing and Future Land Use

The surrounding areas of the study area are primarily privately owned; ADOT and the Maricopa County Flood Control District own the parcels adjacent to SR 101L. The surrounding land use is predominately single-family residential homes. Multi-family residential, commercial, and educational land is in the proximity of the SR 101L TIs and along the arterials.

The following schools and colleges are located within two miles of the study area:

- Midwestern University
- Deer Valley High School
- Mountain Ridge High School
- Hillcrest Middle School
- Highland Lakes School
- Legend Springs Elementary School
- Copper Creek Elementary School
- Sierra Verde Elementary School

Other nearby major traffic attractors impacting the study area include:

- Honeywell Aerospace DSES - Glendale
- Abrazo Arrowhead Hospital
- Christ's Church of the Valley - Peoria

One development associated with Midwestern University was identified from the MAG *Land Use Explorer*. The development includes educational and dormitory facilities at several parcels adjacent to the existing university. The vacant parcel located on the southeast corner of the 59th Avenue TI is included. No other current developments were identified; however, the Study Planning Partners have indicated that there is potential for future residential development to the north of the study area.

1.4.3. Previous Projects

The ADOT freeway widening project F0316, titled SR 101L from 75th Avenue to I-17 Black Canyon has been identified from the current ADOT 2022-2026 Five-Year Program and the tentative 2023-2017 Five-Year Program. Construction is scheduled to begin in 2024, with potential to begin earlier. Approximately $154 million is programmed. For the purposes of this project, the base condition of SR 101L includes completion of this widening project. The project limits are shown in ***Figure 3***. Some key project design elements include:

- Addition of one GPL in each direction along SR 101L from 75th Avenue to I-17;
- Bridge widening of some existing structures to accommodate the new GPLs;
- Beardsley Road widening from one lane to two in the exit ramp gore area and removal of the yield for frontage road traffic for both eastbound and westbound frontage roads at 67th and 59th Avenues;
- Lane addition on eastbound SR 101L between 75th and 67th Avenues; and
- Expansion of the exit ramps at the 67th and 59th Avenue TIs from the existing one-lane ramp to the proposed two-lane ramp configuration.

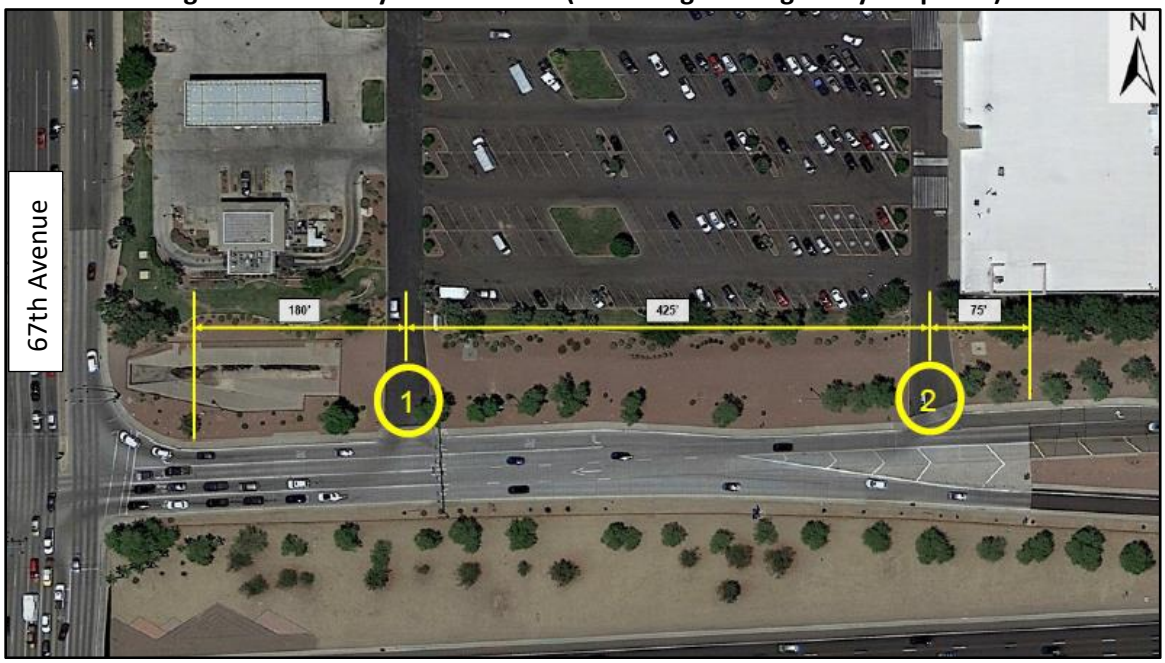
In February 2020, MAG completed a feasibility analysis to identify potential alternatives at the SR 101L traffic interchange with 75th Avenue to improve traffic flow and mitigate safety issues. In addition to MAG, the study planning partners included COG, the City of Peoria, ADOT, and the Maricopa County Department of Transportation (MCDOT). The result of the study was the recommendation of a third southbound 75th Avenue to eastbound Beardsley Road turning lane, a recommendation which was adopted into the F0316 design elements.

Figure 3: F0316 Project Limits (ADOT)

As part of the F0316, an Initial Scoping Report was completed in May 2021, in which traffic operational failures were reported at both 67th Avenue and 59th Avenue TIs in the existing conditions (2020).

In December 2021, a Value Engineering Study was prepared as part of F0316. The recommendation proposed in the study includes closing the driveway located approximately 180 feet east of the curb return at 67th Avenue, shown as Driveway No. 1 in ***Figure 4***. The study indicated the advantages of the closure include reducing interference in the weaving area, removing potential for errant left-turn vehicles becoming wrong-way drivers on SR 101L, and closer compliance with ADOT access control standards; the disadvantage would be a potential increase to project cost.

Figure 4: Driveway No. 1 Closure (Value Engineering Study Response)



MAG completed the SR 101L Northwest Area Intersections Traffic Analysis in June 2019. The study established capacity and operational needs for TIs along SR 101L between Thunderbird Road and 67th Avenue based on 2018 existing and 2040 no-build conditions.

All previous construction projects relevant to the 67th and 59th Avenue TIs are listed in ***Table 3***.

Table 3: Previous Construction Projects

Roadway	Project Number	MP	As-Built Date	Project Description
SR 101L: 75th Avenue to 35th Avenue	H0797	Approx. 17.1 to 22.8	1995	Construct mainline, ramps, structures, and frontage roads
SR 101L: 67th Avenue to 59th Avenue	H5985	18.7 to 18.9	2002	Construct auxiliary lane; construct second southbound left-turn lane at 67th Avenue
SR 101L: 75th Avenue to 51st Avenue	H6035	17.2 to 19.2	2002	Construct auxiliary lanes

1.4.4. Existing Right-of-Way and Access Control

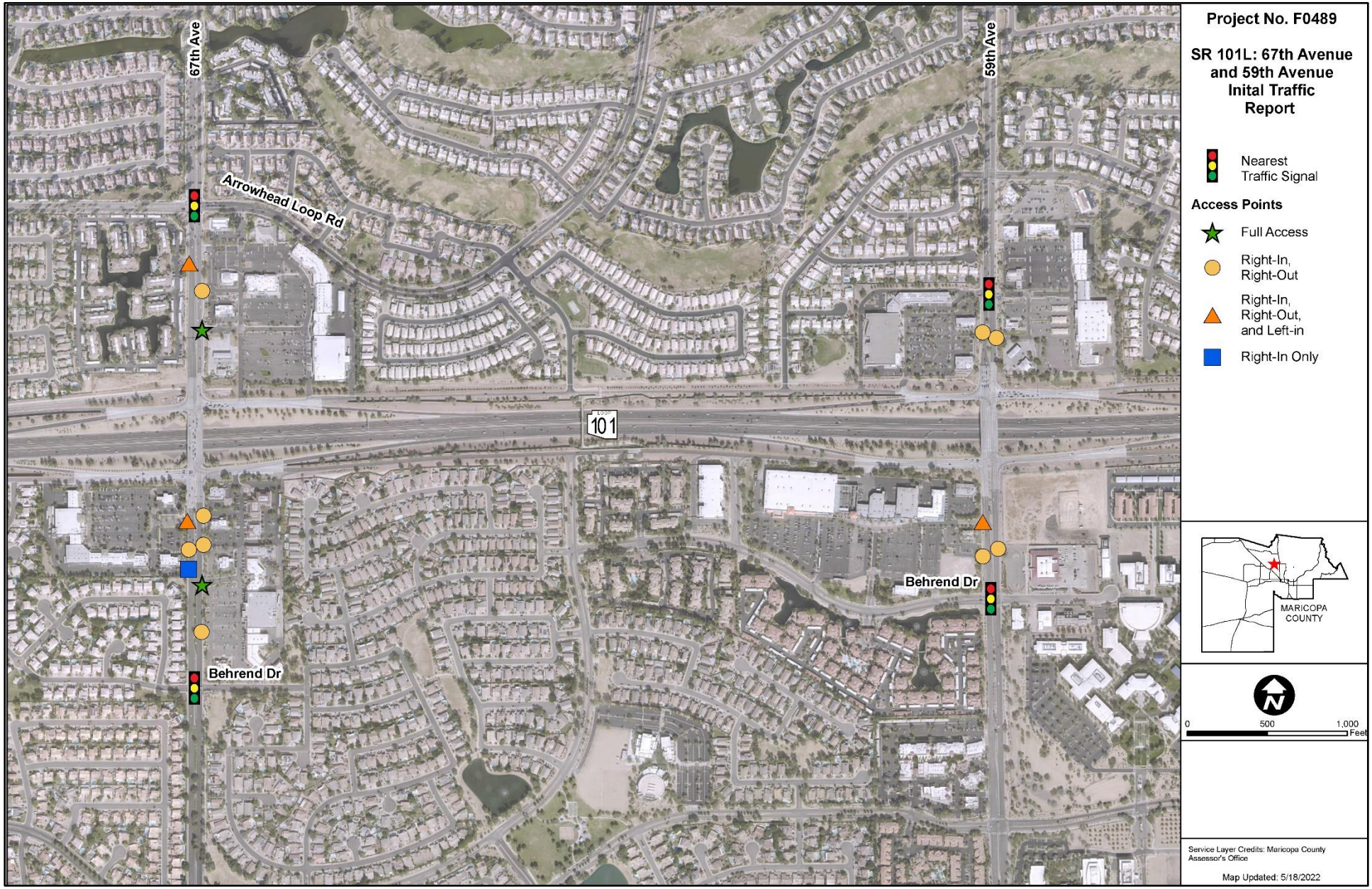
The right-of-way varies at the TIs. Along the arterials, there is approximately 55 to 65 feet and 55 to 70 feet of right-of-way at 67th Avenue and 59th Avenue, respectively, measured from roadway centerline to right-of-way boundary. The greatest right-of-way constraints are generally along eastbound Beardsley Road.

There are several driveways located along the arterials in the proximity of the TIs. The driveways located between the TIs and the nearest traffic signals along the arterials are listed in ***Table 4***. The access points are described as full access, limited access (right-in, right-out, and left-in), right-in, right-out only (RIRO), or right-in only. The access point locations are depicted in ***Figure 5***.

Table 4: Existing Access Points

Location	Location on Arterial (East/West)	Distance From TI (ft)	Access Point Type
67th Avenue, North of TI	East	410	Full access
	East	660	Right-in, right-out only
	West	820	Limited access (right-in, right-out, and left-in)
67th Avenue, South of TI	East	200	Right-in, right-out only
	West	220	Limited access (right-in, right-out, and left-in)
	East	380	Right-in, right-out only
	West	405	Right-in, right-out only
	West	535	Right-in only
	East	620	Full access
	East	920	Right-in, right-out only
59th Avenue, North of TI	East	295	Right-in, right-out only
	West	325	Right-in, right-out only
59th Avenue, South of TI	West	305	Limited access (right-in, right-out, and left-in)
	East	485	Right-in, right-out only
	West	540	Right-in, right-out only

Figure 5: Existing Access Points



1.4.5. Existing Drainage

As-Built record drawings do not show any existing irrigation pipe systems, canals, or tailwater ditches within the study area between 67th Avenue and 59th Avenue. The area was agricultural land prior to residential development in the 1980's and 1990's which built out the area to the residential and commercial land uses seen today. Abandoned irrigation pipes and tailwater ditch canals may be present in the subsurface. The agricultural activities grew citrus trees and relied on groundwater pumping for irrigation. There are no surface canals delivering irrigation water to the area today. Historical aerials depicting these land use changes are shown in ***Figure 6*** through ***Figure 8***.

Figure 6: Historic Aerial 1996 (Maricopa County GIS)

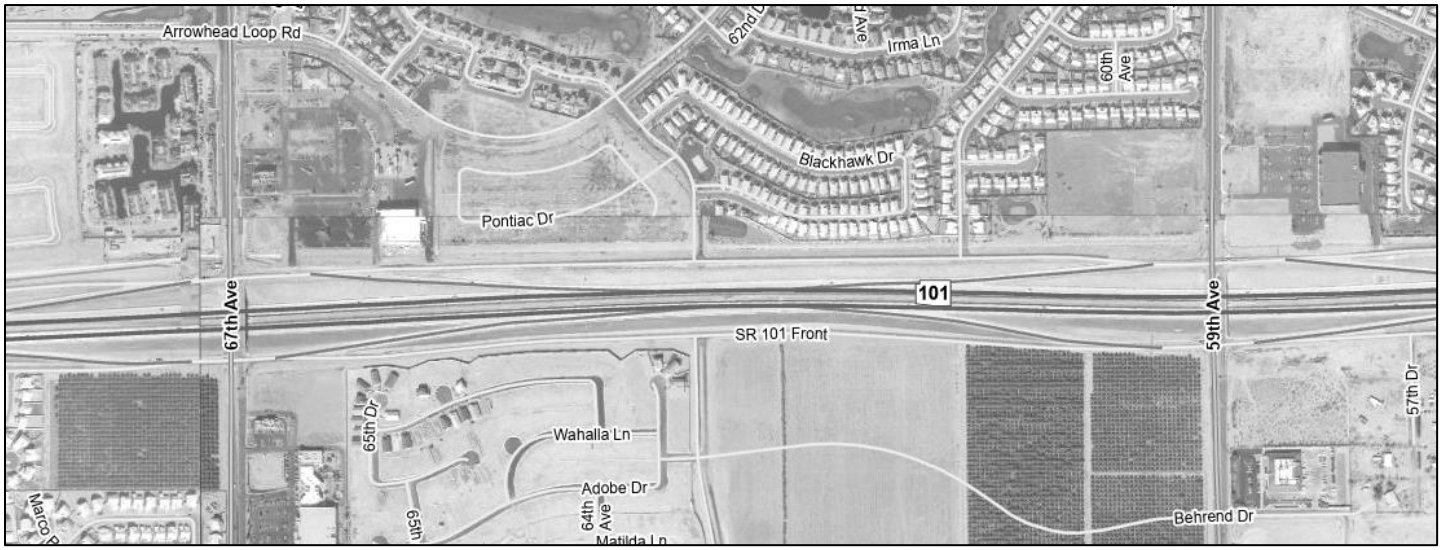


Figure 7: Historic Aerial 1993 (Maricopa County GIS)

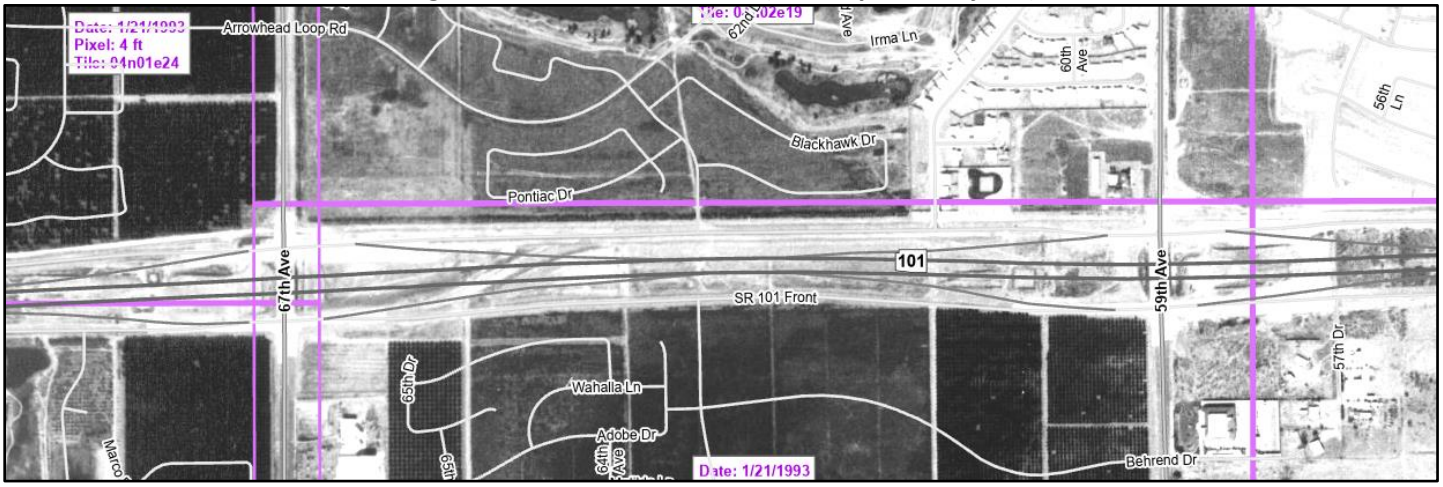
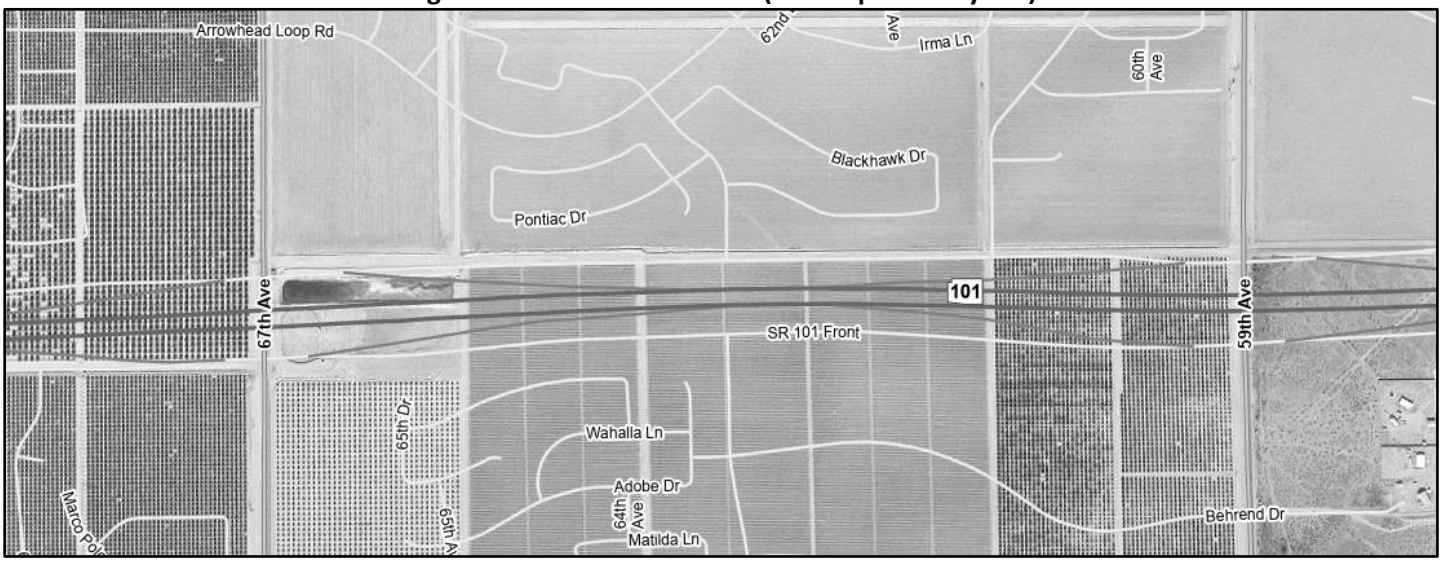


Figure 8: Historic Aerial 1979 (Maricopa County GIS)



1.4.5.1. General Drainage Characteristics

The surrounding areas of the study area are medium density residential subdivisions with commercial areas. The existing topographic relief generally slopes southwest towards the New River drainageway, illustrated in ***Figure 9***. Offsite runoff is generated from the Thunderbird Recreation Area in the Hedgpeth Hills northeast of the freeway with a maximum elevation of 2,194 feet. The areas south of the hills have a flatter terrain with an average slope of 0.0040 feet/feet to the southwest. Offsite soils are mostly Laveen Loam, Gilman Loam, and Rock Outcrop-Cheriono Complex. Offsite runoff is intercepted by the SR 101L West Channel where the channel outfalls to the New River Zone AE floodplain west of SR 101L near Beardsley Road west of 75th Avenue. The existing topographic relief is included in ***Figure 10***. The offsite United States Geological Survey (USGS) topographic map is shown in ***Figure 11***.

There are no mapped Federal Emergency Management Agency (FEMA) or local jurisdictional floodplains within the study limits between 67th Avenue and 59th Avenue along SR 101L. The flood zones are identified as Zone X “0.2% Annual Chance Flood Hazard” on FEMA Flood Insurance Rate Map (FIRM) panel 04013C1265L, dated 10/15/2013, and FIRM panel 04013C1270M, dated 9/17/2020.

Figure 9: SR 101L West Channel Outfall to New River

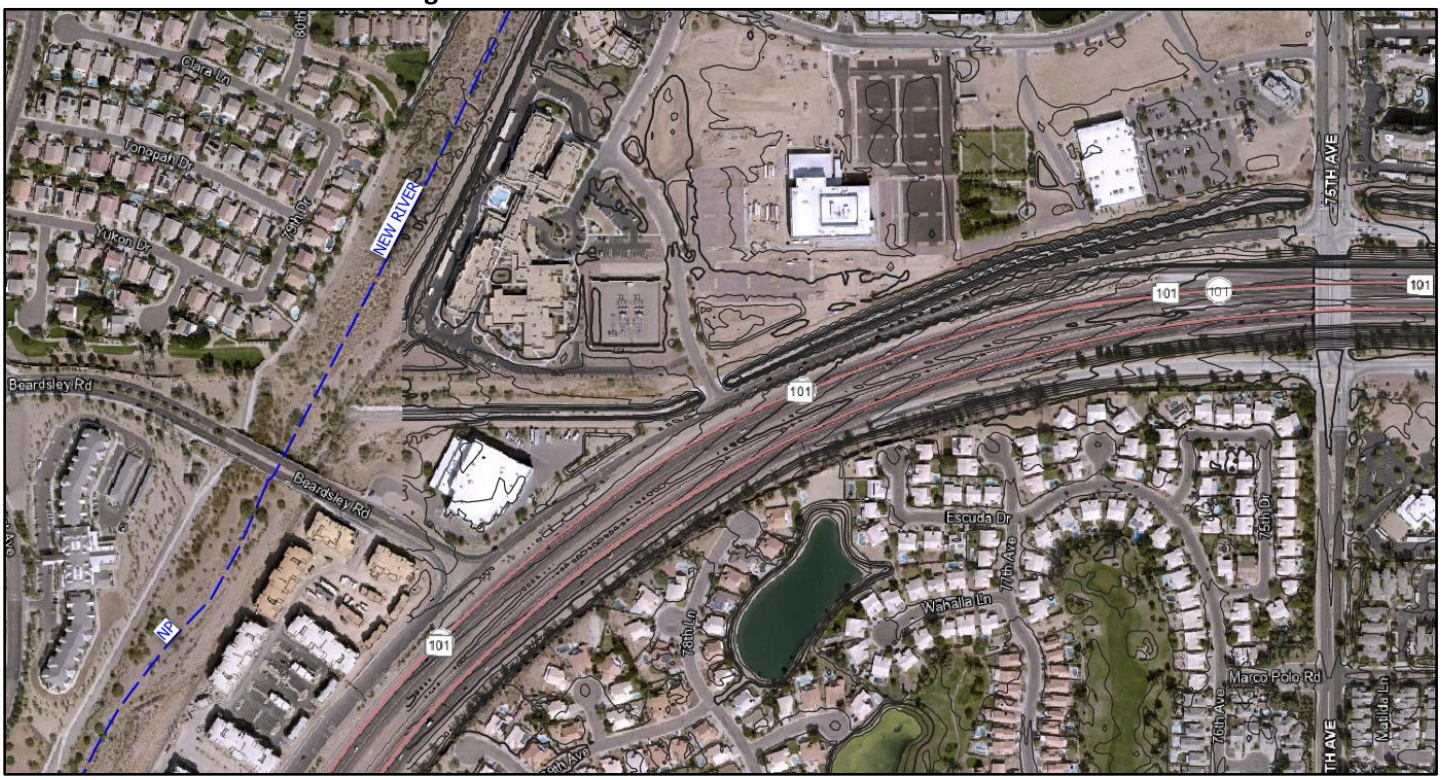


Figure 10: Offsite Area Topographic Relief

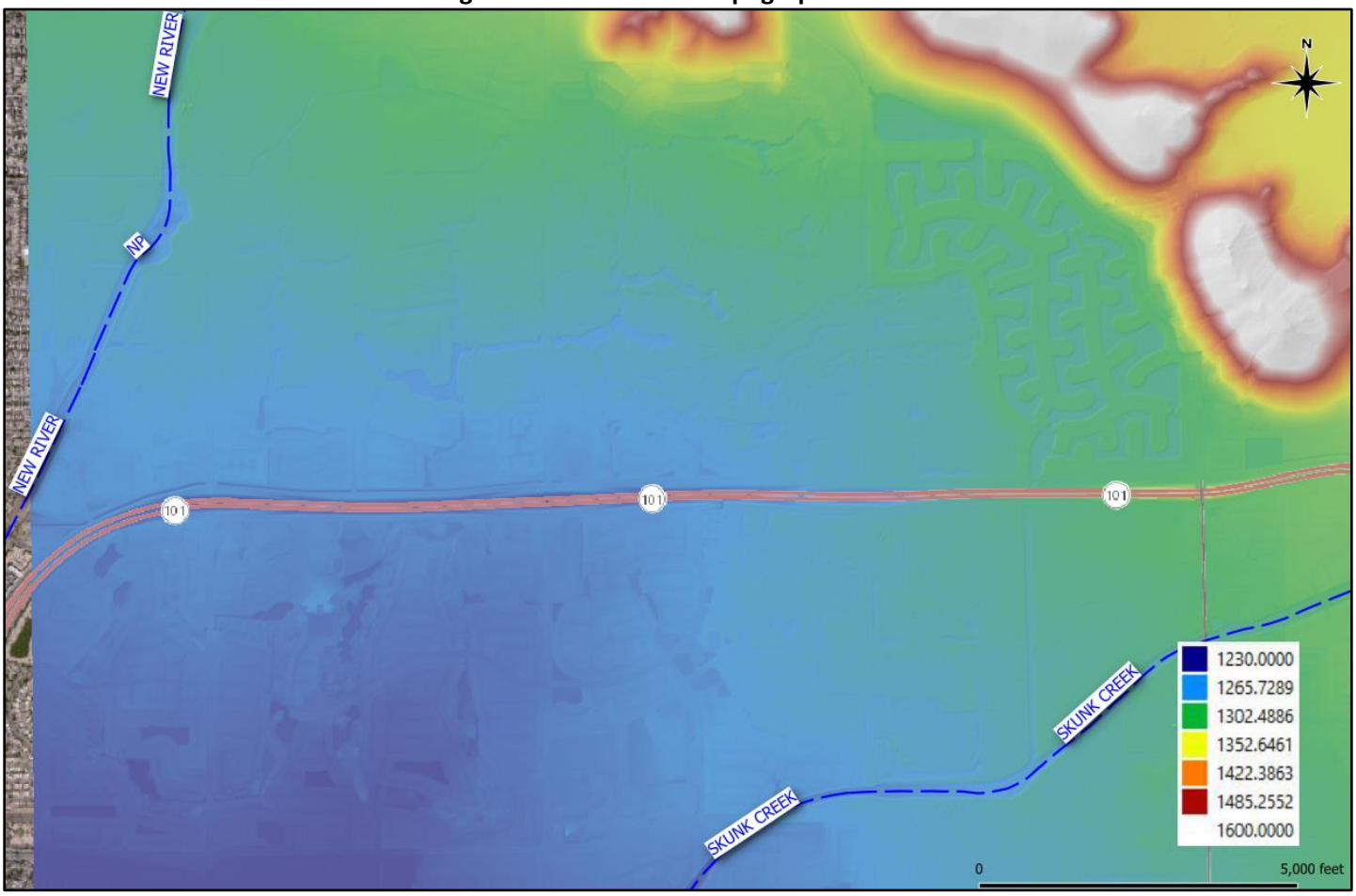
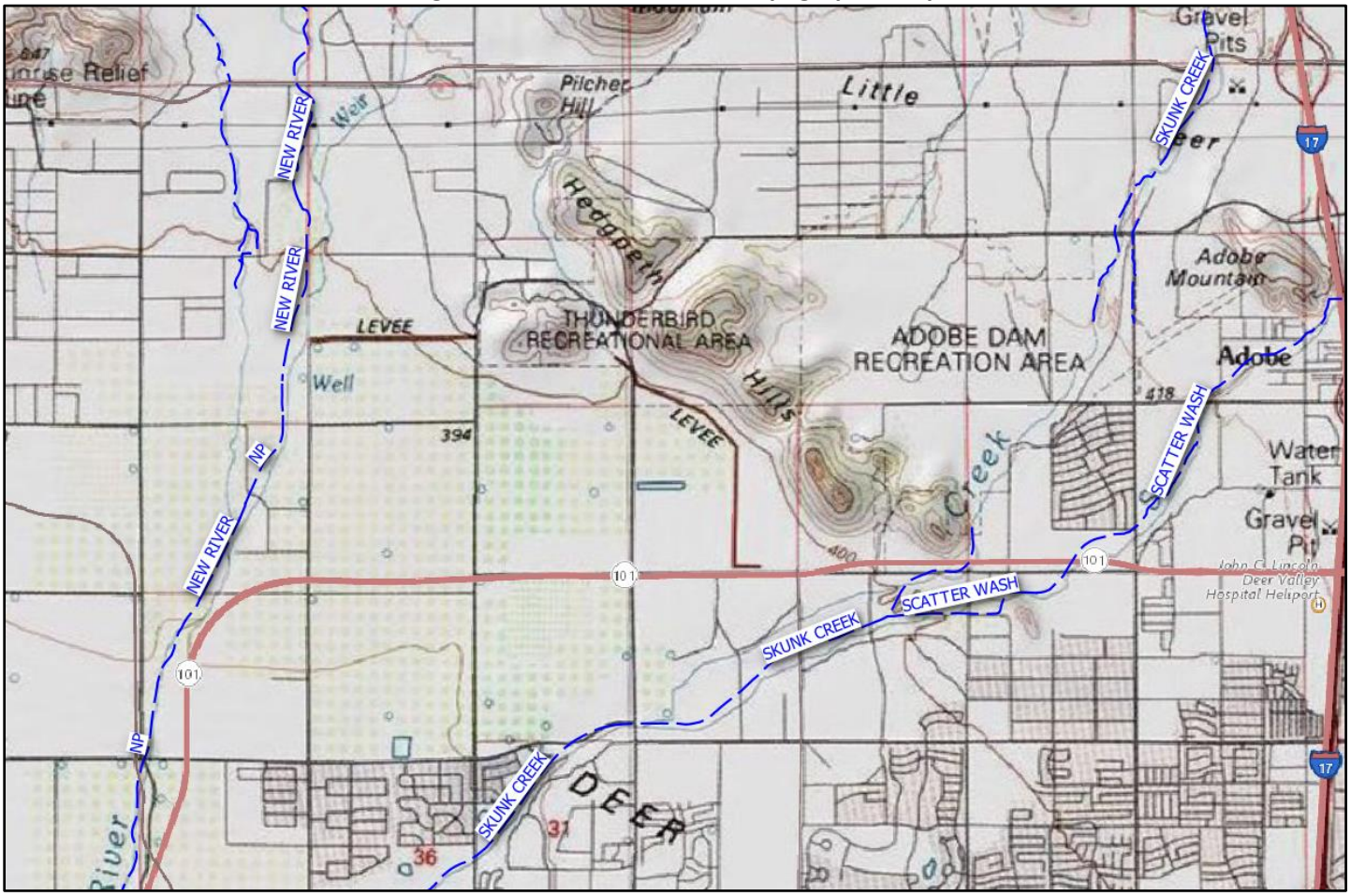


Figure 11: Offsite Area USGS Topographic Map



1.4.5.2. Existing Onsite Drainage

The existing onsite drainage consists of freeway style catch basins and storm drain systems to capture the pavement runoff and convey it to a central trunkline system draining west along the SR 101L freeway corridor to its outfall into New River. There are existing freeway catch basins and infield area catch basins located along Beardsley Road and the freeway interchange ramps at 67th Avenue and 59th Avenue. The onsite storm drain systems were designed to convey the onsite runoff from the 10-year storm. There have been auxiliary lane projects that have widened the freeway, pushing out the onsite drainage catch basins systems where they now connect to capped catch basins and capped manholes. The existing trunklines are still under pavement in the original freeway construction locations.

The ongoing F0316 project will relocate catch basins and wall inlets to the new edge of pavement location and connect to existing catch basins and storm drain trunklines. Refer to the F0316 plans and drainage report for the exact locations and numbers of onsite drainage facilities between 67th Avenue and 59th Avenue.

1.4.5.3. Existing Offsite Drainage

Offsite freeway drainage consists of longitudinal interceptor channels and box culverts. The existing offsite systems convey freeway stormwater runoff along with urban drainage areas. The SR 101L West Channel ultimately outfalls to New River west of 75th Avenue near Beardsley Road. The existing drainage channel and cross culvert details are summarized in ***Table 5*** and ***Table 6***, respectively.

Table 5: Existing Drainage Channel Summary					
Channel Configuration/Limits	**Length (ft)**	**Depth (ft)**	**Side Slopes (H:1)**		**Bottom Width (ft)**
			Lt	**Rt**	
Concrete Trapezoidal Channel: 67th Avenue to 59th Avenue – Station 915+00 to 998+10, LT	8,300	7 to 10	2	2	12

Table 6: Existing Cross Culverts Summary						
Traffic Interchange	**SR 101L Mainline Station**	**Barrels (No.)**	**Size**	**Skew (Lt/Rt)**	**Length (ft)**	**Upstream Invert Elev (ft)**
67th Avenue	995+77, 302 LT	2	8’ Span x 5’ Rise	89.39	130	1,251.25 (AB)
59th Avenue	1045+46, 282 LT	1	2’	90	200	1,270.69 (AB)

1.4.6. Site Topography and Geology

The geotechnical conditions in the study area were documented as part of the Phase I Geotechnical Assessment for F0316. The assessment was completed in September 2020.

The site geology generally consists of the following materials and traits:

- Relatively flat-lying surficial late to middle Pleistocene variably cemented terrace deposits of sand, silt, and clay;
- A variation of gravels and cobbles, often increasing in hardness and depth;
- Volcanic basalt rock, Oligocene to middle Miocene, exposed in a northwest to southeast trending hill just north of the alignment near 43rd Avenue and extending southeast of the SR 101L alignment for several hundred feet;
- Groundwater not encountered within existing test borings advanced throughout the study area (maximum depth of about 100 feet); and
- No reported earth fissures within the study area.

The subgrade conditions can be generally described as firm to hard, finer grained, low-to-medium plasticity silty to clayey sands and sandy clays. Typically, these soil types are weakly cemented with calcium carbonate (lime) and are firm in the upper 5 to 15 feet, becoming hard (refusal blow count N-values and associated refusal of drilling augers) and more cemented with depth.

As-Built record drawings revealed the existing mainline, ramp, and frontage road pavement sections: SR 101L mainline was constructed with Portland Cement Concrete Pavement (PCCP) with a typical section of 12-inch PCCP over 4 to 6 inches of Class 2 Aggregate Base (AB), Asphalt Concrete Base (ACB) was used in place of AB in depressed freeway areas, entrance and exit ramps were constructed with 10-inch PCCP over 5-inch AB, and crossroads and frontage road pavement sections varied.

As-Built record drawings also revealed areas of subgrade treatment for subgrade soils. Collapsible soils and low R-value subgrade were addressed by the following treatment methods: geogrid, over-excavation and replacement, lime, or scarification.

1.4.7. Existing Structures

There are three existing bridges within the study area: two underpass bridges at the 67th Avenue and 59th Avenue TIs with SR 101L and one pedestrian underpass bridge. The pedestrian bridge crosses over SR 101L and is located between the 67th Avenue and 59th Avenue TIs, providing a connection for 63rd Avenue over SR 101L. The crossing passes under eastbound Beardsley Road, while a High-Intensity Activated Crosswalk (HAWK) is present at the westbound Beardsley Road crossing. General data related to the existing structures in the study area is included in ***Table 7***.

1.4.7.1. 67th Avenue TI Underpass

The existing bridge is a two, unequal spans cast-in-place (CIP)/post-tensioned (PT) concrete box girder bridge with 133-foot and 127-foot spans and 5.5-foot-deep superstructure. The out-to-out bridge width is 96.5 feet including a one-foot-wide concrete parapet with chain-link fence, a 5.8-foot sidewalk and a concrete separation traffic barrier on the east and west sides of the bridge, seven traffic lanes and a four-foot raised concrete median centered on the bridge centerline. The existing minimum vertical clearance is 16.8 feet. The substructure consists of integral stub abutments supported on concrete footing caps over staggered drilled shafts with a sliding surface between the abutment stub and the footing cap, and the pier consists of two integral columns supported on individual spread footings.

1.4.7.2. 59th Avenue TI Underpass

The existing bridge is a two, 128-foot spans CIP/PT concrete box girder bridge with 5.5-foot-deep superstructure. The out-to-out bridge width is 108.5 feet including a one-foot-wide concrete parapet with chain-link fence, a 5.8-foot sidewalk and a concrete separation traffic barrier on the east and west sides of the bridge, seven traffic lanes and a four-foot raised concrete median offset six feet from the bridge centerline. The existing minimum vertical clearance is 16.8 feet. The substructure consists of integral stub abutments on continuous concrete footings with a sliding surface between the abutment stub and the footing, and the pier consists of two integral columns supported on individual spread footings.

1.4.7.3. 63rd Avenue Pedestrian Underpass

The existing pedestrian bridge is a two, 130-foot spans steel truss bridge with cable-stays. The structure was built in 2011 and is identified as in “Good” condition per the latest ADOT bridge inspection reports. The existing minimum vertical clearance is 20.4 feet.

Table 7: Existing Structures

Name of Structure	MP	Structure No.	No. of Spans	Length (ft)	Max. Span Length (ft)	Condition	Sufficiency Rating
67th Avenue TI Underpass	18.24	2052	2	261	133	FAIR	74.50
63rd Avenue Pedestrian Underpass	18.70	10605	2	265	130	GOOD	-2.0*
59th Avenue TI Underpass	19.18	2053	2	257	128	FAIR	99

*ADOT standard sufficiency rating designation for all pedestrian, railroad, and flume bridges.

1.4.8. Existing Utilities

A Bluestake ticket was filed with AZ811 to identify the existing utilities within the study area. The utilities, including company contact information, are listed in ***Table 8***.

Table 8: Existing Utilities

Agency/Company	Utility Type	Contact Person	Phone No.
ADOT	Culverts, electric, fiber optics, gas, irrigation, sewer, storm drains, telephone, traffic signals, water	Scott Vollrath	602-568-3284
Arizona Public Service	Electric	APS Locate Dept	602-493-4225
Arrowhead Ranch Amenities	Irrigation, water	Bob Revolinski	602-339-5676
City of Glendale	Irrigation, reclaimed water, sewer, water, fiber optics, traffic signals	Josh Elias Victor Gonzales (irrigation) Ruben Lopez (signals)	623-512-7688 623-980-0496 623-930-2762
City of Phoenix	Reclaimed water, sewer, water, fiber optics, traffic signals	Hector Lepur Signal Shop	602-534-8342 602-262-6021

Table 8: Existing Utilities			
Agency/Company	**Utility Type**	**Contact Person**	**Phone No.**
Cox Communications	CATV, fiber optics	UCIC Dispatch Center	800-778-9140
CenturyLink	Coaxial, fiber optics	UCIC Dispatch Center	800-778-9140
Verizon	Fiber optics	Supervisor on duty	800-624-9675
Southwest Gas	Gas	ELM Locating Dispatch SWG Westside Office	623-780-3350 602-484-5265
Zayo Group FKA AGL	Communication, fiber optics	Stake Center Dispatch	801-364-1063

1.5. Agency and Public Scoping

Because this project is in the early stages of development, all public involvement efforts will be deferred until the next phases of the project. Future public involvement will be evaluated and addressed by ADOT as necessary. Public information will be offered at a later date to inform the community and nearby stakeholders of the project and provide ample opportunity to offer input. Project issues, concerns, and opportunities may be discussed during public meeting(s). The Office of Community Relations within ADOT Communications will lead public involvement efforts for the agency. All public involvement will occur in accordance with the ADOT Public Involvement Plan (PIP), which has been approved by FHWA. Prior to the start of any formal public involvement activities, a project or study specific public involvement plan, in compliance with the ADOT PIP, will be developed and approved by ADOT Community Relations.

2.0 Traffic and Crash Data

2.1. Crash Analysis

There were no recent ADOT crash analyses or reports identified in the study area. As part of this project, a crash analysis was conducted at the 67th and 59th Avenue TIs using crash data from 2016 to 2020.

Crash data for a five-year period from January 1, 2016, to December 31, 2020, were obtained from the ADOT Accident Location Incident Surveillance System (ALISS) database for the interchanges associated with SR 101L at 67th Avenue and 59th Avenue. Comparisons are offered based upon the 2019 and 2020 *Arizona Motor Vehicle Crash Facts* (Crash Facts) published by ADOT in July 2020 and 2021, respectively. The comparison to both publications is offered as 2020 is the most current, but due to the COVID-19 pandemic, 2020 was an atypical year.

2.1.1. 67th Avenue

Crash severity data at the 67th Avenue TI between 2016 and 2020 are summarized in ***Table 9***; additional crash severity information by year is provided in ***Table 10***.

A total of 321 crashes occurred near the 67th Avenue TI between 2016 and 2020. There were no fatal crashes, but there were three crashes causing incapacitating injuries. All three incapacitating crashes involved a collision between two vehicles; two of which were angle front-to-side accidents (which exclude left-turn movements) and the third was a sideswipe between two vehicles moving in the same direction. ***Figure 12*** shows a crash map detailing crash severity and location.

Table 9: 67th Avenue Crash Severity Summary				
Crash Severity	**Number of Crashes**	**Percent of Total**	**2019 Statewide Urban Average**	**2020 Statewide Urban Average**
Property Damage Only	265	***82.6%***	71.2%	70.6%
Injury	56	17.4%	28.3%	28.7%
Fatal	0	0.0%	0.5%	0.7%
Total	**321**	**100.0%**	**100.0%**	**100.0%**
Note: Cells with bold, red text denote percentages above the statewide average.				

Table 10: 67th Avenue Detailed Crash Severity 2016-2020						
Crash Severity	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**
Fatal	0	0	0	0	0	0
Incapacitating	1	0	0	2	0	3
Non-incapacitiating	1	2	4	5	4	16
Possible Injury	9	5	11	7	5	37
Property Damage Only	32	54	79	50	50	265
Total	**43**	**61**	**94**	**64**	**59**	**321**

Figure 12: 67th Avenue Crash Severity Map

The first harmful event for the crashes near the 67th Avenue TI is listed in ***Table 11***. There was a higher occurrence of crashes involving other vehicles with 1.2 times greater share of crashes than the statewide urban average, as shown in ***Table 11***.

Table 11: 67th Avenue First Harmful Event				
Collision Manner	**Number of Crashes**	**Percent of Total**	**2019 Statewide Urban Average**	**2020 Statewide Urban Average**
Collision with Motor Vehicle in Transport	307	***95.6%***	81.2%	76.8%
Overturning	3	1.0%	0.8%	0.6%
Collision with Pedestrian	0	0.0%	1.5%	1.5%
Collision with Pedalcyclist	0	0.0%	1.0%	0.9%
Collision with Animal	0	0.0%	0.3%	0.4%
Collision with Fixed Object	5	1.7%	8.0%	10.8%
Collision with Non-Fixed Object*	5	1.7%	4.3%	5.8%
Vehicle Fire or Explosion	0	0.0%	0.1%	0.1%
Other Non-Collision**	0	0.0%	0.3%	0.5%
Unknown	0	0.0%	2.5%	2.5%
Total	**321**	**100.0%**	**100.0%**	**100.0%**

* Includes collision with parked vehicles, trains, railway vehicles, and work zone equipment.
** Includes vehicle immersion, jackknife, and cargo loss or shift.
Note: Cells with bold, red text denote percentages above the statewide average.

Table 12 includes the collision manner in which these vehicle-to-vehicle crashes occurred. It was found that angle (front to side) crashes occurred at a rate 1.6 times greater than the statewide average. Rear end crashes exceeded by a factor of 1.2. ***Figure 13*** and ***Figure 14*** illustrate crashes by collision manner at 67th Avenue and westbound Beardsley Road and 67th Avenue and eastbound Beardsley Road, respectively.

Table 12: 67th Avenue Manner of Collision in Multi-Vehicle Crashes				
Type of Crash	**Number of Crashes**	**Percent of Total**	**2019 Statewide Average**	**2020 Statewide Average**
Angle	75	***24.4%***	14.2%	15.7%
Left Turn	34	11.1%	17.0%	17.4%
Rear End	145	***47.2%***	43.3%	39.4%
Head-On	2	0.7%	1.8%	2.2%
Sideswipe Same Direction	49	16.0%	16.3%	16.7%
Sideswipe Opposite Direction	1	0.3%	1.5%	1.9%
Other*	1	0.3%	5.1%	5.9%
Unknown	0	0.0%	0.8%	0.8%
Total	**307**	100.0%	**100.0%**	**100.0%**

*Other includes pedestrian, pedalcyclist, and rear-to-side crashes.
Note: Cells with bold, red text denote percentages above the statewide average.

Figure 13: 67th Avenue and Westbound Beardsley Road Crashes by Collison Manner

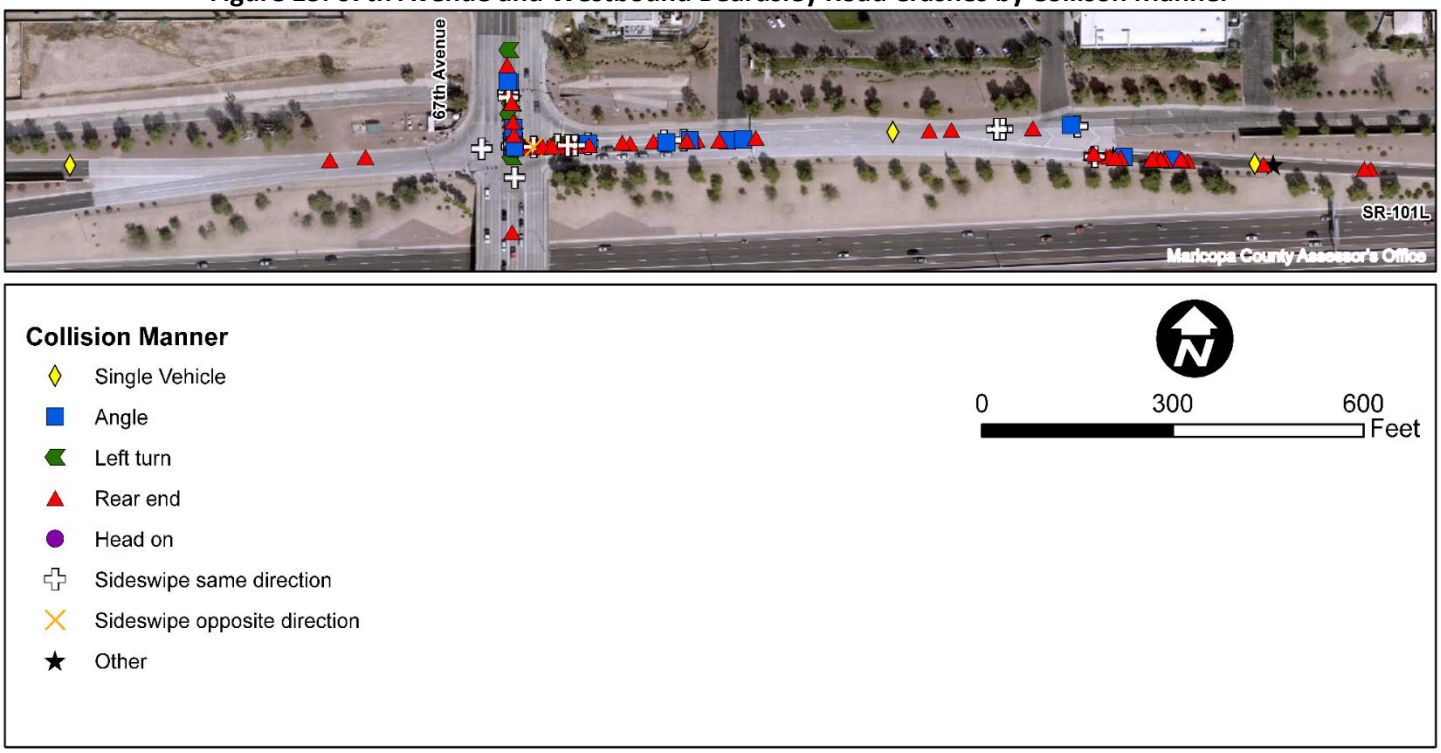


Figure 14: 67th Avenue and Eastbound Beardsley Road Crashes by Collison Manner

2.1.3. 59th Avenue

From 2016-2020, 140 crashes occurred near the 59th Avenue TI. There were no fatal or incapacitating injuries within the analysis period. A summary of the total crashes is provided in ***Table 13***. ***Table 14*** provides a detailed list of the crash severity at the 59th Avenue TI by year.

A total of 140 crashes occurred near the 59th Avenue TI between 2016 and 2020. There were no fatal crashes or crashes causing incapacitating injuries. A crash map detailing crash severity and location is shown in ***Figure 15***.

Table 13: 59th Avenue Crash Severity Summary

Crash Severity	Number of Crashes	Percent of Total	2019 Statewide Urban Average	2020 Statewide Urban Average
Property Damage Only	114	***81.4%***	71.2%	70.6%
Injury	26	18.6%	28.3%	28.7%
Fatal	0	0.0%	0.5%	0.7%
Total	**140**	**100.0%**	**100.0%**	**100.0%**

Note: Cells with bold, red text denote percentages above the statewide average.

Table 14: 59th Avenue Detailed Crash Severity

Crash Severity	2016	2017	2018	2019	2020	Total
Fatal	0	0	0	0	0	0
Incapacitating	0	0	0	0	0	0
Non-incapacitiating	0	2	2	1	1	6
Possible Injury	5	4	4	5	2	20
Property Damage Only	26	27	22	21	18	114
Total	**31**	**33**	**28**	**27**	**21**	**140**

Figure 15: 59th Avenue Crash Severity Map

The first harmful event for the crashes near the 67th Avenue TI is listed in ***Table 15***. There is a higher occurrence of crashes involving other vehicles compared to the urban statewide average, as shown in ***Table 15***.

Table 15: 59th Avenue First Harmful Event				
Collision Manner	**Number of Crashes**	**Percent of Total**	**2019 Statewide Urban Average**	**2020 Statewide Urban Average**
Collision with Motor Vehicle in Transport	136	***97.2%***	81.2%	76.8%
Overturning	0	0.0%	0.8%	0.6%
Collision with Pedestrian	1	0.7%	1.5%	1.5%
Collision with Pedalcyclist	0	0.0%	1.0%	0.9%
Collision with Animal	0	0.0%	0.3%	0.4%
Collision with Fixed Object	1	0.7%	8.0%	10.8%
Collision with Non-Fixed Object*	2	1.4%	4.3%	5.8%
Vehicle Fire or Explosion	0	0.0%	0.1%	0.1%
Other Non-Collision**	0	0.0%	0.3%	0.5%
Unknown	0	0.0%	2.5%	2.5%
Total	**140**	**100.0%**	**100.0%**	**100.0%**

* Includes collision with parked vehicles, trains, railway vehicles, and work zone equipment.
** Includes vehicle immersion, jackknife, and cargo loss or shift.
Note: Cells with bold, red text denote percentages above the statewide average.

Table 16 includes the collision manner in which these vehicle-to-vehicle crashes occurred. Angle crashes exceed the statewide average, at 1.1 times greater. Rear end crashes exceed the statewide average, at 1.4 times greater. Sideswipes between vehicles moving in the same direction exceed the statewide average by a factor of 1.4. ***Figure 16*** and ***Figure 17*** illustrate crashes by collision manner at 59th Avenue and westbound Beardsley Road and 59th Avenue and eastbound Beardsley Road, respectively.

Table 16: 59th Avenue Manner of Collision in Multi-Vehicle Crashes				
Type of Crash	**Number of Crashes**	**Percent of Total**	**2019 Statewide Average**	**2020 Statewide Average**
Angle	23	***16.9%***	14.2%	15.7%
Left Turn	2	1.5%	17.0%	17.4%
Rear End	77	***56.6%***	43.3%	39.4%
Head-On	0	0.0%	1.8%	2.2%
Sideswipe Same Direction	31	***22.8%***	16.3%	16.7%
Sideswipe Opposite Direction	2	1.5%	1.5%	1.9%
Other*	1	0.7%	5.1%	5.9%
Unknown	0	0.0%	0.8%	0.8%
Total	**136**	**100.0%**	**100.0%**	**100.0%**

*Other includes pedestrian, pedalcyclist, and rear to side crashes.
Note: Cells with bold, red text denote percentages above the statewide average.

Figure 16: 59th Avenue and Westbound Beardsley Road Crashes by Collison Manner

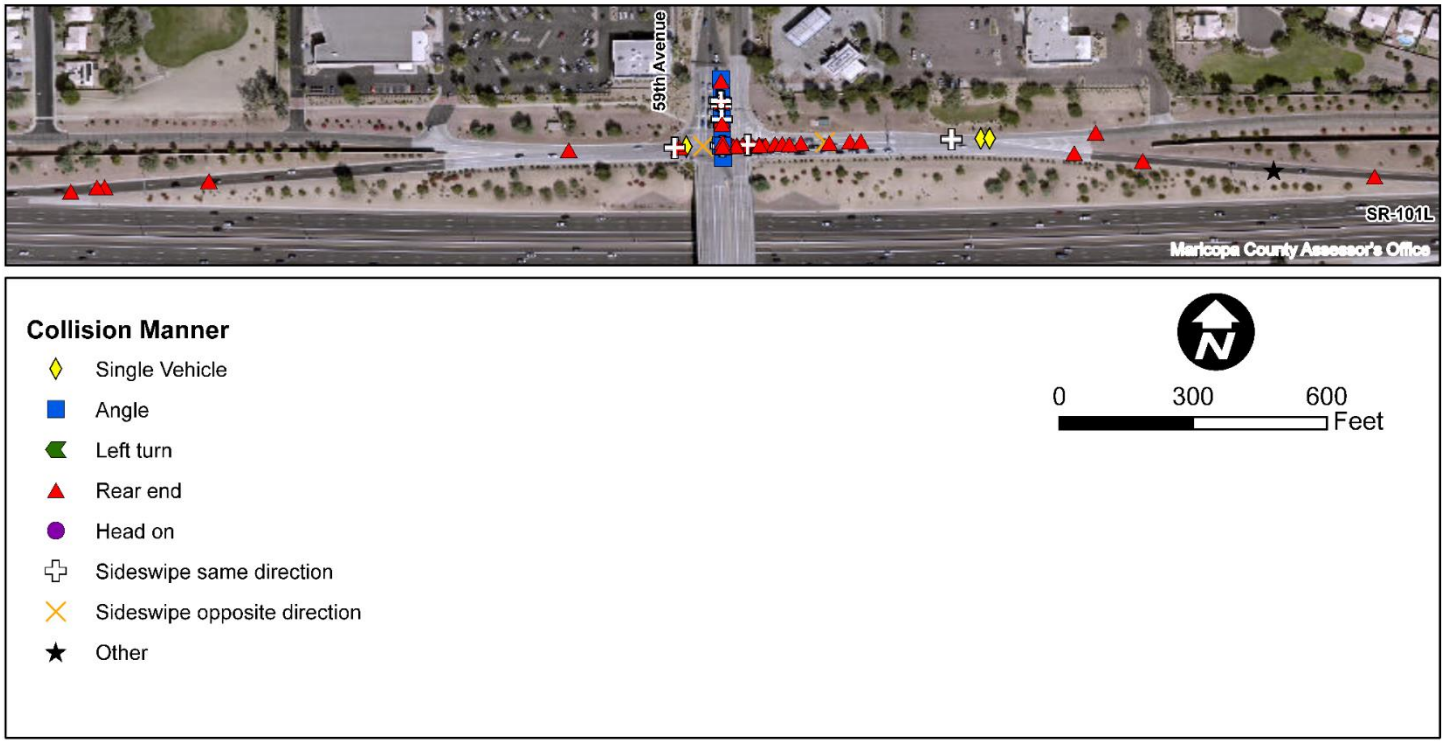


Figure 17: 59th Avenue and Eastbound Beardsley Road Crashes by Collison Manner

2.3. Traffic Analysis

2.3.1. Traffic Data

The Annual Average Daily Traffic (AADT), Design Hour Factor (K), Directional Distribution Factor (D), and Truck and Recreational Vehicle Factor (T) for SR 101L were obtained from the *ADOT Traffic Data Management System* (TDMS). The data was obtained in 2019; except for the truck factors, which were obtained in 2016. The traffic factors are listed in ***Table 17***.

Table 17: 2019 Traffic Factors for SR 101L

SR 101L Segment	AADT	Design Hour Traffic Factor (K)	Directional Distribution Factor (D)	Truck Factor* (T)
75th Avenue to 67th Avenue	135,200	9%	52%	8%
67th Avenue to 59th Avenue	140,119	9%	57%	8%
59th Avenue to 51st Avenue	161,029	9%	50%	8%
*Most recent data available was 2016.				

Turning movement counts (TMCs) were collected on Tuesday, December 7, 2021, at the 67th and 59th Avenue TIs and the frontage roads. The traffic counts were collected from 7 AM to 9 AM, 11 AM to 1 PM, and from 4 PM to 6 PM on a typical weekday. The existing conditions traffic counts are illustrated in ***Figure 18***.

2045 traffic volume forecasts were developed using the following methodology due to the unavailability of the 2045 MAG model:

- 2020 MAG model was calibrated to existing traffic counts to determine adjustment factors;
- The resulting adjustment factors were applied to the 2040 MAG model;
- NCHRP 765 report was used to refine the traffic forecasts;
- The linear growth rate was determined from the existing conditions to 2040 traffic forecasts;
- The linear growth rate was applied to the 2040 forecasts to develop 2045 forecasts; and
- It was confirmed there are no programmed improvements between 2040 and 2045 that may impact the project area.

The 2045 forecasted TMCs are included in ***Figure 19***. Additional information regarding the traffic volume forecasting is provided in the *SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements Traffic Report*.

Figure 18: Existing Conditions (2021) Peak Hour Turning Movement Counts

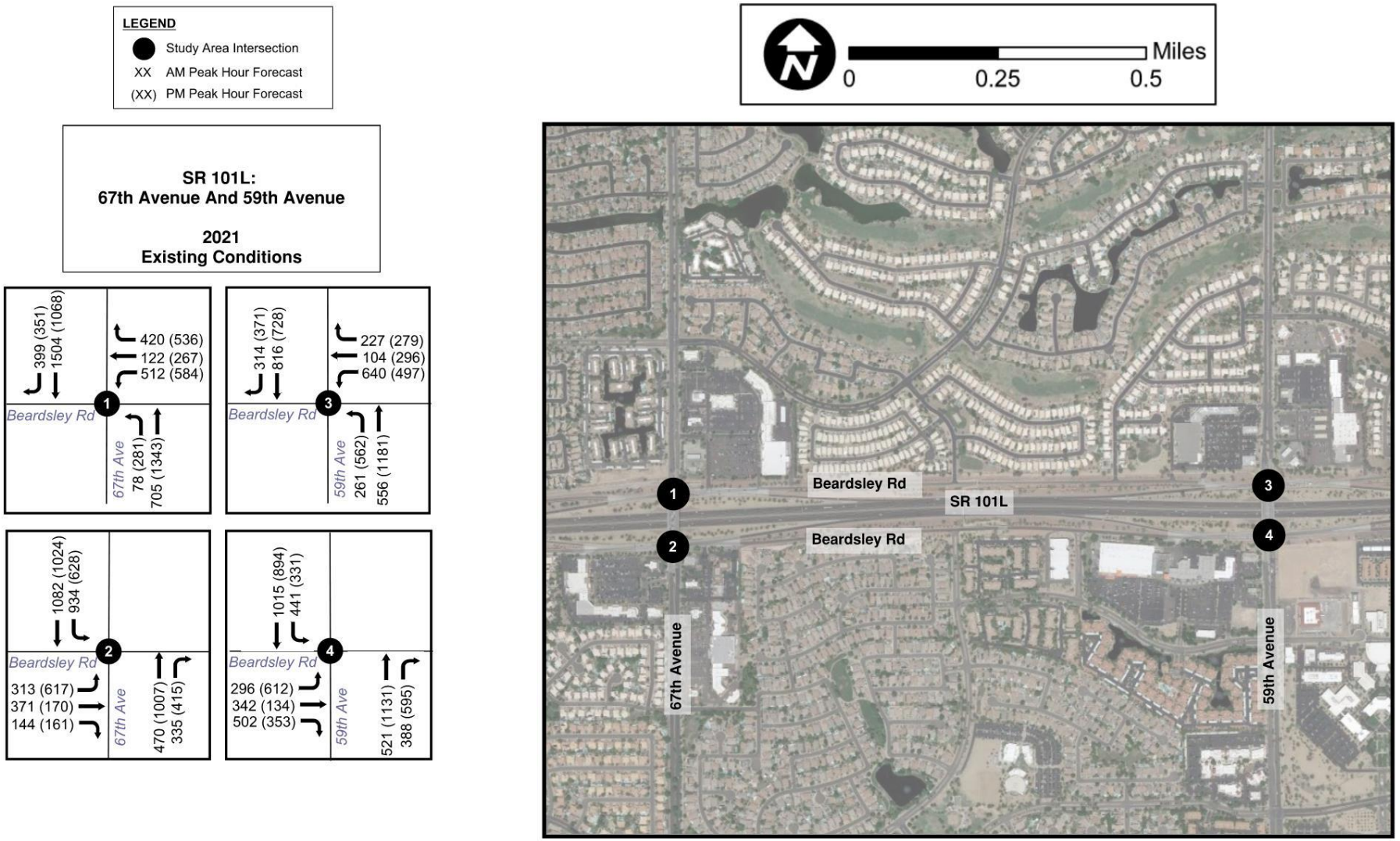


Figure 19: Forecasted (2045) Peak Hour Turning Movement Forecasts

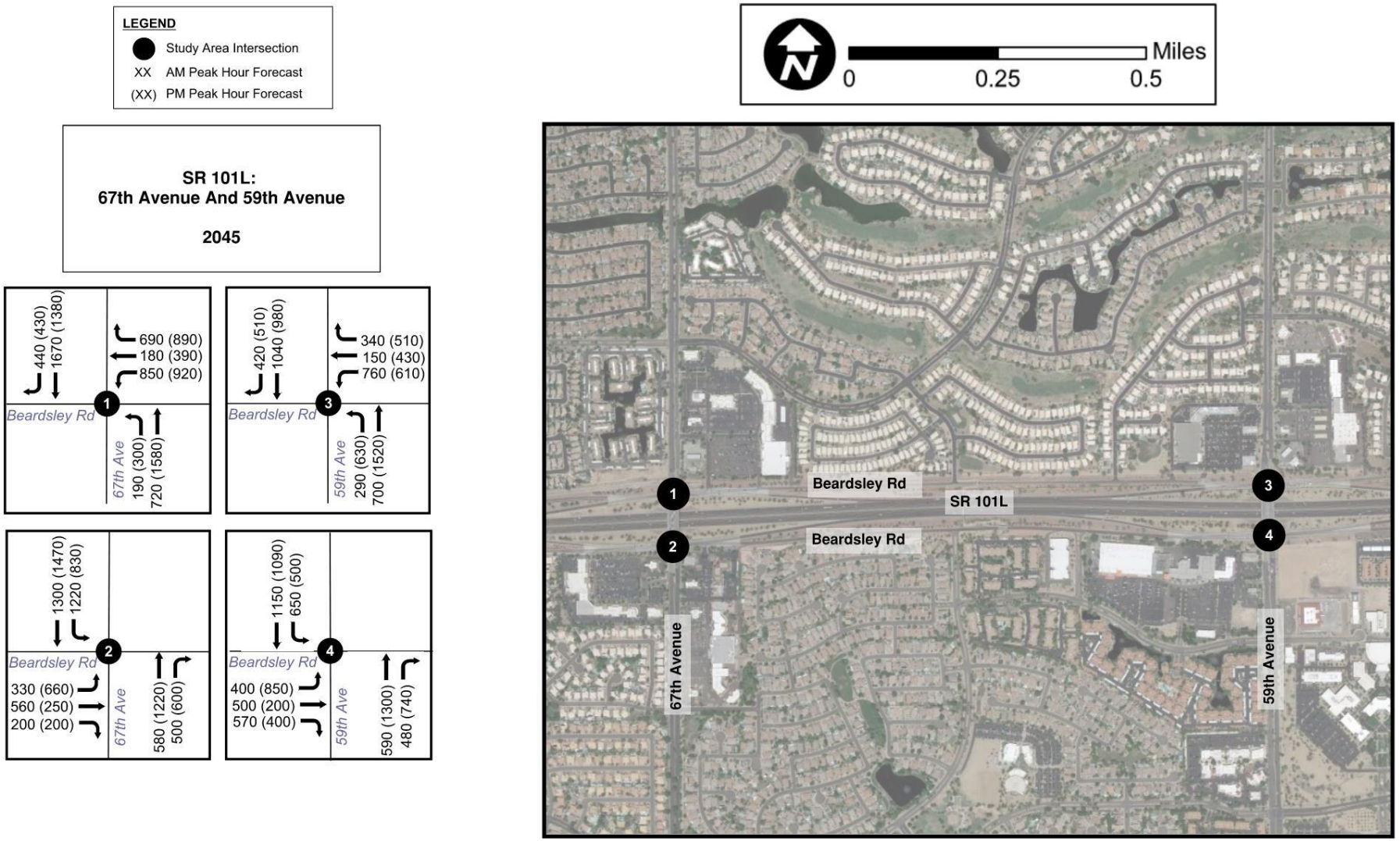
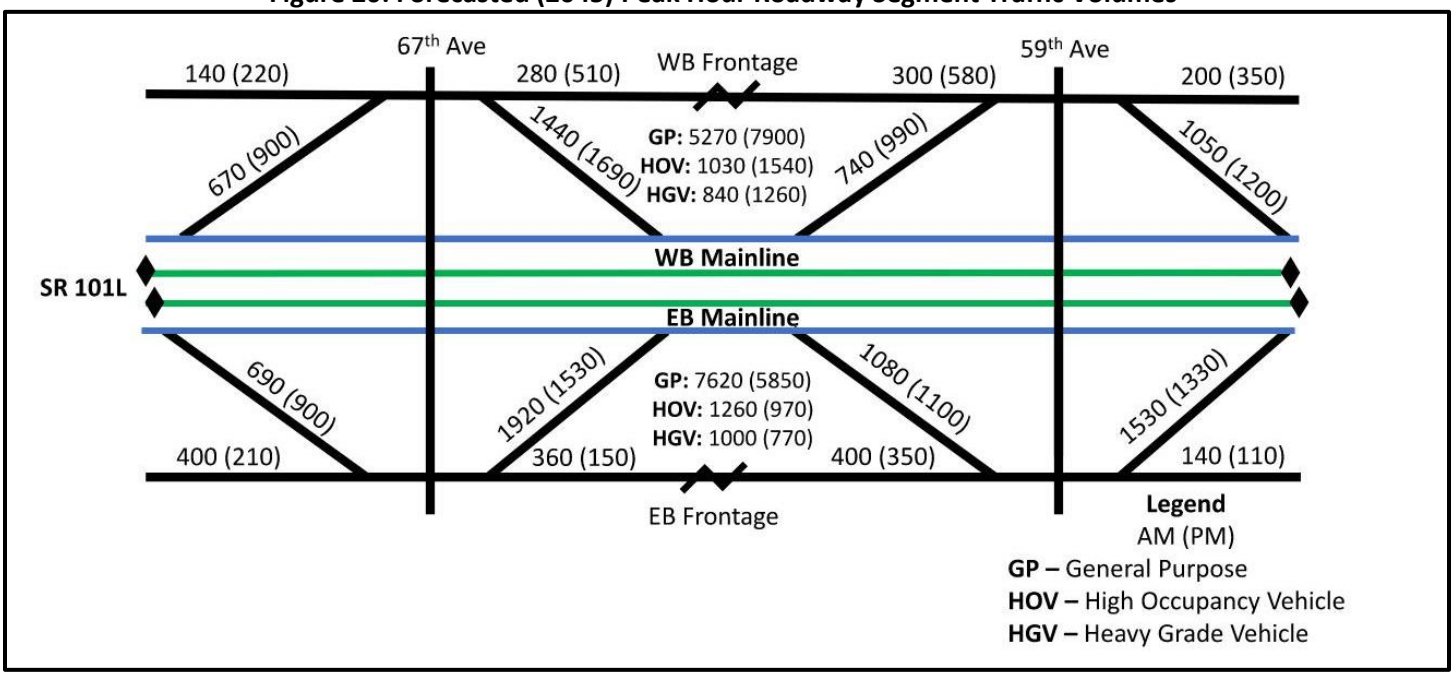


Figure 20 provides 2045 peak hour traffic forecasts for the roadway segments within the study area. The freeway ramp and frontage road volumes represent the total volumes, while the mainline is divided into the following vehicle types: general purpose (GP), high occupancy vehicle (HOV), and heavy grade vehicle (HGV).

Figure 20: Forecasted (2045) Peak Hour Roadway Segment Traffic Volumes



2.3.2. Operational Analysis Methodology

The operational analysis methodology applied to this study area was designed to capture the traffic patterns observed in the real world while also being sensitive to how these travel patterns will change over time. This methodology incorporates the impacts of several network characteristics including land use, roadway geometry, regional travel demands, driver behavior, routing decisions, vehicle type distribution, and traffic signal operations.

In addition to the SR 101L TIs at 67th Avenue and 59th Avenue, the following signalized intersections were included in the model development due to their proximity and potential impacts to the TIs:

- Arrowhead Loop Road and 67th Avenue
- Behrend Drive and 67th Avenue
- 20500 N and 59th Avenue
- Behrend Drive and 59th Avenue

The 67th Avenue and 59th Avenue TIs in the existing conditions and future-no build conditions were analyzed using Synchro (Version 10). The existing traffic signal timing plans were received from ADOT and Glendale. The timing plans and existing traffic TMCs were entered into Synchro for baseline analysis. The 2045 forecasted volumes and future lane configurations with F0316 improvements accounted for were input into Synchro for future no-build analysis. The traffic signal timing plans were optimized based on the adjusted traffic volumes.

The existing and future freeway operations were analyzed with Highway Capacity Software 7 (HCS7) using travel demands derived from the 2020 and 2040 MAG TDMs, calibrated to segment counts and TMCs using Visum's T-Flow Fuzzy module. HCS7 software analyzes LOS of freeway segments while considering how weaving, merging, diverging, and basic freeway segments impact LOS.

An existing conditions microsimulation model was developed using Vissim (Version 2022) and calibrated to observed travel times using INRIX data along the SR 101L mainline from the 75th Avenue exit ramp to the 51st Avenue exit ramp. A comparison of the modeled versus observed travel times of the existing conditions are shown in **Figure 21** and **Figure 22** for the AM peak hour and **Figure 23** and **Figure 24** for the PM peak hour. The figures illustrate the modeled SR 101L travel times closely align with the observed INRIX travel times.

Figure 21: Calibration of AM Peak Hour Eastbound SR 101L Travel Time

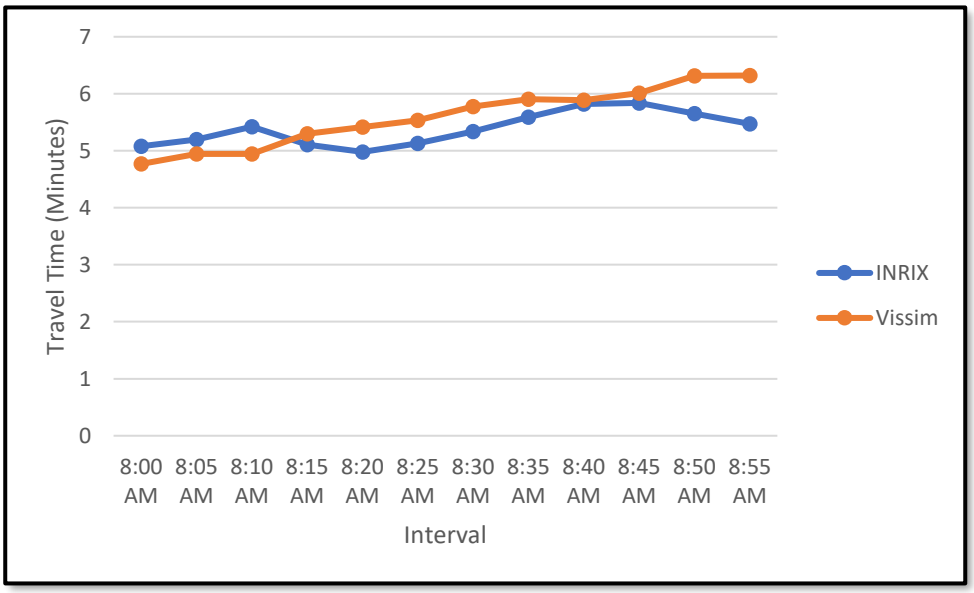


Figure 22: Calibration of AM Peak Hour Westbound SR 101L Travel Time

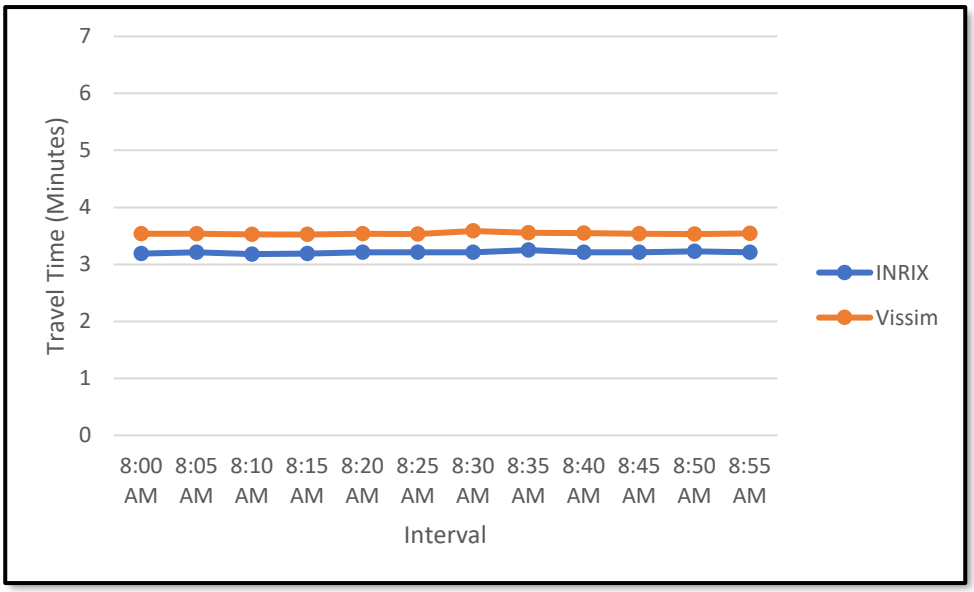


Figure 23: Calibration of PM Peak Hour Eastbound SR 101L Travel Time

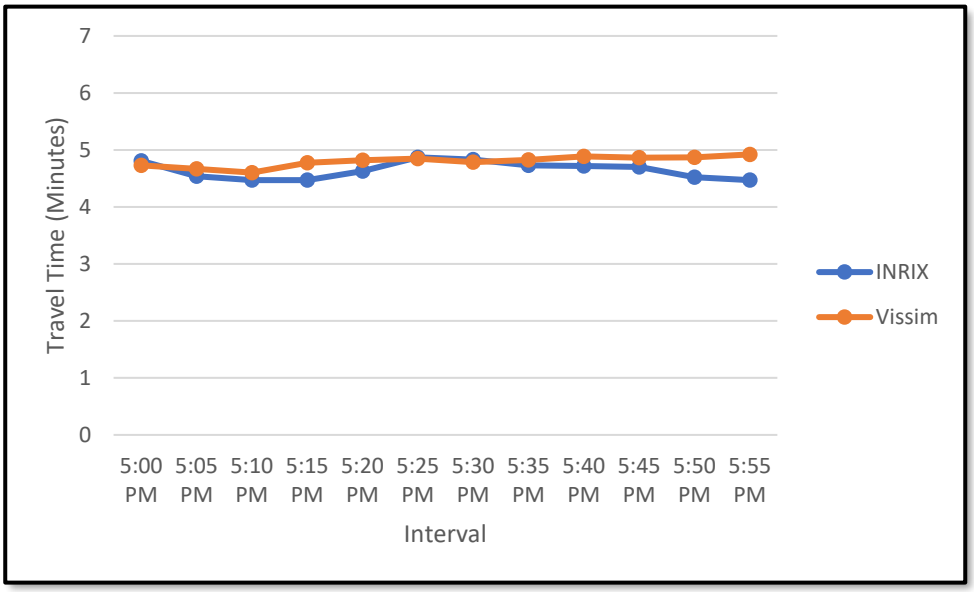
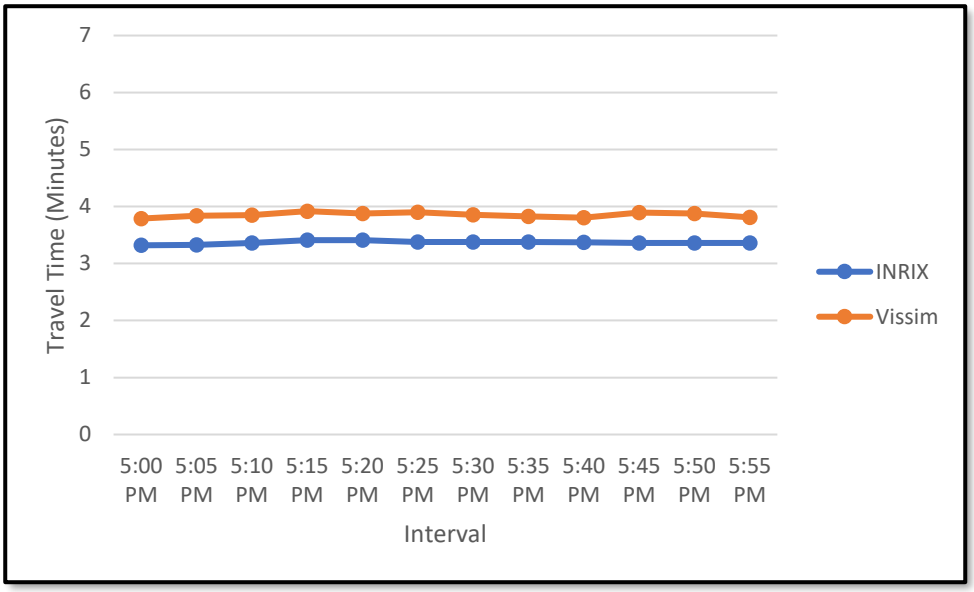


Figure 24: Calibration of PM Peak Hour Westbound SR 101L Travel Time



With future (2045) traffic volumes applied, the model was used to analyze the design concept alternatives (excluding roundabout alternatives) due to its ability to model complex and/or closely spaced intersections. Synchro was used to optimize and refine traffic signal timings utilized in the conceptual alternatives before importing to Vissim. Roundabouts were analyzed using Sidra; Sidra employs a combined geometry and gap-acceptance modeling approach to account for the effect of roundabout geometry on driver behavior through gap-acceptance modeling.

More information regarding traffic operations analysis methodology is provided in the *SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements Traffic Report*.

2.3.3. Operational Performance Criteria

Level of Service (LOS) is a qualitative measure (A to F) used to relate the quality of motor vehicle traffic service. LOS is used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measures such as vehicle speed, density, congestion, etc. LOS thresholds are broadly defined as LOS A

representing free-flow conditions; LOS B indicating reasonable free-flow; LOS C as stable operation; LOS D as lower range of stable flow; LOS E as unstable flow; and LOS F as breakdowns in traffic flow or when the ratio of demand to capacity exceeds 1.0. LOS C to LOS D is listed as the design LOS in the 2021 *ADOT Roadway Design Guidelines* for controlled-access highways in urban areas. For the purposes of this project, LOS D was selected as the minimum acceptable LOS.

The LOS of freeway segments is related to its density, in passenger cars per mile per travel lane. The LOS criteria for basic, weaving, merge, and diverge freeway segments as presented in the Highway Capacity Manual (HCM) is included in ***Table 18***.

Table 18: Level of Service Criteria for Freeway Segments

Level of Service	Urban Basic Freeway Segment Density (pc/mi/ln)	Weaving Segment Density (pc/mi/ln)	Merge or Diverge Segment Density (pc/mi/ln)
A	≤ 11	≤ 10	≤ 10
B	> 11 to 18	>10 to 20	>10 to 20
C	> 18 to 26	> 20 to 28	> 20 to 28
D	> 26 to 35	> 28 to 35	> 28 to 35
E	> 35 to 45	> 35 to 43	> 35
F	> 45 or demand exceeds capacity	> 43 or demand exceeds capacity	Demand exceeds capacity

The LOS criteria of signalized or roundabout intersections are different than that of freeways and is instead measured in delay per vehicle. These LOS thresholds, as defined in the HCM, are listed in ***Table 19***.

Table 19: Level of Service Criteria for Signalized and Roundabout Intersections

Level of Service	Signalized Intersection Control Delay (s/veh)	Roundabout Intersection Control Delay (s/veh)
A	≤ 10	≤ 10
B	> 10 to 20	>10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

2.3.4. Freeway Segment Analysis

Mainline freeway, merging, diverging, and weaving operations were evaluated using HCS7. The existing conditions freeway segment LOS during the AM peak hour and PM peak hour are shown in ***Figure 25*** and ***Figure 26***, respectively. The future no-build segment LOS during the AM peak hour and PM peak hour are illustrated in ***Figure 27*** and ***Figure 28***, respectively.

Figure 25: Existing Conditions (2021) AM Peak Hour Freeway Segment Level of Service

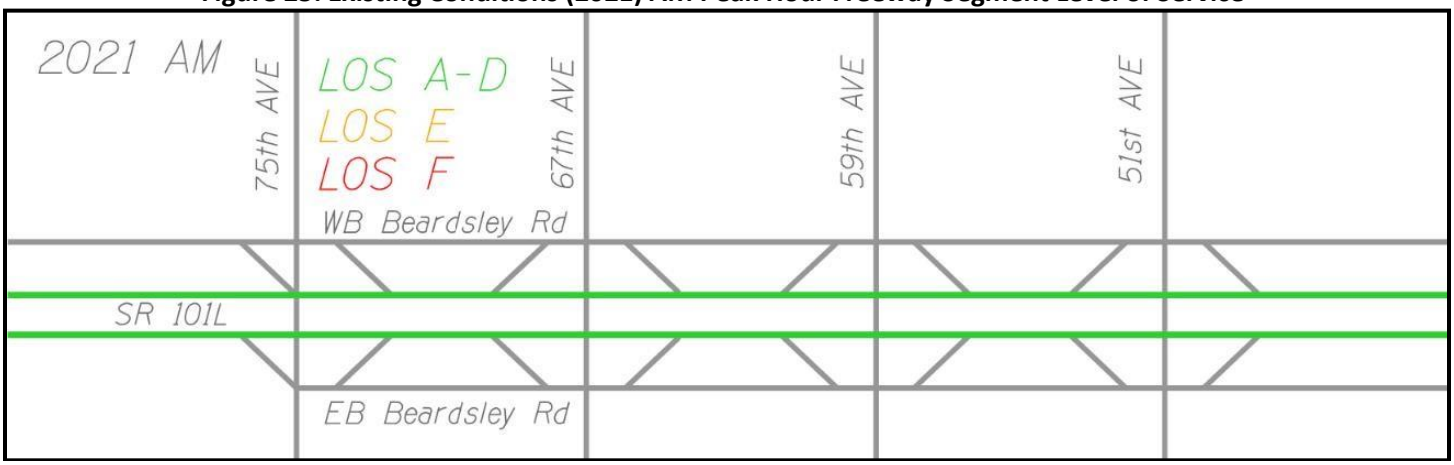


Figure 26: Existing Conditions (2021) PM Peak Hour Freeway Segment Level of Service

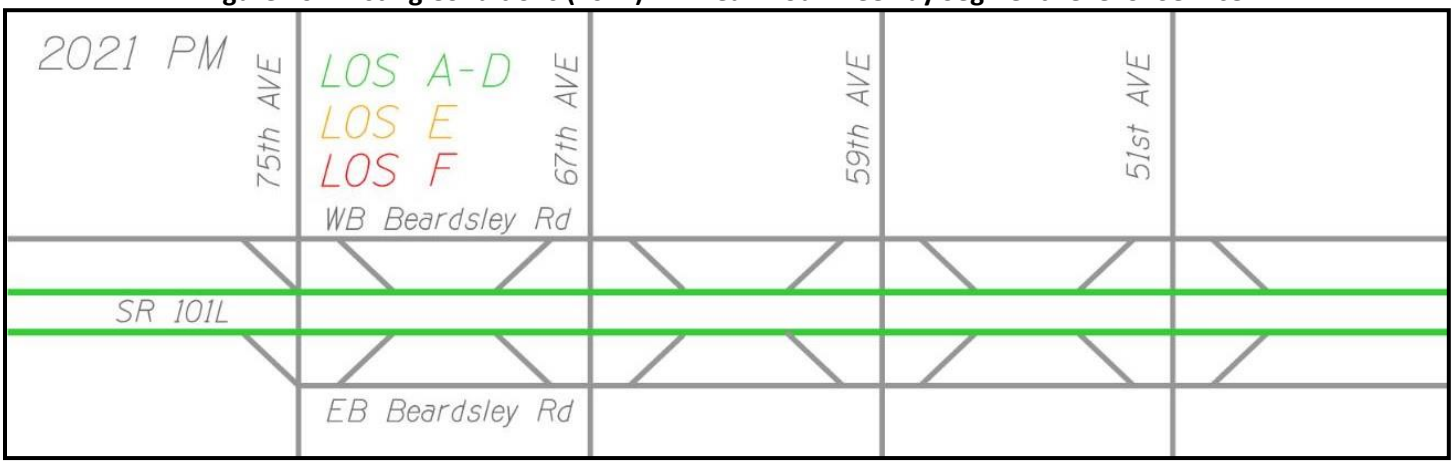


Figure 27: No-Build Conditions (2045) AM Peak Hour Freeway Segment Level of Service

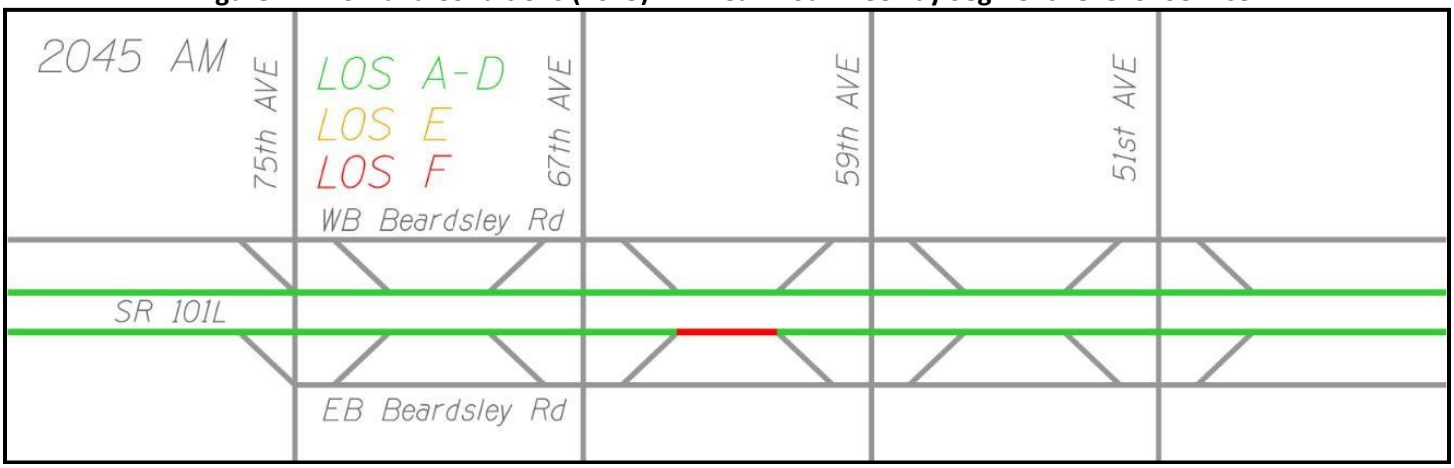
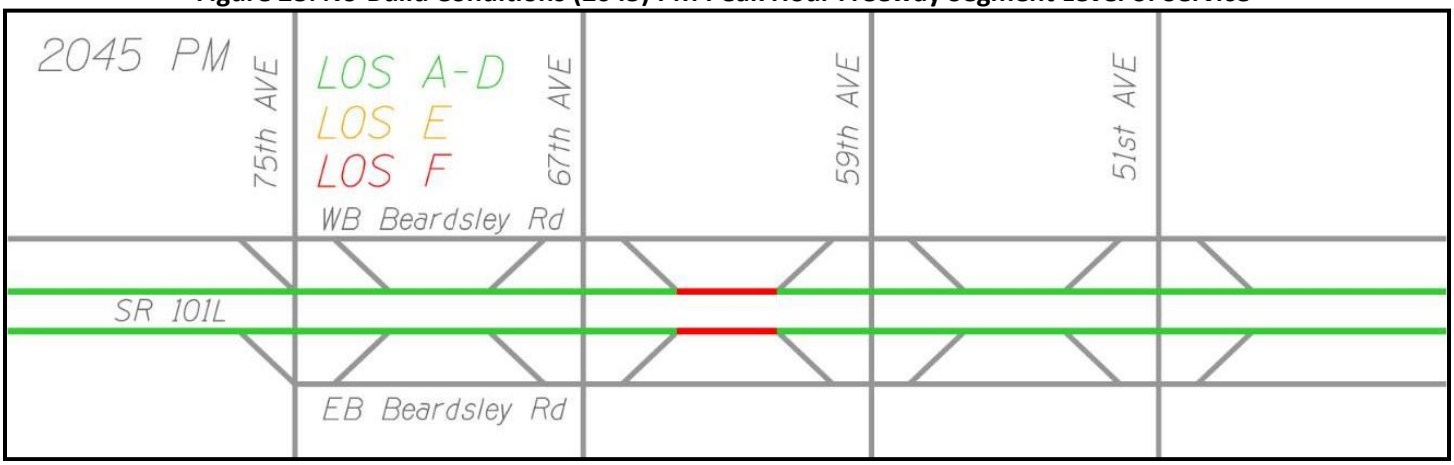


Figure 28: No-Build Conditions (2045) PM Peak Hour Freeway Segment Level of Service



Modeled travel time of the existing conditions and the future no-build conditions along SR 101L from the 75th Avenue exit ramp to the 51st Avenue exit ramp were compared using Vissim. The comparisons are shown are shown in ***Figure 29*** and ***Figure 30*** for the AM peak hour and ***Figure 31*** and ***Figure 24*** for the PM peak hour. The figures illustrate the travel time increases substantially in the future no-build condition in the eastbound direction during the AM peak hour and in both the eastbound and westbound directions during the PM peak hour.

This study is focused on the operations of the freeway TIs. Analysis of mainline operations was limited to determining the impacts of the proposed TI concepts to mainline operations. Two of the alternatives impacted the freeway mainline: Alternative 67-2A and Alternative 67-2B. These alternatives are discussed in ***Section 3.3.1.2***. Furthermore, the impacts of these alternatives was limited to the eastbound direction. The resulting mainline travel times are documented in ***Figure 33*** through ***Figure 36***. All other alternatives have identical mainline travel times to the no build configuration.

Figure 29: Modeled Existing (2021) and No-Build (2045) AM Peak Hour Eastbound SR 101L Travel Time

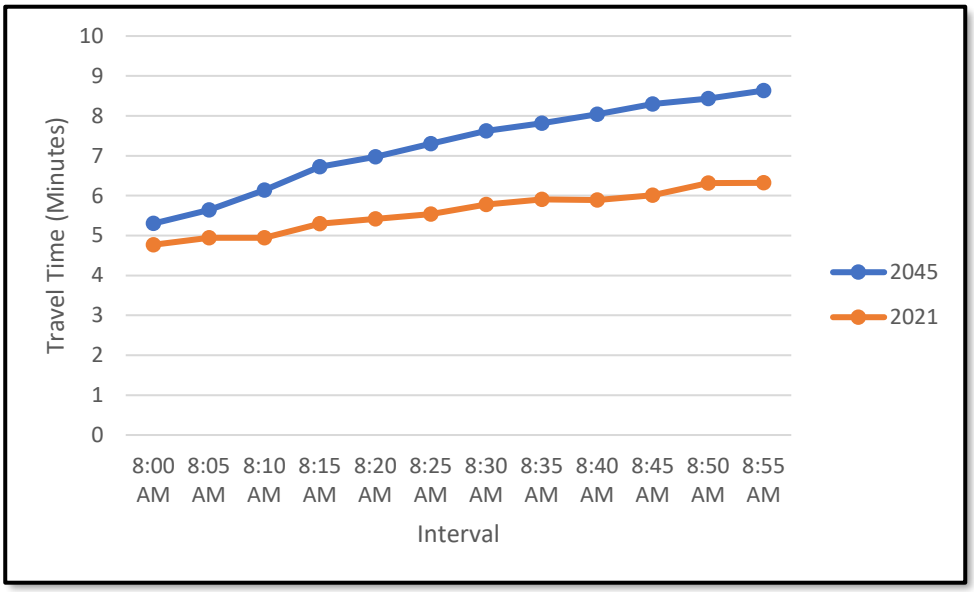


Figure 30: Modeled Existing (2021) and No-Build (2045) AM Peak Hour Westbound SR 101L Travel Time

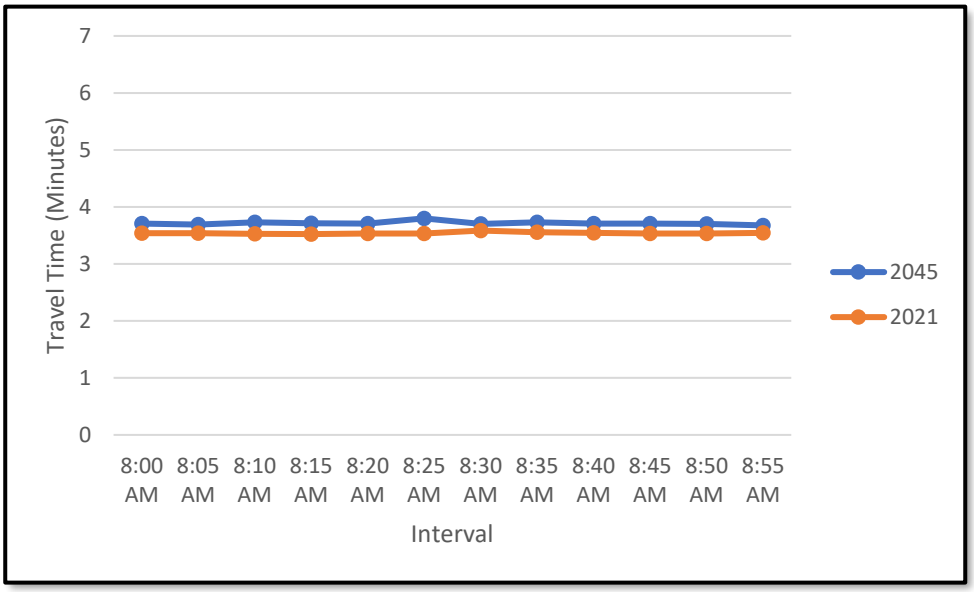


Figure 31: Modeled Existing (2021) and No-Build (2045) PM Peak Hour Eastbound SR 101L Travel Time

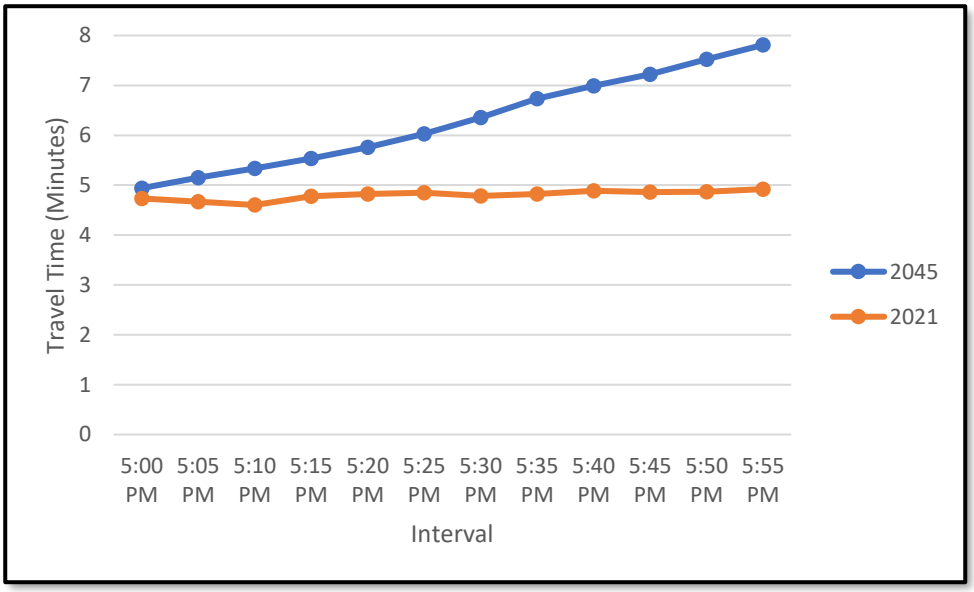


Figure 32: Modeled Existing (2021) and No-Build (2045) PM Peak Hour Westbound SR 101L Travel Time

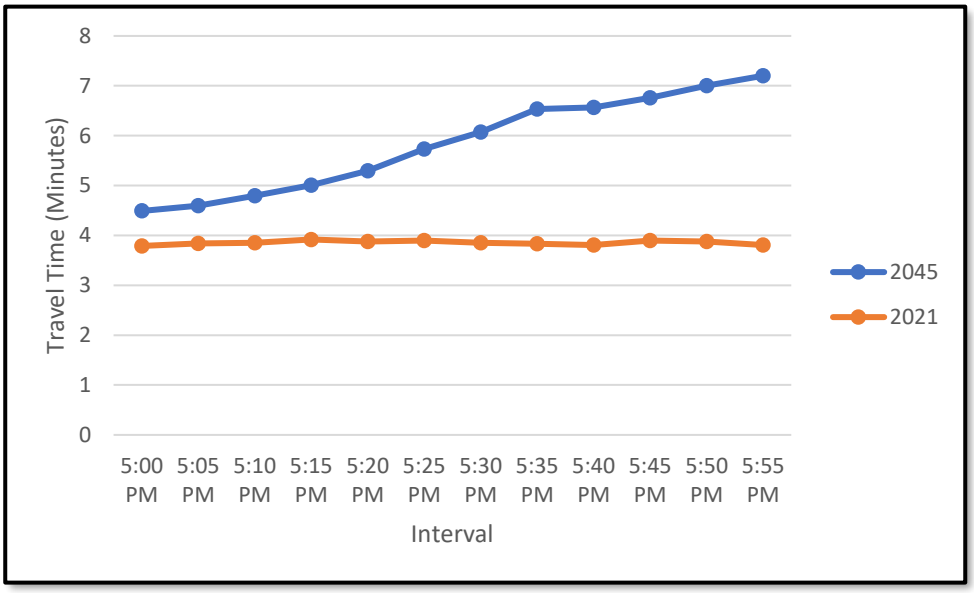


Figure 33: No Build (2045) and 67-2A (2045) AM Peak Hour Eastbound SR 101L Travel Time

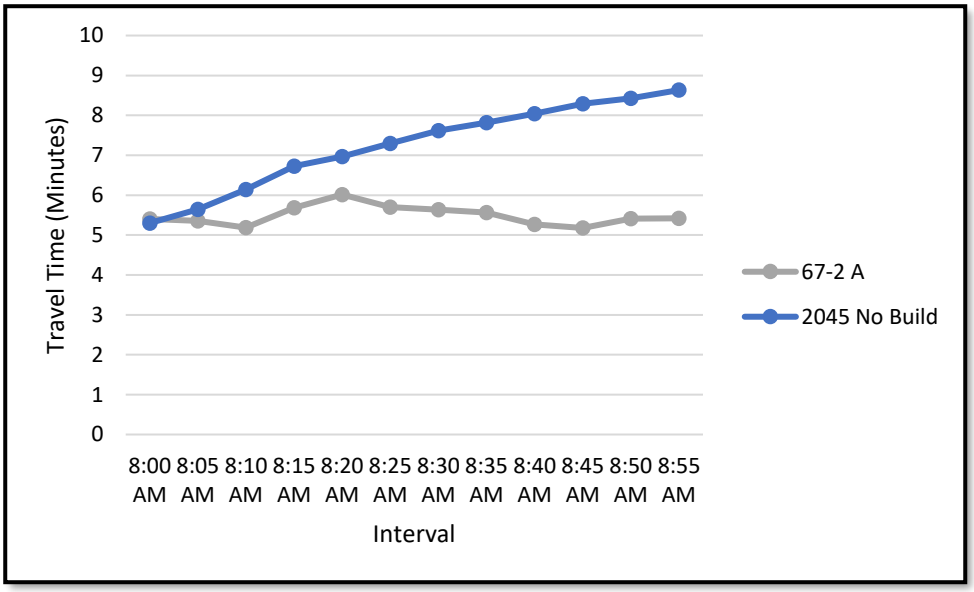


Figure 34: No Build (2045) and 67-2B (2045) AM Peak Hour Eastbound SR 101L Travel Time

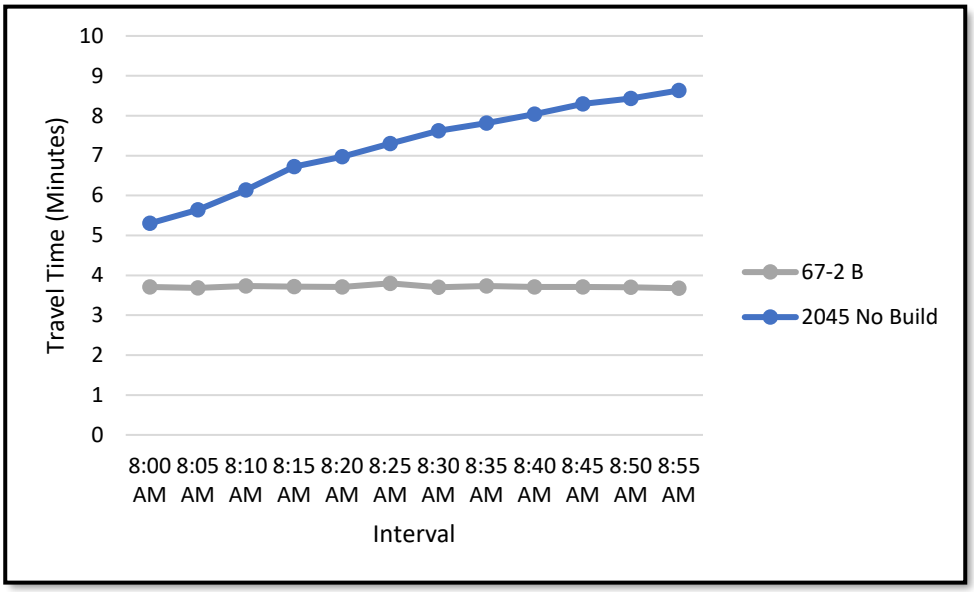


Figure 35: No Build (2045) and 67-2A (2045) PM Peak Hour Eastbound SR 101L Travel Time

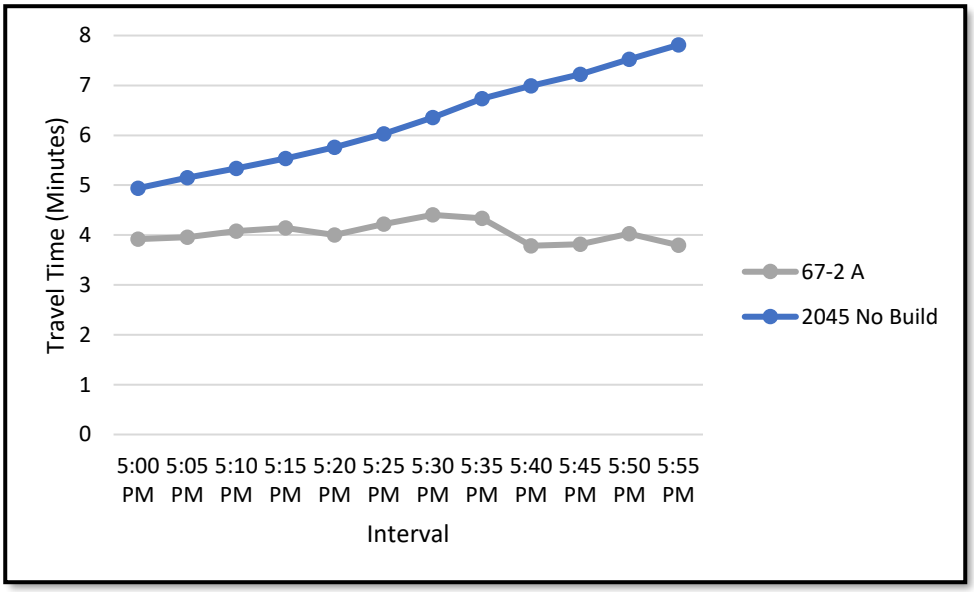
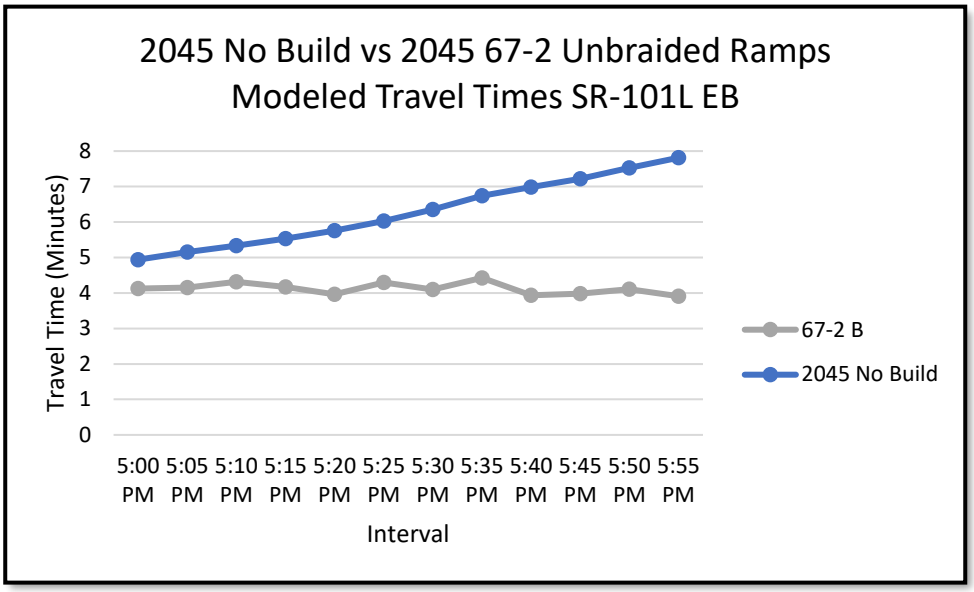


Figure 36: No Build (2045) and 67-2B (2045) PM Peak Hour Eastbound SR 101L Travel Time



2.3.5. Intersection Analysis

The existing traffic signal timing plans were received from ADOT and Glendale. The timing plans and existing traffic TMCs were entered into Synchro for baseline analysis. The existing conditions LOS of the 67th Avenue and 59th Avenue TIs for the peak hours is included in ***Table 20*** and illustrated in ***Figure 37***. The 2045 forecasted volumes were input into Synchro for future no-build analysis. The traffic signal timing plans were optimized based on the adjusted traffic volumes and lane configurations. The future no-build LOS of the TIs for the peak hours is listed in ***Table 21*** and shown in ***Figure 38***.

Table 20: Existing Conditions (2021) Delay and Level of Service Analysis

Intersection	Parameter	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Overall
AM Peak Hour														
67th Avenue and WB Ramps	Delay (sec/veh)				67.0	54.5	12.7	35.4	2.0			29.3	4.0	**26.6**
	LOS				E	D	B	D	A			C	A	**C**
67th Avenue and EB Ramps	Delay (sec/veh)	72.6	65.7	8.1					41.2	40.9	26.1	18.3		**34.3**
	LOS	E	E	A					D	D	C	B		**C**
59th Avenue and WB Ramps	Delay (sec/veh)				109	61.5	9.4	5.3	4.5			49.2	11.3	**38.4**
	LOS				F	E	A	A	A			D	B	**D**
59th Avenue and EB Ramps	Delay (sec/veh)	150	168	11.7					54.5	43.3	3.8	7.7		**56.8**
	LOS	F	F	B					D	D	A	A		**E**
PM Peak Hour														
67th Avenue and WB Ramps	Delay (sec/veh)				93.8	77.3	39.3	48.5	3.1			30.6	15.3	**35.4**
	LOS				F	E	D	D	A			C	B	**D**
67th Avenue and EB Ramps	Delay (sec/veh)	82.8	53.4	8.9					55.0	44.4	69.4	37.5		**52.9**
	LOS	F	D	A					D	D	E	D		**D**
59th Avenue and WB Ramps	Delay (sec/veh)				104	99.3	10.0	20.7	17.3			54.3	58.0	**47.8**
	LOS				F	F	A	C	B			D	E	**D**
59th Avenue and EB Ramps	Delay (sec/veh)	186	140	11.2					88.2	57.2	4.4	13.9		**70.0**
	LOS	F	F	B					F	E	A	B		**E**

Table 21: No-Build Conditions (2045) Delay and Level of Service Analysis														
Intersection	**Parameter**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**Overall**
AM Peak Hour														
67th Avenue and WB Ramps	Delay (sec/veh)				95.7	78.1	27.8	12.9	6.1			72.4	5.1	**53.2**
	LOS				F	E	C	B	A			E	A	**D**
67th Avenue and EB Ramps	Delay (sec/veh)	79.0	76.6	9.6					26.2	78.3	75.1	20.0		**49.7**
	LOS	E	E	A					C	E	E	B		**D**
59th Avenue and WB Ramps	Delay (sec/veh)				163	116	9.1	4.6	6.8			92.2	47.3	**69.1**
	LOS				F	F	A	A	A			F	D	**E**
59th Avenue and EB Ramps	Delay (sec/veh)	130	148	9.2					65.0	160	19.1	58.3		**82.4**
	LOS	F	F	A					E	F	B	E		**F**
PM Peak Hour														
67th Avenue and WB Ramps	Delay (sec/veh)				112	120	77.1	42.4	17.7			101	29.0	**72.9**
	LOS				F	F	E	D	B			F	C	**E**
67th Avenue and EB Ramps	Delay (sec/veh)	95.8	72.3	29.2					66.7	140	75.5	76.4		**80.5**
	LOS	F	E	C					E	F	E	E		**F**
59th Avenue and WB Ramps	Delay (sec/veh)				273	283	33.5	22.1	64.2			90.6	263	**132**
	LOS				F	F	C	C	E			F	F	**F**
59th Avenue and EB Ramps	Delay (sec/veh)	253	170	12.9					78.3	218	23.6	85.8		**118.1**
	LOS	F	F	B					E	F	C	F		**F**

Figure 37: Existing Conditions (2021) Peak Hour Intersection Level of Service

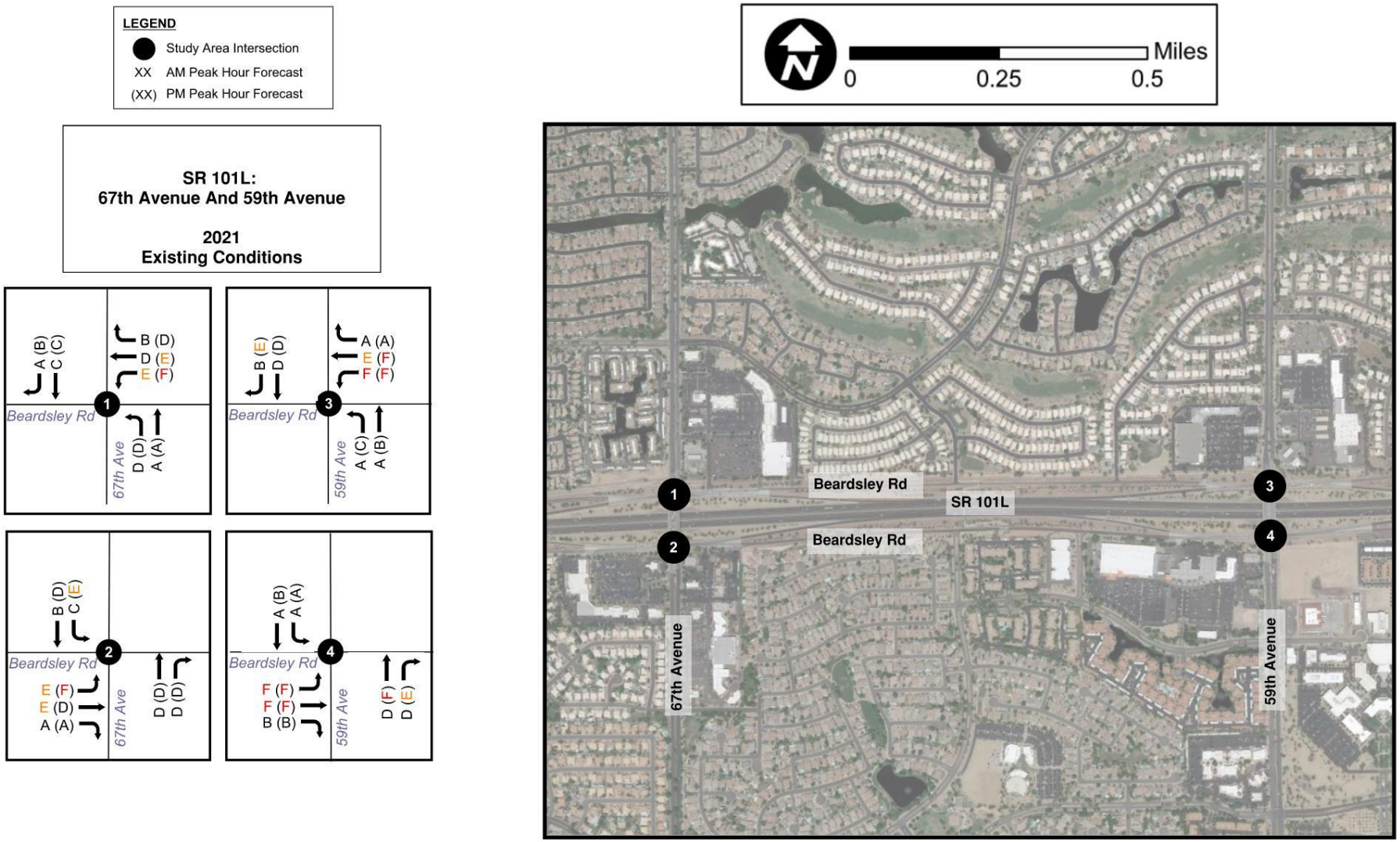
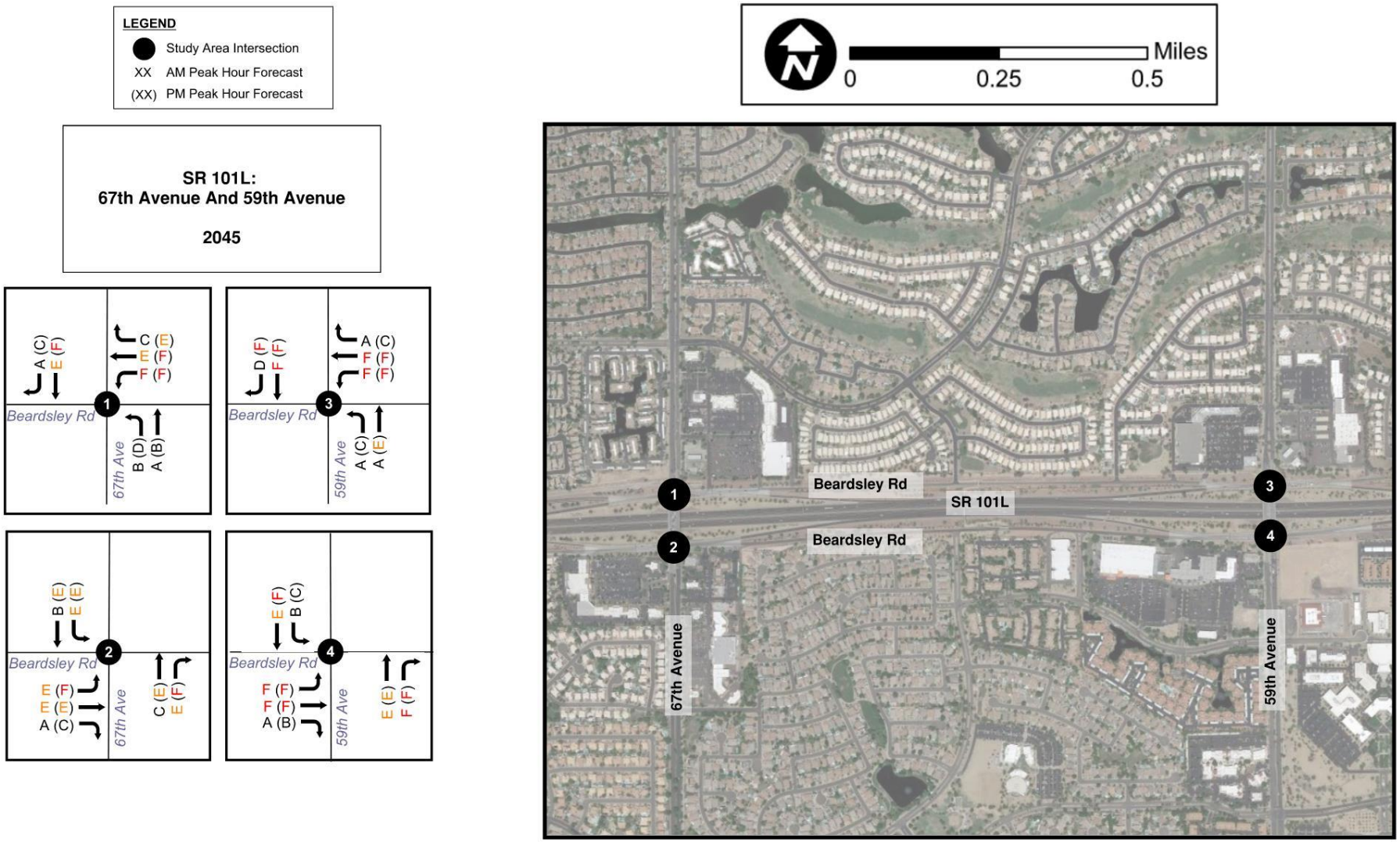


Figure 38: No-Build Conditions (2045) Peak Hour Intersection Level of Service



3.0 Design Concept Alternatives

3.1. Introduction

A one-day Alternatives Evaluation Process and Identification Workshop was conducted on February 15, 2022, which included ADOT, MAG, FHWA, Glendale, and Phoenix and focused on the development of the alternatives evaluation process and discussed potential alternatives for 67th and 59th Avenues.

The conceptual alternatives tie into the existing SR 101L entrance and exit ramps and frontage roads with the planned changes provided by F0316 and utilize the existing PCCP and bridges wherever feasible. Alternatives that passed the operational analysis screening were further developed including:

- Horizontal alignment for ramps;
- Horizontal alignment for the arterial for approximately 0.25 miles north and south of SR 101L;
- Plan view linework denoting pavement edges, shoulders, curbs, and conceptual pavement markings; and
- Vertical alignment assumptions which utilize engineering best practices for alternatives without topographic survey to develop work limits.

3.2. Design Concept Alternatives

The conceptual alternatives that were discussed during the workshop and included for evaluation are briefly described below. The alternatives include added lanes, roundabouts, partial or full continuous flow intersections (CFIs), and a split diamond with or without a south to east (S-E) flyover ramp from 67th Avenue to SR 101L. Alternatives were considered at the 67th Avenue and 59th Avenue TIs individually, unless noted otherwise.

Added lanes: Additional travel lane(s) would provide increased capacity through the interchange. Additional travel lanes may consist of left or right turning lanes, thru lanes, or a combination of turning and thru lanes and may be added to the arterial roadway, SR 101L entrance or exit ramps, or frontage road. Some added lane alternatives include triple left-turn movements. Triple left turns were designed using Figure 505.1B in the ADOT Roadway Design Guidelines (RDG) to establish curb lines as well as design vehicles.

Roundabouts: Two triple-lane roundabouts, one at each existing intersection, would be constructed for a roundabout TI.

Partial CFI: Also known as a displaced left-turn (DLT) intersection, the CFI guides left-turning traffic onto a separate roadway that runs parallel to the opposing thru traffic. In the partial CFI, traffic heading northbound along the arterial to westbound SR 101L would crossover at the SR 101L eastbound ramps TI. Traffic would proceed along the left side of southbound traffic and complete a left turn at the SR 101L westbound ramps TI to access SR 101L or frontage road.

Full CFI: The full CFI is similar to the partial CFI, except both northbound and southbound traffic would have displaced left-turn lanes. The crossovers would occur at two new intersections, one immediately north of the TI and one immediately south. Traffic turning left to access SR 101L along both the northbound and southbound arterials would crossover at the new intersection, proceed along the left side of opposing traffic, and complete a left turn at the desired TI to access SR 101L or frontage road.

Split diamond: A split diamond interchange has its entrance/exit ramps “split” between two arterials; for this study area, the split diamond design would incorporate both 67th and 59th Avenue TIs. Four SR 101L ramps would close: the eastbound entrance ramp at 67th Avenue, the eastbound exit ramp at 59th Avenue, the westbound entrance ramp at 59th Avenue, and the westbound exit ramp at 67th Avenue. Vehicles would instead utilize the frontage road and travel through both 67th Avenue and 59th Avenue TIs. The split diamond design could be considered with or without a directional flyover ramp from southbound 67th Avenue to eastbound SR 101L.

3.3. Evaluation of Alternatives

Evaluation of the alternatives was completed in a two-step process: (1) a preliminary evaluation which determined operational and land use feasibility and (2) a comprehensive evaluation discussed in ***Section 3.3.2***.

3.3.1. Preliminary Evaluation

The alternatives were first evaluated to determine operational and right-of-way feasibility. The traffic simulation software Vissim was used to evaluate lane addition, partial or full CFI, and split diamond alternatives. Sidra was used to evaluate the roundabout interchanges. Additional methodology information can be found in ***Section 2.3.2***.

Preliminary evaluation determined that several conceptual alternatives would likely fail operationally; others would require considerable right-of-way (ROW) acquisition and have subsequent land use impacts. These alternatives were dismissed and not advanced for further evaluation. The results of this preliminary evaluation are summarized in ***Table 22***.

Table 22: Conceptual Alternatives Preliminary Evaluation

Alternative	Advanced	Dismissed	Reason, if Dismissed
67th Avenue TI			
Westbound Exit Ramp Triple Left-Turn	X		
Triple Southbound Left-Turn (Braided Ramps or Dual Auxiliary Lanes)	X		
Roundabouts		X	The westbound approach at the southbound ramps TI and eastbound approach at the northbound ramps TI do not require yielding to other vehicles to enter the roundabout. Heavy traffic on these unrestricted approaches does not provide adequate gaps for traffic at other approaches to enter roundabout; excessive queueing occurs along the arterial and exit ramp.
Partial CFI		X	Inconsistent traffic signal phasing between intersections causes queueing on bridge which extends beyond available storage capacity for thru movements.
Full CFI		X	Configuration would require considerable ROW and create numerous access control impacts to surrounding parcels.
59th Avenue TI			
Dual Northbound Left-Turn and Thru Lanes	X		
Dual Northbound Left-Turn and Thru Lanes; Triple Southbound Left-Turn		X	Dual southbound left-turn lanes meet operational requirements. Triple left-turn lanes unnecessary.
Roundabouts		X	Heavy traffic on unrestricted approach does not provide adequate gaps for traffic at other approaches to enter roundabout; excessive queueing along the arterial and exit ramp.
Partial CFI		X	Inconsistent traffic signal phasing between intersections causes queueing on bridge which extends beyond available storage capacity for thru movements.
Full CFI		X	Configuration would require considerable ROW and create numerous access control impacts to surrounding parcels.
67th and 59th Avenue TIs			
Split Diamond (With or Without S-E Flyover Entrance Ramp at 67th Avenue)		X	Increased traffic demand at the remaining SR 101L entrance and exit ramps causes overcapacity conditions.

The conceptual alternatives that were determined to be feasible were carried forward for further evaluation. Two alternatives for the 67th Avenue TI were selected for additional analysis; one of which has two eastbound SR 101L entrance ramp sub-alternatives. One alternative for the 59th Avenue TI was selected. These alternatives are described in the following subsections.

3.3.1.1. Alternative 67-1: Westbound Triple Left-Turn

This alternative would consist of added lanes to the east- and westbound SR 101L exit ramp intersection approaches. The westbound ramp would be increased to a six-lane cross section with two left-turn, a single left-turn/thru, a single thru, and two right-turn lanes. The eastbound ramp would also be a six-lane cross section with two left-turn, two thru, and two right-turn lanes. The alternative would also include a third southbound thru lane through both TI intersections. Additionally, a second right-turn lane would be added to the 67th Avenue and SR 101L eastbound ramps intersection. Alternative 67-1 is illustrated in ***Figure 39*** and has planning level estimated construction cost of $12,530,000. The cost estimate is available in ***Appendix A***.

The LOS and queue length analysis is included in ***Table 23***. Both 67th Avenue TI intersections are expected to perform at an acceptable level, LOS D or better, in both the AM and PM peak hours with the Alternative 67-1 configuration and the 2045 forecasted traffic volumes. Furthermore, all individual intersection turning/thru movements are also expected to perform at an acceptable level, LOS D or better.

Right-of-Way Considerations:

The area required that is currently outside of the existing right-of-way is 5,775 square feet. Right-of-way needs are identified on the southeast and southwest quadrants of the TI. Further evaluation will be required to determine exact requirements once a recommended is selected. Right-of-way acquisition is estimated to cost $55,300.

Drainage Considerations:

Existing storm drain catch basins and pipes are located at each corner of the intersection. The catch basins would be moved to new edge of pavement with the lane addition configuration which would also require minor catch basin lateral extension work. The storm drain trunk lines (36-inch diameter or larger) constructed with the original freeway construction projects would be maintained throughout the corridor. Headwall extension or modification would be needed on the existing two, 8-foot by 5-foot reinforced concrete box culvert (RCBC) on the northeast corner of 67th Avenue for any potential widening.

Structures Considerations:

The existing bridge would be widened 13.5 feet to the east. After removal of the existing four-foot deck overhang, the total widening would be 17.5 feet. Due to the 2% bridge cross slope and the minimum required 16.5-foot vertical clearance to the mainline below, the available superstructure depth for the widening would be approximately 62 inches.

It is recommended to use three (3) precast prestressed Utah Bulb Tee (UBT) 50 girders spaced at five feet on center with an eight-inch deck slab and a 2.5-foot deck overhang. The ultimate out-to-out bridge width is 110 feet including a one-foot-wide parapet with ADOT mesh conforming to current standards on the east side and the existing chain-link fence on the west side, a six-foot raised sidewalk on the east and west sides of the bridge and eight traffic lanes. The lane configuration includes 14-foot outside, 12-foot thru, and 11-foot turn lanes. The remaining chain-link fence on the west would have a reduction in pedestrian vertical clearance of 6 inches from the 7.25-foot height of the B-Standards used at time of construction.

Another structure type alternative would be to widen in-kind with CIP/PT concrete girders with the superstructure constructed high on falsework and lowered in-place; this alternative would require approval from ADOT to allow falsework in the SR 101L freeway.

Figure 39: Alternative 67-1 Configuration

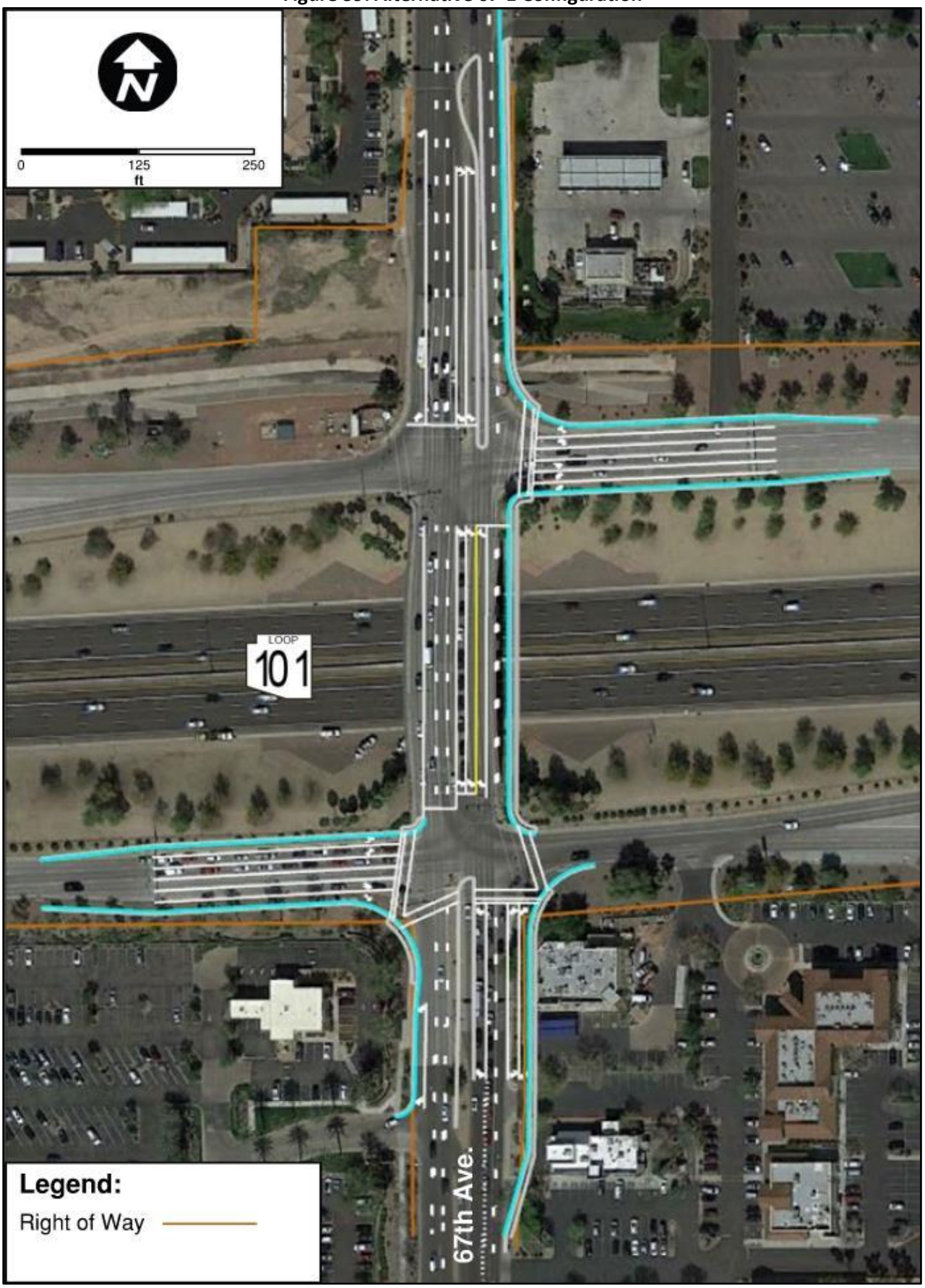


Table 23: Alternative 67-1 Level of Service and Queue Length Analysis														
Intersection	**Parameter**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**Overall**
AM Peak Hour														
67th Avenue and WB Ramps	Delay (s/veh)				30.2	27.2	13.7	38.7	1			41.1	9.8	**25.2**
	LOS				C	C	B	D	A			D	A	**C**
	Available Storage (ft)				505	505	505	280	290			390	390	
	Avg Queue (ft)				72	71	10	40	40			236	175	
	Max Queue (ft)				262	262	157	136	136			439	437	
	Cycle Length (s)	75												
67th Avenue and EB Ramps	Delay (s/veh)	29.4	40.1	13					40.6	22.6	7	3		**17.3**
	LOS	C	D	B					D	C	A	A		**B**
	Available Storage (ft)	415	415	415					610	610	280	280		
	Avg Queue (ft)	73	75	73					78	74	36	36		
	Max Queue (ft)	256	255	255					295	295	295	323		
	Cycle Length (s)	75												
PM Peak Hour														
67th Avenue and WB Ramps	Delay (s/veh)				32.9	33.1	21.9	52	5.7			34.7	11.9	**23.8**
	LOS				C	C	C	D	A			C	B	**C**
	Available Storage (ft)				505	505	505	280	290			390	390	
	Avg Queue (ft)				91	91	50	94	95			110	85	
	Max Queue (ft)				296	296	299	278	279			411	410	
	Cycle Length (s)	75												
67th Avenue and EB Ramps	Delay (s/veh)	30.4	26.3	11.2					34.3	12.2	18.2	3.3		**18.6**
	LOS	C	C	B					C	B	B	A		**B**
	Available Storage (ft)	415	415	415					610	610	280	290		
	Avg Queue (ft)	56	56	50					118	116	60	64		
	Max Queue (ft)	249	249	249					330	330	302	304		
	Cycle Length (s)	75												

3.3.1.2. Alternative 67-2: Triple Southbound Left-Turn

This alternative would consist of added lanes to the east- and westbound SR 101L exit ramp intersection approaches. Both ramps would be increased to be a six-lane cross section, with two left-turn, two thru, and two right-turn lanes. The alternative would also include a third southbound left-turn lane at the 67th Avenue and SR 101L westbound ramps intersection. Additionally, a second right-turn lane would be added to the 67th Avenue and SR 101L eastbound ramps intersection. The 67th TI configuration for Alternative 76-2 is illustrated in ***Figure 41***.

The LOS and queue length analysis is included in ***Table 24***. Both 67th Avenue TI intersections are expected to perform at an acceptable level, LOS D or better, in both the AM and PM peak hours with the Alternative 67-2 configuration and the 2045 forecasted traffic volumes. Furthermore, all individual intersection turning/thru movements are also expected to perform at an acceptable level, LOS D or better.

Right-of-Way Considerations:
The area required that is currently outside of the existing right-of-way is 5,775 square feet. Right-of-way needs are identified on the southeast and southwest quadrants of the TI. Further evaluation will be required to determine exact requirements once a recommended is selected. Right-of-way acquisition is estimated to cost $55,300.

Drainage Considerations:
Existing storm drain catch basins and pipes are located at each corner of the intersection. The catch basins would be moved to new edge of pavement with the lane addition configuration which would also require minor catch basin lateral extension work. The storm drain trunk lines (36-inch diameter or larger) constructed with the original freeway construction projects would be maintained throughout the corridor. Headwall extension or modification would be needed on the existing two, 8-foot by 5-foot reinforced concrete box culvert (RCBC) on the northeast corner of 67th Avenue for any potential widening.

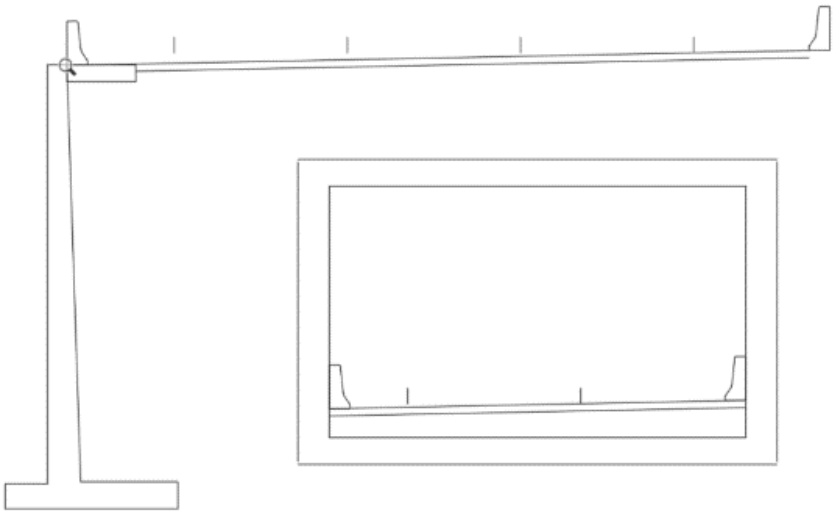
Structures Considerations:
The required 67th Avenue bridge widening would be the same as Alternative 67-1. For a description of the widening, see ***Section 3.3.1.1***.

Two SR 101L entrance ramp alternatives were considered to accommodate the third eastbound departure lane to the freeway:

> ***Alternative 67-2A: Triple Southbound Left-Turn (Braided Ramps)*** **–** This alternative would braid the SR 101L entrance ramp from 67th Avenue with the exit ramp at 59th Avenue. The three lanes would merge to a single lane before joining the mainline near 59th Avenue. The eastbound 59th Avenue exit ramp is relocated west to weave underneath the eastbound 67th Avenue entrance ramp. The braided ramp configuration is shown in ***Figure 42*** and has planning level estimated construction cost of $62,745,000. The cost estimate is available in ***Appendix A***.
>
> **Additional Drainage Considerations:**
> Existing inlets and storm drain on the pedestrian overpass would need to be removed and replaced to drain the new overpass alignment. The 67th Avenue braided ramp would require a storm drain system and catch basins to meet spread criteria for ramps. The system would be designed to convey the 10-year storm with a minimum 24-inch diameter pipe system. The system would outfall to the existing SR 101L freeway storm drain trunkline system near 67th Avenue Ramp D.
>
> **Additional Structures Considerations:**
> This alternative would require a new structure carrying eastbound 67th Avenue entrance ramp traffic over eastbound SR 101L traffic exiting onto the frontage road ahead of 59th Avenue. This configuration requires adjustment of the existing 67th Avenue eastbound entrance ramp profile, and due to tight geometries, the structure would ideally be constructed with a full closure of the ramp.

A 332-foot-long by 35.3-foot-wide cast-in-place (CIP), reinforced concrete frame bridge ("tunnel") with approach retaining walls is an ideal structure type for this high-skew condition and is illustrated in ***Figure 40***. Alternatively, a two-span, precast, prestressed concrete girder bridge with dapped ends supported on a straddle pier is a suitable alternative, though comparatively more challenging to construct and likely at a higher cost than the CIP frame.

Figure 40: Reinforced Concrete Frame "Tunnel" Bridge



To accommodate the proposed eastbound 59th Avenue exit ramp, the existing pedestrian bridge must be replaced due to conflict at the south abutment with the ramp. The cost for the replacement is based off a 2022 customary square foot cost for pedestrian bridge types commonly used in the valley.

Alternative 67-2B: Triple Southbound Left-Turn (Dual Auxiliary Lanes) – This alternative would merge three lanes to two prior to the ramp meter. Two lanes would enter the freeway, with one as an auxiliary lane that exits at 59th Avenue exit ramp and the second lane would merge with SR 101L east of the 59th Avenue bridge. The dual auxiliary lanes configuration is shown in ***Figure 43*** and has planning level estimated construction cost of $19,282,000. The cost estimate is available in ***Appendix A***.

Additional Drainage Considerations:
The lane drop off of 67th Avenue Ramp D to mainline SR 101L requires relocation of sag inlets on the ramp and freeway auxiliary lane inlets. The catch basins will require extension of existing storm drain catch basin laterals to tie into existing trunklines under eastbound SR 101L pavement.

Figure 41: Alternative 67-2 TI Configuration

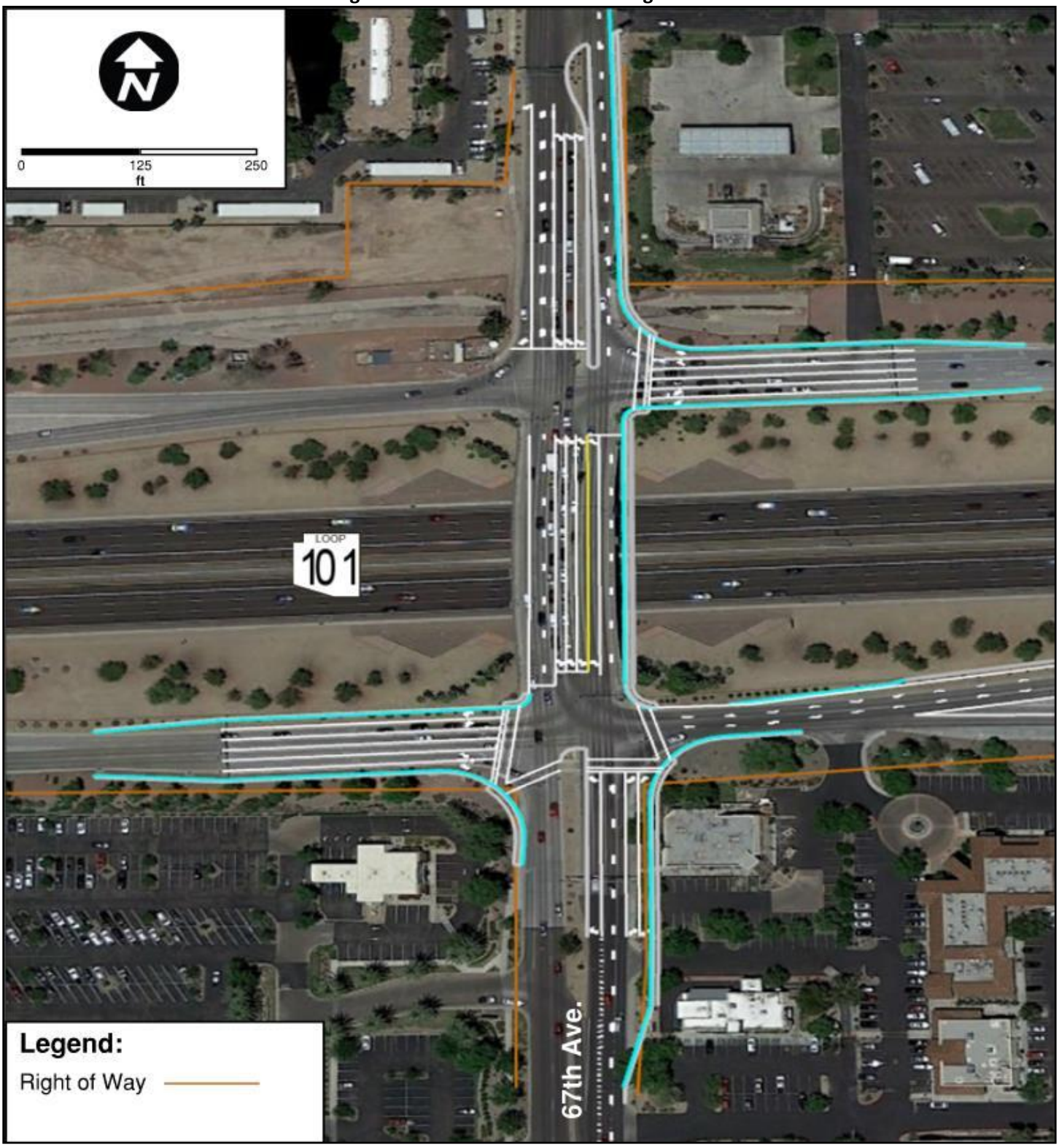


Table 24: Alternative 67-2 Level of Service and Queue Length Analysis														
Intersection	**Parameter**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**Overall**
AM Peak Hour														
67th Avenue and WB Ramps	Delay (s/veh)				42.6	31	20	23.9	10.8			31.6	12.4	**16.2**
	LOS				D	C	B	C	B			C	B	**B**
	Available Storage (ft)				505	505	505	280	290			390	390	
	Avg Queue (ft)				142	142	133	39	39			121	109	
	Max Queue (ft)				546	546	542	295	295			394	392	
	Cycle Length (s)	100												
67th Avenue and EB Ramps	Delay (s/veh)	38.4	36.1	8.8					30.3	16	29.4	8		**23.8**
	LOS	D	D	A					C	B	C	A		**C**
	Available Storage (ft)	415	415	415					610	610	280	290		
	Avg Queue (ft)	71	71	63					50	48	129	130		
	Max Queue (ft)	244	243	243					226	226	406	408		
	Cycle Length (s)	100												
PM Peak Hour														
67th Avenue and WB Ramps	Delay (s/veh)				41.9	31.2	30.5	20	5			26.2	13	**22.7**
	LOS				D	C	C	B	A			C	B	**C**
	Available Storage (ft)				505	505	505	280	290			390	390	
	Avg Queue (ft)				133	133	124	37	42			74	65	
	Max Queue (ft)				537	537	533	255	255			287	285	
	Cycle Length (s)	80												
67th Avenue and EB Ramps	Delay (s/veh)	25.8	21.8	15.9					28.4	10.9	44.4	2.7		**20.3**
	LOS	C	C	B					C	B	D	A		**C**
	Available Storage (ft)	415	415	415					610	610	280	290		
	Avg Queue (ft)	47	47	33					93	89	75	76		
	Max Queue (ft)	205	205	203					455	455	195	197		
	Cycle Length (s)	80												

Figure 42: Alternative 67-2A Braided Ramps

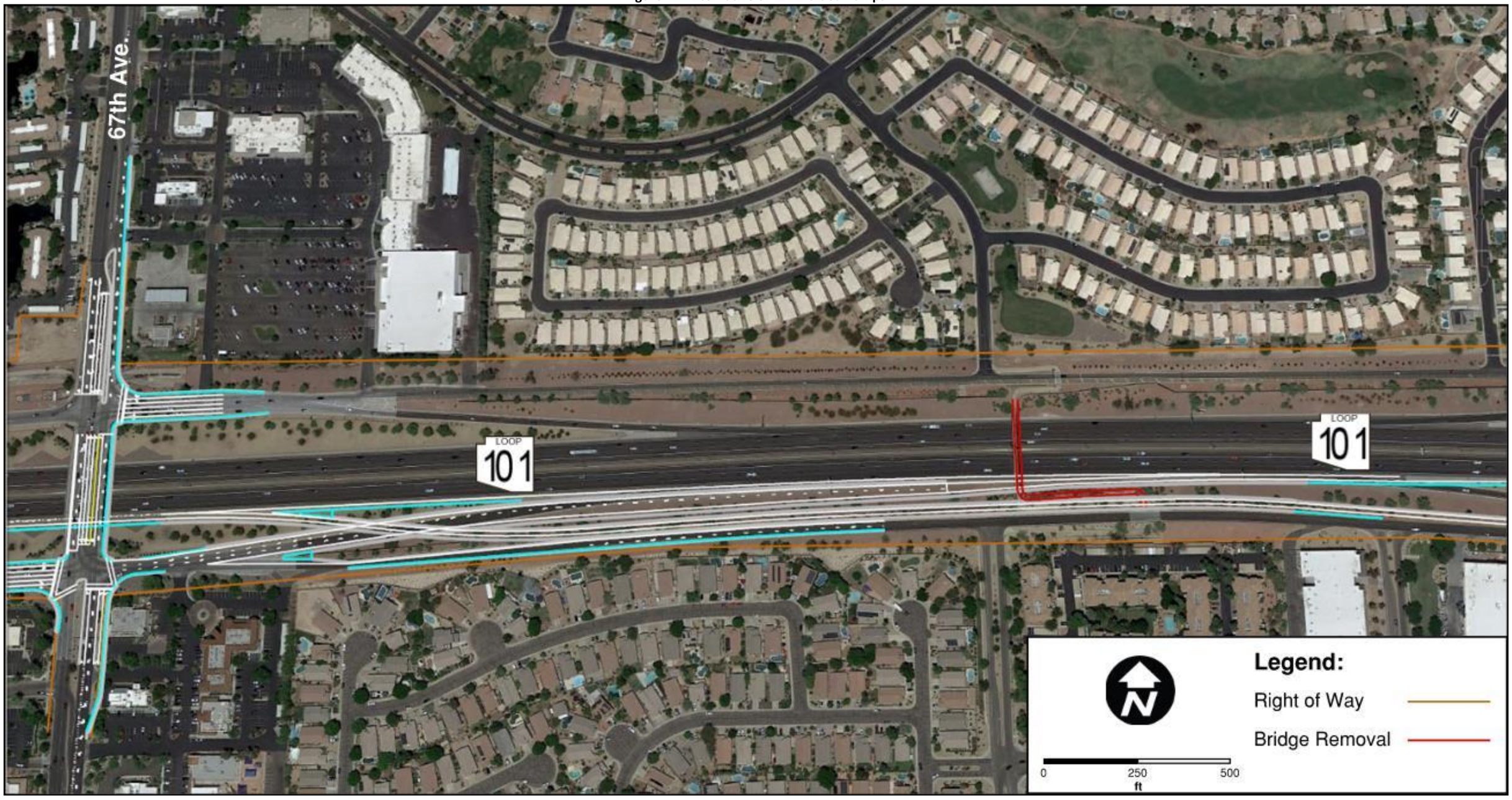


Figure 43: Alternative 67-2B Dual Auxiliary Lanes

3.3.1.3. Alternative 59-1: Dual Northbound Left Turn and Thru Lanes

This alternative would consist of added lanes to the east- and westbound SR 101L exit ramp intersection approaches. Both ramps would be increased to a six-lane cross section with two left-turn, two thru, and two right-turn lanes. The alternative would also include an additional lane across the bridge to provide two northbound left-turn lanes and two northbound thru lanes. The lane addition would eliminate the need for the traffic signal to operate on a split phase for the northbound movement, increasing capacity. The northbound approach at the 59th Avenue and SR 101L eastbound ramps intersection would be widened to accommodate two left-turn, two thru, and two right-turn lanes. Alternative 59-1 is illustrated in ***Figure 44*** and has planning level estimated construction cost of $8,231,000. The cost estimate is available in ***Appendix A***.

The LOS and queue length analysis is included in ***Table 25***. Both 59th Avenue TI intersections are expected to perform at an acceptable level, LOS D or better, in both the AM and PM peak hours with the Alternative 59-1 configuration and the 2045 forecasted traffic volumes. Furthermore, all individual intersection turning/thru movements are also expected to perform at an acceptable level, LOS D or better.

Right-of-Way Considerations:

The area required that is currently outside of the existing right-of-way is 1,400 square feet. Right-of-way needs are identified on southwest quadrant of the TI within the existing vacant parcel. Further evaluation will be required to determine exact requirements once a recommended is selected. Right-of-way acquisition is estimated to cost $16,600.

Drainage Considerations:

Existing storm drain catch basins and pipes are located at each corner of the intersection. The catch basins would be moved to new edge of pavement with the lane addition configuration which would also require minor catch basin lateral extension work. The storm drain trunk lines (36-inch diameter or larger) constructed with the original freeway construction projects would be maintained throughout the corridor. The existing 24-inch culvert headwall may be impacted by curb and gutter and sidewalk widening.

Structures Considerations:

The existing bridge would be widened 1.5 feet to the east. After removal of the existing four-foot deck overhang, the total widening would be 5.5 feet. Due to the 2% bridge cross-slope and the minimum required 16.5-foot vertical clearance to the mainline below, the available superstructure depth for the widening is approximately 65 inches.

It is recommended to use a single precast prestressed UBT50 concrete girder with an eight-inch slab and a 2.5-foot deck overhang. The ultimate out-to-out bridge width would be 110 feet including a one-foot-wide parapet with ADOT mesh conforming to current standards on the east side and the existing chain-link fence on the west side, a six-foot raised sidewalk on the east and west sides of the bridge and eight traffic lanes. The lane configuration includes 14-foot outside, 11-foot thru, and 11-foot turn lanes. The remaining chain-link fence on the west would have a reduction in pedestrian vertical clearance of six inches from the 7.25-foot height of the B-Standards used at time of construction.

> ***Cost Savings Alternative***: In lieu of bridge widening, the existing traffic barriers and median could be removed, and a 5.25-foot-wide sidewalk installed while accommodating the proposed lane configuration. The 5.25-foot sidewalk would require ADOT exception to the six-foot minimum width in the SD Standard Details, however, this approach would eliminate the costs of widening the bridge.

Figure 44: Alternative 59-1 Configuration

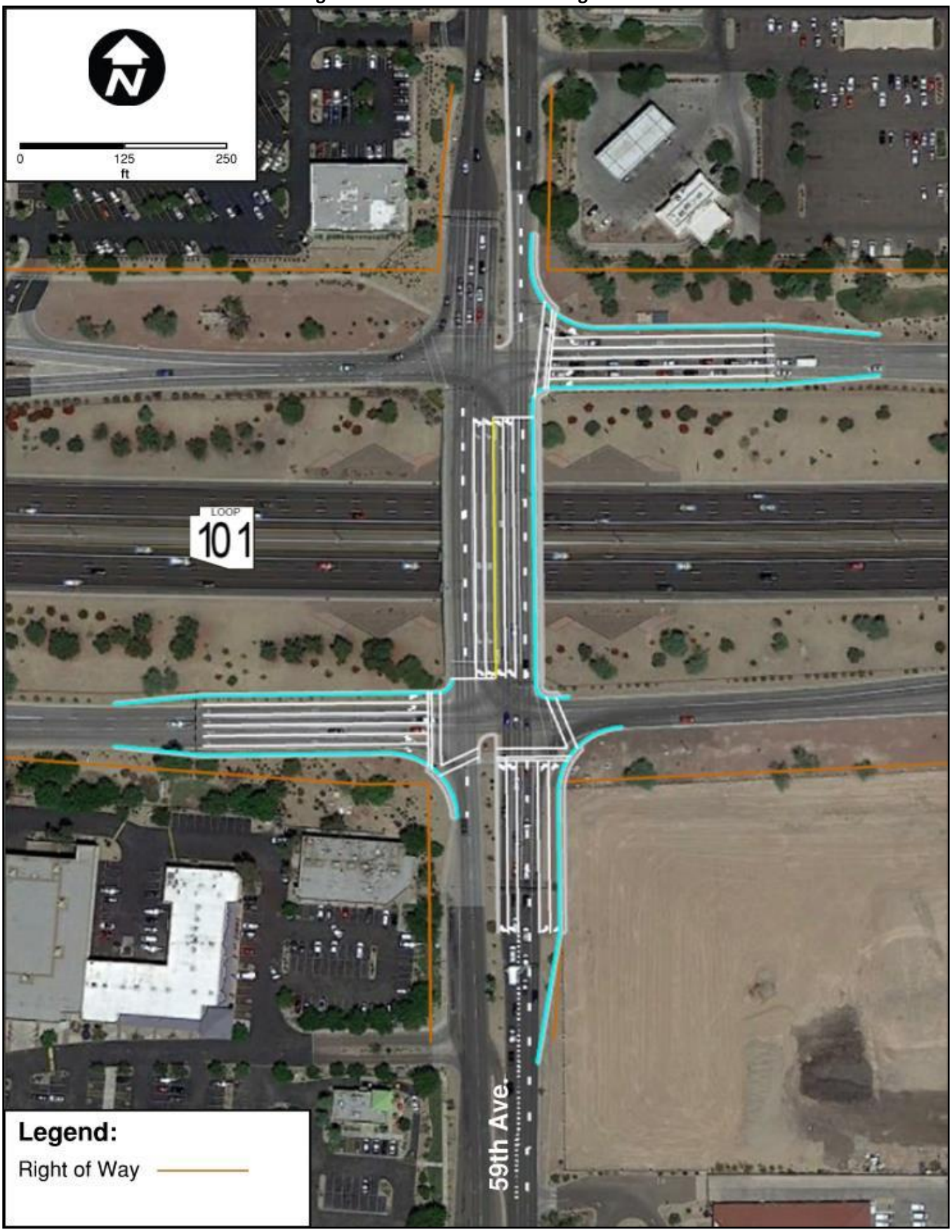


Table 25: Alternative 59-1 Level of Service and Queue Length Analysis														
Intersection	**Parameter**	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**	**Overall**
AM Peak Hour														
67th Avenue and WB Ramps	Delay (s/veh)				26.1	24	12.9	13.1	5			31.9	11.9	**19.2**
	LOS				C	C	B	B	A			C	B	**B**
	Available Storage (ft)				450	450	450	290	290			550	550	
	Avg Queue (ft)				61	61	51	20	20			75	74	
	Max Queue (ft)				276	276	275	143	145			227	228	
	Cycle Length (s)	70												
67th Avenue and EB Ramps	Delay (s/veh)	28.5	32.8	11.7					32.9	18.3	46.8	10.9		**24.5**
	LOS	C	C	B					C	B	D	B		**C**
	Available Storage (ft)	440	440	440					760	760	290	290		
	Avg Queue (ft)	60	61	60					60	55	106	107		
	Max Queue (ft)	227	227	227					228	227	279	277		
	Cycle Length (s)	70												
PM Peak Hour														
67th Avenue and WB Ramps	Delay (s/veh)				25.5	25.7	33.2	11.7	10.1			29.8	13.2	**19.7**
	LOS				C	C	C	B	B			C	B	**B**
	Available Storage (ft)				450	450	450	290	290			550	550	
	Avg Queue (ft)				67	68	66	47	47			64	64	
	Max Queue (ft)				366	366	366	414	416			195	196	
	Cycle Length (s)	80												
67th Avenue and EB Ramps	Delay (s/veh)	36.1	26.7	10					33.5	10.4	46.6	10.2		**25.6**
	LOS	D	C	A					C	B	D	B		**C**
	Available Storage (ft)	440	440	440					760	760	290	290		
	Avg Queue (ft)	92	92	86					91	88	81	82		
	Max Queue (ft)	404	404	404					273	279	227	225		
	Cycle Length (s)	80												

3.3.2. Comprehensive Evaluation

The alternatives that were determined to be feasible in the preliminary evaluation were carried forward for further evaluation. The evaluation criteria were grouped into the following categories:

- Total project cost
- Structures
- Drainage and floodplain impacts
- Traffic operational performance
- Multimodal opportunities
- Right-of-way impacts
- Public and agency acceptance
- Incident management
- Interchange type

The evaluation criteria were divided into approximately 30 performance measure subcategories to determine the extent each alternative met each criterion. Both qualitative and quantitative metrics were used in the evaluation. A high-moderate-low scale was used for the qualitative comparison; the following symbols were used to represent this scale:

- Highest performance or lowest impact – ●
- Moderate performance or impact – ◎
- Lowest performance or highest impact – ○

The performance measure and evaluation criteria are included in ***Table 26***. The evaluation of the 67th Avenue TI and 59th Avenue TI design concept alternatives are shown in ***Table 27*** and ***Table 28***, respectively.

Table 26: Performance Measure and Evaluation Criteria					
Category	**Criteria**	**Performance Measure**	**Scale**		
			●	◎	○
Total Project Cost	Construction cost	Planning level construction cost estimate	Lowest cost	Moderate cost	Highest cost
	ROW cost	Planning level ROW cost estimate	Lowest cost	Moderate cost	Highest cost
	Long-term maintenance cost	Long-term maintenance cost	Lowest cost	Moderate cost	Highest cost
Structures	Total square footage of bridge	Structure size	Lowest square footage	Moderate square footage	Highest square footage
	Depth of structure	Structure depth and impact to roadway profile, embankment, and retaining wall quantity	Shallowest structure, lowest roadway profile, lowest mainline embankment and retaining wall quantity	Moderate structure depth, moderate roadway profile, moderate mainline embankment and retaining wall quantity	Deepest structure depth, highest roadway profile, highest mainline embankment and retaining wall quantity
	Ease of widening	Ability to widen in-kind, impact to crossroad traffic when widen in-kind and cost of widening	Easiest to widen in-kind, least impact to crossroad traffic	Moderately challenging to widen in-kind, moderate impact to crossroad traffic	Most challenging to widen in-kind, highest impact to crossroad traffic
Drainage and Floodplain Impacts	Impacts to existing drainage facilities	Capital cost to remove existing structures	Lowest impact to existing drainage elements	Moderate impact to existing drainage elements	Highest impact to existing drainage elements
	Long-term maintenance impacts	Long-term maintenance cost/effort	Lowest long-term maintenance cost/effort	Moderate long-term maintenance cost/effort	Highest long-term maintenance cost/effort
Traffic Operational Performance	TI operations	Level of Service	LOS A or B	LOS C or D	LOS E or F
	Individual movement operations	Level of Service	Over 70% of movements at LOS B or better	Over 70% of movements at LOS D or better	Movements with LOS E or F
	Potential ability to accommodate greater than anticipated traffic demand based	Ability to add capacity with minimal future improvements	Capacity can be added with signing and marking improvements	Capacity can be added with signing and marking improvements, as well as moderate widening and other infrastructure improvements	Capacity can be added with signing and marking improvements, as well as significant roadway widening and infrastructure improvements
Multimodal Opportunities	Pedestrian accommodations	Locations of sidewalk/crossings	Highest level of pedestrian access	Moderate level of pedestrian access	Lowest level of pedestrian access
		Familiarity with navigating intersection type	Pedestrians familiar with navigating intersection type	Pedestrians somewhat familiar with navigating intersection type	Pedestrians unfamiliar with navigating intersection type
		Number of conflict points	Few conflict points	Moderate conflict points	Most conflict points
Right-of-Way (ROW) Impacts	Area of impact	Area required outside of existing ROW	No impacts outside of existing ROW	Moderate impacts outside of existing ROW	Largest impacts outside of existing ROW
	Access control requirements	Length required for future limited access easement	Lowest impacts outside of existing ROW	Moderate impacts outside of existing ROW	Largest impacts outside of existing ROW
Acceptance	Local agency acceptance	Ability to gain local agency support	Highest potential for support	Moderate potential for support	Lowest potential for support
	Public acceptance	Ability to gain public support	Highest potential for support	Moderate potential for support	Lowest potential for support
	Nonstandard design features	Number of design exceptions or variances	Less than 4 design exceptions or variances	4 to 6 design exceptions or variances	More than 6 design exceptions or variances
Incident Management	Emergency services access	Ability to provide access for emergency services personnel	Highest level of access	Moderate level of access	Lowest level of access
	Incident traffic management	Level of flexibility for clearing incidents	Lowest flexibility for clearing incidents	Moderate flexibility for clearing incidents	Highest flexibility for clearing incidents
Interchange Type	Corridor consistency	Interchange type is consistent with other interchanges along SR 101L corridor	Interchange type is most common in SR 101L corridor	Interchange type is somewhat common in SR 101L corridor	Interchange type is least common in SR 101L corridor
	Driver expectation	Ability to meet driver expectation	Type of interchange is highly familiar to drivers	Type of interchange is moderately familiar to drivers	Type of interchange is not familiar to drivers
	Potential vehicle conflicts	Number of conflict points	Less than 20 conflict points	21 to 25 conflict points	More than 25 conflict points
	Existing transportation infrastructure	Impact to existing transportation infrastructure	Lowest impact	Moderate impact	Highest impact
	Constructability	Complexity and duration of construction	Lowest complexity	Moderate complexity	Highest complexity

Table 27: 67th Avenue TI Evaluation Matrix

Category	Criteria	Performance Measure	67th Avenue Alternative							
			Future No-Build		Alternative 67-1 Westbound Triple Left-Turn		Alternative 67-2A Southbound Triple Left-Turn with Braided Ramps		Alternative 67-2B Southbound Triple Left-Turn with Dual Auxiliary Lanes	
Total project Cost	Construction cost	Planning level construction cost estimate	N/A	N/A	●	$12,530,000	○	$62,745,000	◉	$19,282,000
	ROW cost	Planning level ROW cost estimate	N/A	N/A	◉	$55,300	◉	$55,300	◉	$55,300
	Long-term maintenance cost	Long-term maintenance cost	N/A	N/A	●	Lowest long-term maintenance cost	○	Highest long-term maintenance cost due to additional structures	◉	Moderate long-term maintenance cost due to additional PCCP
Structures	Total square footage of bridge	Structure size	N/A	N/A	◉	4,570 square feet	○	21,025 square feet	◉	4,570 square feet
	Depth of structure	Structure depth and impact to roadway profile, embankment, and retaining wall quantity	●	5.5 feet	◉	5.5 feet	○	5.5 feet (67th Avenue bridge) Cast in place tunnel (braid) Steel truss bridge (pedestrian)	◉	5.5 feet
	Ease of widening	Ability to widen in-kind, impact to crossroad traffic when widen in-kind and cost of widening	N/A	N/A	●	67th Avenue bridge can be sufficiently widened without mainline impacts	●	67th Avenue bridge can be sufficiently widened without mainline impacts	●	67th Avenue bridge can be sufficiently widened without mainline impacts
Drainage and Floodplain Impacts	Impacts to existing drainage facilities	Capital cost to remove existing structures	N/A	N/A	●	Lowest impact to existing infrastructure	○	Highest impact to existing infrastructure	◉	Moderate impact to existing infrastructure
	Long-term maintenance impacts	Long-term maintenance cost/effort	N/A	N/A	●	Lowest long-term maintenance cost	○	Highest long-term maintenance cost due to extensive SD system	●	Lowest long-term maintenance cost
Traffic Operational Performance	TI operations	Level of Service	○	LOS D, E, and F	◉	LOS B and C	◉	LOS B and C	◉	LOS B and C
	Individual movement operations	Level of Service	○	LOS E and F	◉	Over 70% of movements at LOS D or better	◉	Over 70% of movements at LOS D or better	◉	Over 70% of movements at LOS D or better
	Potential ability to accommodate greater than anticipated traffic demand based	Ability to add capacity with minimal future improvements	◉	Existing median could be removed for capacity improvements	○	Capacity can be added with significant roadway widening and infrastructure improvements	○	Capacity can be added with significant roadway widening and infrastructure improvements	○	Capacity can be added with significant roadway widening and infrastructure improvements
Multimodal Opportunities	Pedestrian accommodations	Locations of sidewalk/crossings	◉	Sidewalks present in both directions, pedestrians able to cross 67th Avenue	●	Sidewalks present in both directions, pedestrians able to cross 67th Avenue	●	Sidewalks present in both directions, pedestrians able to cross 67th Avenue	●	Sidewalks present in both directions, pedestrians able to cross 67th Avenue
		Familiarity with navigating intersection type	●	Pedestrians highly familiar with navigating diamond TIs	●	Pedestrians highly familiar with navigating diamond TIs	●	Pedestrians highly familiar with navigating diamond TIs	●	Pedestrians highly familiar with navigating diamond TIs
		Number of conflict points	◉	10	◉	10	◉	10	◉	10
Right-of-Way (ROW) Impacts	Area of impact	Area required outside of existing ROW	N/A	N/A	◉	5,775 square feet	◉	5,775 square feet	◉	5,775 square feet
	Access control requirements	Length required for future limited access easement	○	Maintains existing access points	◉	Improves access control with closure of existing driveway in southeast quadrant	◉	Improves access control with closure of existing driveway in southeast quadrant	◉	Improves access control with closure of existing driveway in southeast quadrant
Acceptance	Local agency acceptance	Ability to gain local agency support	N/A	N/A	◉	Acceptable to Partners	◉	Acceptable to Partners	◉	Acceptable to Partners
	Public acceptance	Ability to gain public support	N/A	N/A	TBD	Pending public engagement	TBD	Pending public engagement	TBD	Pending public engagement
	Nonstandard design features	Number of design exceptions or variances	N/A	N/A	●	None	●	None	◉	Dual auxiliary lanes require design variance

Table 27: 67th Avenue TI Evaluation Matrix

Category	Criteria	Performance Measure	67th Avenue Alternative							
			Future No-Build		Alternative 67-1 Westbound Triple Left-Turn		Alternative 67-2A Southbound Triple Left-Turn with Braided Ramps		Alternative 67-2B Southbound Triple Left-Turn with Dual Auxiliary Lanes	
Incident Management	Emergency services access	Ability to provide access for emergency services personnel	●	Permits thru movement from ramp	●	Permits thru movement from ramp	●	Permits thru movement from ramp	●	Permits thru movement from ramp
	Incident traffic management	Level of flexibility for clearing incidents	●	Permits thru movement from ramp	●	Permits thru movement from ramp	●	Permits thru movement from ramp	●	Permits thru movement from ramp
Interchange Type	Corridor consistency	Interchange type is consistent with other interchanges along SR 101L corridor	●	Surrounding TIs are all standard diamond interchanges	●	Surrounding TIs are all standard diamond interchanges	○	No other braided ramps exist within the corridor	◉	Will match future 75th Avenue triple left configuration
	Driver expectation	Ability to meet driver expectation	●	High ability to meet driver expectation due to prevalence of diamond TIs on SR 101L and within the region	●	High ability to meet driver expectation due to prevalence of diamond TIs on SR 101L and within the region	◉	Drivers are less familiar with braided ramps	●	High ability to meet driver expectation due to prevalence of diamond TIs on SR 101L and within the region
	Potential vehicle conflicts	Number of conflict points	○	30	○	30	○	30	○	30
	Existing transportation infrastructure	Impact to existing transportation infrastructure	N/A	N/A	●	Minimizes impacts to existing facilities	○	Requires extensive reconstruction of 67th Avenue on-ramp and 59th Avenue off-ramp	◉	Requires expansion of existing 67th Avenue on-ramp and mainline widening
	Constructability	Complexity and duration of construction	N/A	N/A	●	Lowest complexity and shortest duration to construct 67th Avenue	○	Highest complexity and longest duration to construct 67th Avenue	◉	Moderate complexity and moderate duration to construct 67th Avenue

Table 28: 59th Avenue TI Evaluation Matrix

Category	Criteria	Performance Measure	59th Avenue Alternative			
			Future No-Build		Alternative 59-1 Dual NB Left-Turn and Thru	
Total project Cost	Construction cost	Planning level construction cost estimate	N/A	N/A	●	$8,231,000
	ROW cost	Planning level ROW cost estimate	N/A	N/A	●	$16,600
	Long-term maintenance cost	Long-term maintenance cost	N/A	N/A	●	Low long-term maintenance cost due to minimal modifications to TI
Structures	Total square footage of bridge	Structure size	N/A	N/A	◎	1,415 square feet
	Depth of structure	Structure depth and impact to roadway profile, embankment, and retaining wall quantity	●	5.5 feet	◎	5.5 feet
	Ease of widening	Ability to widen in-kind, impact to crossroad traffic when widen in-kind and cost of widening	N/A	N/A	●	59th Avenue bridge can be sufficiently widened without mainline impacts
Drainage and Floodplain Impacts	Impacts to existing drainage facilities	Capital cost to remove existing structures	N/A	N/A	●	Low impact to existing structures
	Long-term maintenance impacts	Long-term maintenance cost/effort	N/A	N/A	●	Low long-term maintenance cost
Traffic Operational Performance	TI operations	Level of Service	○	LOS E and F	◎	LOS B and C
	Individual movement operations	Level of Service	○	LOS E and F	◎	Over 70% of movements at LOS D or better
	Potential ability to accommodate greater than anticipated traffic demand based	Ability to add capacity with minimal future improvements	◎	Existing median could be removed for capacity improvements	○	Capacity can be added with significant roadway widening and infrastructure improvements
Multimodal Opportunities	Pedestrian accommodations	Locations of sidewalk/crossings	◎	Sidewalks present in both directions, pedestrians able to cross 59th Avenue	●	Sidewalks present in both directions, pedestrians able to cross 59th Avenue
		Familiarity with navigating intersection type	●	Pedestrians highly familiar with navigating diamond TIs	●	Pedestrians highly familiar with navigating diamond TIs
		Number of conflict points	◎	10	◎	10
Right-of-Way (ROW) Impacts	Area of impact	Area required outside of existing ROW	N/A	N/A	◎	1,400 square feet
	Access control requirements	Length required for future limited access easement	○	Maintains existing access points	○	Maintains existing access points
Acceptance	Local agency acceptance	Ability to gain local agency support	○	N/A	◎	Acceptable to Partners
	Public acceptance	Ability to gain public support	○	N/A	TBD	Pending public engagement
	Nonstandard design features	Number of design exceptions or variances	N/A	N/A	●	None
Incident Management	Emergency services access	Ability to provide access for emergency services personnel	●	Permits thru movement from ramp	●	Permits thru movement from ramp
	Incident traffic management	Level of flexibility for clearing incidents	●	Permits thru movement from ramp	●	Permits thru movement from ramp
Interchange Type	Corridor consistency	Interchange type is consistent with other interchanges along SR 101L corridor	●	Surrounding TIs are all standard diamond interchanges	●	Surrounding TIs are all standard diamond interchanges
	Driver expectation	Ability to meet driver expectation	●	High ability to meet driver expectation due to prevalence of diamond TIs on SR 101L and within the region	●	High ability to meet driver expectation due to prevalence of diamond TIs on SR 101L and within the region
	Potential vehicle conflicts	Number of conflict points	○	30	○	30
	Existing transportation infrastructure	Impact to existing transportation infrastructure	N/A	N/A	●	Minimizes impacts to existing facilities
	Constructability	Complexity and duration of construction	N/A	N/A	●	Low complexity and short duration to construct 59th Avenue

3.4. Recommendations

3.4.1. 67th Avenue

Of the 67th Avenue conceptual alternatives, Alternative 67-1 (Triple Westbound Left-Turn) and Alternative 67-2B (Triple Southbound Left-Turn with Dual Auxiliary Lanes) yield high operational results with relatively low project costs. Alternative 67-1 has the lowest complexity and duration of construction of the build alternatives. Alternative 67-2B has similar complexity and duration to Alternative 67-1 and has a proposed configuration similar to the proposed improvements at the 75th Avenue TI. Alternative 67-1 is the least expensive of the build alternatives.

The multimodal opportunities, incident management, and number of vehicle and pedestrian conflict points are the same in all alternatives, with the exception that the build alternatives would include construction of pedestrian facilities to the newest design standards. The right-of-way and access control impacts are the same in all build alternatives, with a driveway on the southeast quadrant marked for closure. 67th Avenue bridge widening would be required for all build alternatives. However, unlike the other two build alternatives (Alternative 67-2A and 67-2B), Alternative 67-1 does not require the complications of adding a third receiving lane to the eastbound entrance ramp at 67th Avenue and tying into the mainline. Local project partners have been engaged throughout the alternative development process and both Alternative 67-1 and Alternative 67-2B are acceptable. The public will be engaged as the project progresses.

It is recommended that Alternatives 67-1 and 67-2B be advanced in the design process. Roll plot schematics of Alternative 67-1 and Alternative 67-2B are available in ***Appendix B***.

3.4.2. 59th Avenue

Of the 59th Avenue conceptual alternatives, Alternative 59-1 (Dual Northbound Left-Turn and Thru) yields high operational results while the project cost, complexity, and duration of construction is relatively low.

The multimodal opportunities, incident management, and number of vehicle and pedestrian conflict points are the same in both alternatives, with the exception that the build alternative, Alternative 59-1, would include construction of pedestrian facilities to the newest design standards (unless the Cost Savings Alternative discussed in Section 3.3.1.3 is considered). The right-of-way and access control impacts of Alternative 59-1 are minimal, with all existing driveways to remain. Furthermore, 59th Avenue bridge widening would be required but could be sufficiently widened without mainline impacts. Local project partners have been engaged throughout the alternative development process and both Alternative 67-1 and Alternative 67-2B are acceptable. The public will be engaged as the project progresses.

It is recommended that Alternative 59-1 be advanced in the design process. A roll plot schematic of Alternative 59-1 is available in ***Appendix B***.

4.0 Major Design Features of Alternatives to Be Advanced

The designs will comply with all applicable federal, state, and local laws. Guidance is taken from The Standard Specifications for the Construction of Roads and Bridges on Federal Highway Projects, Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Manual on Uniform Traffic Control Devices, A Policy on Geometric Design of Highways and Streets, and ADA Standards for Accessible Design. The operational performance of all alternatives to be advanced will be reanalyzed during the design stage using the most up to date forecasted traffic volumes.

4.1. Alternative 67-1

This alternative will increase the number of lanes on westbound Beardsley Road from four to six to allow for two dedicated left turn lanes and a left thru lane, increasing the left turn capacity from two to three lanes. 67th Avenue will be widened from seven to eight lanes on the TIUP bridge, and seven to nine lanes south of the intersection with Eastbound Beardsley Road. Eastbound Beardsley Road will also be widened from four to six lanes.

4.1.1. Horizontal Alignments

In general, the existing horizontal alignments will be utilized without manipulation for the required widening. This includes east- and westbound Beardsley Road and northbound 67th Avenue. Both directions of Beardsley Road will be widened by one lane to both the left and right of center, resulting in a symmetric section remaining symmetric. Southbound 59th Avenue will be widened one lane by shifting the median into existing northbound lanes. The existing section is asymmetrical with four lanes southbound and three lanes northbound. Ultimate configuration will consist of five lanes southbound, and three lanes north bound. The existing bridge will be widened to accommodate the new lane by widening the eastern limits.

4.1.2. Access

The right-hand driveway on westbound Beardsley Road to the east of the 67th Avenue intersection will be closed as part of this alternative. The northernmost right-hand driveway on 67th Avenue south of eastbound Beardsley Road will also be closed.

4.1.3. Right-of-Way Overview

The area required that is currently outside of the existing right-of-way is 5,775 square feet. Right-of-way needs are identified on the southeast and southwest quadrants of the TI. Further evaluation will be required to determine exact requirements once a recommended is selected. Right-of-way acquisition is estimated to cost $55,300.

Minor right-of-way acquisition will be required in the northeast corner of 67th Avenue and westbound Beardsley Road. This area will be required for grading to place the proposed sidewalk. The sidewalk itself will be within the existing right-of-way. Minor right-of-way acquisition will be required in the southwest corner of 67th Avenue and eastbound Beardsley Road. This encroachment is created from the proposed radii of the roadway and sidewalk and is a landscaped area of the private parcel. Additional right-of-way will also be required in the southeast corner of 67th Avenue and eastbound Beardsley Road. This acquisition is necessary for the right-turn lane, curb and gutter, sidewalk, and necessary grading. This acquisition may require the demolition of the existing business located closest to the intersection in this corner. The next business south may have impacts to the drive-thru lane.

Several existing access points are within the preferred access control limits documented in the ADOT Roadway Design Guidelines (RDG) February 2022 Revision. Obtaining access control right-of-way easements can be evaluated during final design.

4.1.4. Drainage

Existing storm drain catch basins and pipes are located at each corner of the intersection. The catch basins would be moved to new edge of pavement with the lane addition configuration which would also require minor catch basin lateral extension work. The eastbound Beardsley Road widening will require the relocation and replacement of two curb inlet structures, one on the approach to the intersection of 67th Avenue and one past. One curb inlet structure on 67th Avenue north of westbound Beardsley Road will require relocation as part of the widening. The storm drain trunk lines (36-inch diameter or larger) constructed with the original freeway construction projects would be maintained throughout the corridor. Headwall extension or modification would be needed on the existing two, 8-foot by 5-foot reinforced concrete box culvert (RCBC) on the northeast corner of 67th Avenue for any potential widening.

The easternmost lane of the 67th Avenue bridge includes two in-street drainage inlets that will need to be relocated with the widening of the bridge. As the collection area will increase for southbound 67th Avenue, the existing structures will need to be evaluated for increase in capacity.

4.1.5. Construction Phasing and Traffic Control Overview

Each direction of Beardsley Road will require widening of one side at a time to minimize impact to the traveling public. The bridge widening will impact northbound 67th Avenue significantly and reduce through capacity to half of existing

during construction. The bridge construction will also require full closure of SR 101L intermittently. Three bridge sign structures will require replacement and are recommended to take places during night closures.

4.1.6. Traffic Design

The TI intersections will operate at LOS C or better in design year 2045. Please see SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements Final Traffic Report (2023) for greater detail. Alternative 67-1 is expected to have a greater performance past the design year as compared to Alternative 67-2.

The improvements as part of this alternative will minimally impact the design of the ADOT freeway GPL project. The improvements to the 67th Avenue TI will complement the improvements form the GPL project in traffic operation.

4.1.7. Utilities

With the widening of the 67th Avenue bridge, the existing under hang utility crossings will require relocation. The widening will also require the relocation of the traffic signals, luminaires, pull boxes, and other underground utilities in conflict with final design.

4.1.8. Structures

This alternative will widen the existing bridge 13.5 feet to the east. After removal of the existing four-foot deck overhang, the total widening would be 17.5 feet. Due to the 2% bridge cross slope and the minimum required 16.5-foot vertical clearance to the mainline below, the available superstructure depth for the widening would be approximately 62 inches.

It is recommended to use three (3) precast prestressed Utah Bulb Tee (UBT) 50 girders spaced at five feet on center with an eight-inch deck slab and a 2.5-foot deck overhang. The ultimate out-to-out bridge width is 110 feet including a one-foot-wide parapet with ADOT mesh conforming to current standards on the east side and the existing chain-link fence on the west side, a six-foot raised sidewalk on the east and west sides of the bridge and eight traffic lanes. The lane configuration includes 14-foot outside, 12-foot thru, and 11-foot turn lanes. The remaining chain-link fence on the west would have a reduction in pedestrian vertical clearance of 6 inches from the 7.25-foot height of the B-Standards used at time of construction.

Another structure type alternative would be to widen in-kind with CIP/PT concrete girders with the superstructure constructed high on falsework and lowered in-place; this alternative would require approval from ADOT to allow falsework in the SR 101L freeway.

4.1.9. Preliminary Pavement Considerations

Existing AC and PCCP roadway surfaces not in conflict with proposed design are adequate to remain in place. Where widening occurs, it is recommended that sawcut and edge preparation occur at the outermost location to preserve as much existing pavement possible.

4.1.10. Multimodal Considerations

Sidewalk is to be relocated through this alternative. Overall sidewalk network length will have negligible change. Five of the existing eight crosswalks within the TI will increase in length due to additional lanes.

4.1.11. Environmental

The project area is located within an established ADOT transportation corridor. The project is federally funded and must therefore comply with the National Environmental Policy Act. While much of the project is located within the existing ADOT ROW, new easements and ROW has been identified. Based on this, the project is anticipated to meet the criteria for a Categorical Exclusion (CE) under 23 CFR 771.117 (c). Ultimately the decision on the type of documentation will be determined by ADOT and FHWA during the design phase of the project.

A high-level, red flag analysis was performed for the project area. The project area is characterized by an existing transportation corridor within a built urban environment with little to no natural biological communities. The analysis determined that anticipated impacts to water resources, biological resources, and cultural resources are low. No impacts to Section 6(f) resources are anticipated to occur. The impacts to Air Quality and Noise and the presence of hazardous material will be evaluated as the project progresses. The anticipated ROW needs and potential displacement of property results in an additional socioeconomic impact.

4.2. Alternative 67-2B

This alternative will increase the number of lanes on westbound Beardsley Road from four to six to allow for two dedicated left turn lanes, two thru lanes and two right turn lanes. 67th Avenue will be widened from seven to eight lanes on the TIUP bridge, and seven to nine lanes south of the intersection with Eastbound Beardsley Road. Eastbound Beardsley Road will also be widened from four to six lanes. Beardsley Road east of the intersection with 67th Avenue will be reduced from two thru lanes to one thru lane to allow three lanes to become the SR 101L entrance ramp.

4.2.1. Horizontal Alignments

In general, the existing horizontal alignments will be utilized without manipulation for the required widening. This includes east- and westbound Beardsley Road and northbound 59th Avenue. Both directions of Beardsley Road will be widened by one lane to both the left and right of center, resulting in a symmetric section remaining symmetric. Southbound 67th Avenue will be widened one lane by shifting the median into existing northbound lanes. The existing section is asymmetrical with four lanes southbound and three lanes northbound. Ultimate configuration will consist of five lanes southbound, and three lanes north bound. The existing bridge will be widened to accommodate the new lane by widening the eastern limits.

4.2.2. Access

The right-hand driveway on westbound Beardsley Road to the east of the 67th Avenue intersection will be closed as part of this alternative. The northernmost right-hand driveway on 67th Avenue south of eastbound Beardsley Road will also be closed.

4.2.3. Right-of-Way Overview

The area required that is currently outside of the existing right-of-way is 5,775 square feet. Right-of-way needs are identified on the southeast and southwest quadrants of the TI. Further evaluation will be required to determine exact requirements once a recommended is selected. Right-of-way acquisition is estimated to cost $55,300.

Minor right-of-way acquisition will be required in the northeast corner of 67th Avenue and westbound Beardsley Road. This area will be required for grading to place the proposed sidewalk. The sidewalk itself will be within the existing right-of-way. Minor right-of-way acquisition will be required in the southwest corner of 67th Avenue and eastbound Beardsley Road. This encroachment is created from the proposed radii of the roadway and sidewalk and is a landscaped area of the private parcel. Additional right-of-way will also be required in the southeast corner of 67th Avenue and eastbound Beardsley Road. This acquisition is necessary for the right-turn lane, curb and gutter, sidewalk, and necessary grading. This acquisition may require the demolition of the existing business located closest to the intersection in this corner. The next business south may have impacts to the drive-thru lane.

Several existing access points are within the preferred access control limits documented in the ADOT Roadway Design Guidelines (RDG) February 2022 Revision. Obtaining access control right-of-way easements can be evaluated during final design.

4.2.4. Drainage

Existing storm drain catch basins and pipes are located at each corner of the intersection. The catch basins would be moved to new edge of pavement with the lane addition configuration which would also require minor catch basin lateral extension work. The eastbound Beardsley Road widening will require the relocation and replacement of two curb inlet

structures, one on the approach to the intersection of 67th Avenue and one past. One curb inlet structure on 67th Avenue north of westbound Beardsley Road will require relocation as part of the widening.

The storm drain trunk lines (36-inch diameter or larger) constructed with the original freeway construction projects would be maintained throughout the corridor. Headwall extension or modification would be needed on the existing two, 8-foot by 5-foot reinforced concrete box culvert (RCBC) on the northeast corner of 67th Avenue for any potential widening.

The easternmost lane of the 67th Avenue bridge includes two in-street drainage inlets that will need to be relocated with the widening of the bridge. As the collection area will increase for southbound 67th Avenue, the existing structures will need to be evaluated for increase in capacity.

The lane drop off of 67th Avenue Ramp D to mainline SR 101L requires relocation of sag inlets on the ramp and freeway auxiliary lane inlets. The catch basins will require extension of existing storm drain catch basin laterals to tie into existing trunklines under eastbound SR 101L pavement.

4.2.5. Construction Phasing and Traffic Control Overview

Each direction of Beardsley Road will require widening of one side at a time to minimize impact to the traveling public. The bridge widening will impact northbound 67th Avenue significantly and reduce through capacity to half of existing during construction. The bridge construction will also require full closure of SR 101L intermittently. Three bridge sign structures will require replacement and are recommended to take places during night closures.

4.2.6. Traffic Design

The TI intersections will operate at LOS C or better in design year 2045. Please see SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements Final Traffic Report (2023) for greater detail.

The improvements as part of this alternative will minimally impact the design of the ADOT freeway GPL project. The improvements to the 67th Avenue TI will complement the improvements form the GPL project in traffic operation.

4.2.7. Utilities

With the widening of the 67th Avenue bridge, the existing under hang utility crossings will require relocation. The widening will also require the relocation of the traffic signals, luminaires, pull boxes, and other underground utilities in conflict with final design.

4.2.8. Structures

The required 67th Avenue bridge widening would be the same as Alternative 67-1. For a description of the widening, see ***Section 4.1.8***.

4.2.9. Preliminary Pavement Considerations

Existing AC and PCCP roadway surfaces not in conflict with proposed design are adequate to remain in place. Where widening occurs, it is recommended that sawcut and edge preparation occur at the outermost location to preserve as much existing pavement possible.

4.2.10. Multimodal Considerations

Sidewalk is to be relocated through this alternative. Overall sidewalk network length will have negligible change. Five of the existing eight crosswalks within the TI will increase in length due to additional lanes.

4.2.11. Environmental

The high-level environmental overview of Alternative 67-2B is identical to Alternative 67-1. See ***Section 4.1.11*** for additional detail.

4.3. Alternative 59-1

This alternative will increase the number of lanes on the east- and westbound Beardsley Road approaches to the TI from four to six. Northbound 59th Avenue approaching the TI will also increase from four to six lanes. The 59th Avenue bridge will be widened from seven to eight lanes to increase the number of northbound lanes from three to four.

4.3.1. Horizontal Alignments

In general, the existing horizontal alignments will be utilized without manipulation for the required widening. This includes east- and westbound Beardsley Road and northbound 59th Avenue. Both directions of Beardsley Road will be widened by one lane to both the left and right of center, resulting in a symmetric section remaining symmetric. Northbound 59th Avenue will be widened one lane to the right to accommodate the split of the northbound left and through lane into two separate lanes dedicated to each movement 59th Avenue currently exists in an asymmetric section with four lanes southbound and three lanes northbound. This alternative will make the section symmetric.

4.3.2. Access

Private access shall not be modified with this alternative.

4.3.3. Right-of-Way Overview

The area required that is currently outside of the existing right-of-way is 1,400 square feet. Right-of-way needs are identified on southwest quadrant of the TI within the existing vacant parcel. Further evaluation will be required to determine exact requirements once a recommended is selected. Right-of-way acquisition is estimated to cost $16,600.

Right-of-way acquisition will be required in the southeast corner of 59th Avenue and eastbound Beardsley Road. This area is approximately two-hundred feet long and will require an estimated twenty-five-foot width to accommodate the addition of two lanes and replacement of the sidewalk, including required grading. This will also require relocation of the existing steel and CMU fence.

Several existing access points are within the preferred access control limits documented in the ADOT Roadway Design Guidelines (RDG) February 2022 Revision. Obtaining access control right-of-way easements can be evaluated during final design.

4.3.4. Drainage

Existing storm drain catch basins and pipes are located at each corner of the intersection. The catch basins would be moved to new edge of pavement with the lane addition configuration which would also require minor catch basin lateral extension work. The eastbound Beardsley Road widening will require the relocation and replacement of two curb inlet structures. Two curb inlet structures south of the TI will require relocation, one on northbound and one on southbound. The westbound Beardsley Road widening will require the relocation and replacement of one curb inlet structure. The storm drain trunk lines (36-inch diameter or larger) constructed with the original freeway construction projects would be maintained throughout the corridor. The existing 24-inch culvert headwall may be impacted by curb and gutter and sidewalk widening. The easternmost lane of the 59th Avenue bridge includes two in-street drainage inlets that will need to be relocated with the widening of the bridge. As the collection area will increase, it is anticipated that these structures will need to increase in capacity.

4.3.5. Construction Phasing and Traffic Control Overview

Each direction of Beardsley Road will require widening of one side at a time to minimize impact to the traveling public. The bridge widening will impact northbound 59th Avenue significantly and reduce through capacity to half of existing during construction. The bridge construction will also require full closure of SR 101L intermittently. Three bridge sign structures will require replacement and are recommended to take places during night closures.

4.3.6. Traffic Design

The TI intersections will operate at LOS C or better in design year 2045. Please see SR 101L: 67th Avenue and 59th Avenue Traffic Interchange Improvements Final Traffic Report (2023) for greater detail.

The improvements as part of this alternative will minimally impact the design of the ADOT freeway GPL project. The improvements to the 59th Avenue TI will complement the improvements form the GPL project in traffic operation.

4.3.7. Utilities

With the widening of the 59th Avenue bridge, the existing under hang utility crossings will require relocation. The widening will also require the relocation of the traffic signals, luminaires, pull boxes, and other underground utilities in conflict with final design.

4.3.8. Structures

The existing bridge would be widened 1.5 feet to the east. After removal of the existing four-foot deck overhang, the total widening would be 5.5 feet. Due to the 2% bridge cross-slope and the minimum required 16.5-foot vertical clearance to the mainline below, the available superstructure depth for the widening is approximately 65 inches.

It is recommended to use a single precast prestressed UBT50 concrete girder with an eight-inch slab and a 2.5-foot deck overhang. The ultimate out-to-out bridge width would be 110 feet including a one-foot-wide parapet with ADOT mesh conforming to current standards on the east side and the existing chain-link fence on the west side, a six-foot raised sidewalk on the east and west sides of the bridge and eight traffic lanes. The lane configuration includes 14-foot outside, 11-foot thru, and 11-foot turn lanes. The remaining chain-link fence on the west would have a reduction in pedestrian vertical clearance of six inches from the 7.25-foot height of the B-Standards used at time of construction.

4.3.9. Preliminary Pavement Considerations

Existing AC and PCCP roadway surfaces not in conflict with proposed design are adequate to remain in place. Where widening occurs, it is recommended that sawcut and edge preparation occur at the outermost location to preserve as much existing pavement possible.

4.3.10. Multimodal Considerations

Sidewalk is to be relocated through this alternative. Overall sidewalk network length will have negligible change. Five of the existing eight crosswalks within the TI will increase in length due to additional lanes.

4.3.11. Environmental

The high-level environmental overview of Alternative 59-1 is identical to Alternative 67-1. See ***Section 4.1.11*** for additional detail.

5.0 Cost Estimate for Alternatives to Be Advanced

Planning level cost estimates are included in Appendix A. The planning level costs are as follows:

- Alternative 67-1: $12,530,000
- Alternative 67-2B: $19,282,000
- Alternative 59-1: $8,231,000

6.0 Implementation Plan

The recommended alternatives likely result in relatively minor throwaway of proposed F0316 project improvements such as curb and gutter, two catch basins on the 67th Avenue frontage road, streetlight poles along the frontage road, and FMS along the north side of the westbound frontage road at both 67th and 59th Avenue TIs. No F0316 constructed PCC pavement throwaway is anticipated.

Appendix A

Cost Estimates

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Westbound Triple Lefts
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 67th Ave
LENGTH: 1 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	**EARTHWORK**				
	CLEARING & REMOVALS	L.SUM	1	$ 800,000.00	800,000
	ROADWAY EXCAVATION	CU.YD.	1,500	$ 50.00	75,000
	DRAINAGE EXCAVATION	CU.YD.		$ 20.00	
	BORROW	CU.YD.		$ 17.00	
	SUBGRADE TREATMENT	SQ.YD.		$ 17.00	
	FURNISH WATER	L.SUM	1	$ 60,000.00	60,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 200				935,000
300 & 400	**BASE AND SURFACE TREATMENT**				
	AGGREGATE BASE	SQ.YD.	5,245	$ 16.00	83,920
	CONCRETE PAVEMENT	SQ.YD.	4,115	$ 150.00	617,250
	ASPHALT PAVEMENT	SQ.YD.	1,130	$ 80.00	90,400
	ARAC SURFACE	SQ.YD.		$ 8.00	
	MILLING & OVERLAY	SQ.YD.	2,930	$ 35.00	102,550
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 300 & 400				894,120
500	**DRAINAGE**				
	DRAINAGE SYSTEM (CLOSED)	L.FT.	300	$ 400.00	120,000
	DRAINAGE SYSTEM (OPEN)	L.FT.		$ 220.00	
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	50	$ 500.00	25,000
	PUMP STATION (NEW)	EACH		$ 2,885,000.00	
	PIPE CULVERTS	L.FT.		$ 460.00	
	MISCELLANEOUS ITEMS (CATCH BASIN/MH ADJUSTMENTS)	EACH	10	$ 12,000.00	120,000
	TOTAL ITEM 500				265,000
600	**STRUCTURES**				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.		$ 211.00	
	FLYOVER HOV RAMP	SQ.FT.		$ 274.00	
	OVERPASS TI BRIDGE	SQ.FT.		$ 219.00	
	RIVER CROSSING BRIDGE	SQ.FT.		$ 227.00	
	PEDESTRIAN BRIDGE	SQ.FT.		$ 282.00	
	BRIDGE WIDENING	SQ.FT.	4,568	$ 350.00	1,598,630
	BRIDGE REHABILITATION	SQ.FT.		$ 156.00	
	BOX CULVERT	L.FT./CELL		$ 1,712.00	
	SIGN STRUCTURES	EACH	4	$ 90,000.00	360,000
	ITS STRUCTURE AND PANEL	EACH		$ 266,000.00	
	O&M CROSSING	EACH		$ 403,900.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 600				1,958,630
700	**TRAFFIC ENGINEERING**				
	SIGNING (FREEWAY)	MILE/DIR		$ 48,000.00	
	SIGNING (STREET)	MILE	0.50	$ 110,000.00	55,000
	PAVEMENT MARKING	LANE-MILE	4.00	$ 5,000.00	20,000
	LIGHTING	MILE	0.50	$ 550,000.00	275,000
	TRAFFIC SIGNAL	EACH	2	$ 400,000.00	800,000
	INTELLIGENT TRANSPORTATION SYSTEM (ITS)	MILE		$ 700,000.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 700				1,150,000
800	**ROADSIDE DEVELOPMENT**				
	LANDSCAPING AND TOPSOIL	SQ.YD.	750	$ 20.00	15,000
	UTILITY RELOCATION	L.SUM	1	$ 250,000.00	250,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 800				265,000

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Westbound Triple Lefts
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 67th Ave
LENGTH: 1 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
900	**INCIDENTALS**				
	RETAINING WALLS	SQ.FT.		$ 100.00	
	SOUND WALLS	SQ.FT.		$ 59.00	
	ROADWAY APPURTENANCES	L.SUM	1	$ 650,000.00	650,000
	ADA IMPROVEMENTS	EACH	6	$ 10,000.00	60,000
	TRANSIT APPURTENANCES	L.SUM			
	RAILROAD ACCOMMODATIONS	L.SUM			
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 900				710,000
	SUBTOTAL A (ITEM SUBTOTAL)				**$6,177,800**
PW	**PROJECT WIDE**				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)			8.0%	494,200
	DUST PALLIATIVE (0% OF SUBTOTAL A) (INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	61,800
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	92,700
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	61,800
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	494,200
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	1,235,600
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				**$8,618,100**
OTHER PROJ	**OTHER PROJECT COSTS**				
	DPS TRAFFIC CONTROL				0
	JOINT PROJECT AGREEMENT ITEMS				0
	CONTRACTOR INCENTIVES				0
	ENVIRONMENTAL MITIGATION				0
	BASE YEAR CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$8,618,100**
BELOW	**BELOW THE LINE ITEMS**				
	POST DESIGN SERVICES (1% OF BASE YEAR CONSTRUCTION COST)			1.0%	86,200
	CONSTRUCTION CONTINGENCIES (5% OF BASE YEAR CONSTRUCTION COST)			5.0%	430,900
	CONSTRUCTION ENGINEERING (14% OF BASE YEAR CONSTRUCTION COST)			14.0%	1,206,500
	SUBTOTAL BASE YEAR CONSTRUCTION				**10,341,700**
	INDIRECT COST ALLOCATION (10.5% OF BASE YEAR CONSTRUCTION+BELOW THE LINE ITEMS)			10.50%	1,085,900
	BASE YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$11,427,600**
DES	**PREDESIGN AND FINAL DESIGN**				
	PREDESIGN/NEPA/PI SERVICES (3% OF BASE YEAR CONSTRUCTION COST)			3.0%	258,500
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	27,100
	SUBTOTAL PREDESIGN				**285,600**
	FINAL DESIGN SERVICES (8% OF BASE YEAR CONSTRUCTION COST)			8.0%	689,400
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	72,400
	SUBTOTAL FINAL DESIGN				**761,800**
	TOTAL ESTIMATED DESIGN COST				**$1,047,400**
UTIL	**UTILITY RELOCATION**				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				
	INDIRECT COST ALLOCATION (10.5% OF ALL UTILITY COSTS)			10.50%	0
	TOTAL ESTIMATED UTILITY COST				**$0**
R/W	**RIGHT-OF-WAY**				
	RIGHT-OF-WAY				50,000
	INDIRECT COST ALLOCATION (10.5% OF ALL RIGHT-OF-WAY COSTS)			10.50%	5,300
	TOTAL ESTIMATED RIGHT-OF-WAY COSTS				**$55,300**
	TOTAL ESTIMATED PROJECT COST				**$12,530,000**

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Southbound Triple Lefts - Braid
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 67th Ave
LENGTH: 3 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	**EARTHWORK**				
	CLEARING & REMOVALS	L.SUM	1	$ 1,600,000.00	1,600,000
	ROADWAY EXCAVATION	CU.YD.	5,000	$ 50.00	250,000
	DRAINAGE EXCAVATION	CU.YD.		$ 20.00	
	BORROW	CU.YD.	10,500	$ 17.00	178,500
	SUBGRADE TREATMENT	SQ.YD.		$ 17.00	
	FURNISH WATER	L.SUM	1	$ 310,000.00	310,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 200				2,338,500
300 & 400	**BASE AND SURFACE TREATMENT**				
	AGGREGATE BASE	SQ.YD.	25,325	$ 16.00	405,200
	CONCRETE PAVEMENT	SQ.YD.	24,200	$ 150.00	3,630,000
	ASPHALT PAVEMENT	SQ.YD.	1,125	$ 80.00	90,000
	ARAC SURFACE	SQ.YD.		$ 8.00	
	MILLING & OVERLAY	SQ.YD.	6,465	$ 35.00	226,280
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 300 & 400				4,351,480
500	**DRAINAGE**				
	DRAINAGE SYSTEM (CLOSED)	L.FT.	3,800	$ 400.00	1,520,000
	DRAINAGE SYSTEM (OPEN)	L.FT.		$ 220.00	
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	50	$ 500.00	25,000
	PUMP STATION (NEW)	EACH		$ 2,885,000.00	
	PIPE CULVERTS	L.FT.		$ 460.00	
	MISCELLANEOUS ITEMS (CATCH BASIN/MH ADJUSTMENTS)	EACH	50	$ 12,000.00	600,000
	TOTAL ITEM 500				2,145,000
600	**STRUCTURES**				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.		$ 211.00	
	FLYOVER HOV RAMP	SQ.FT.		$ 274.00	
	FRONTAGE RAMP	SQ.FT.	13,639	$ 334.00	4,555,330
	RIVER CROSSING BRIDGE	SQ.FT.		$ 227.00	
	PEDESTRIAN BRIDGE	SQ.FT.	2,820	$ 320.00	902,400
	BRIDGE WIDENING	SQ.FT.	4,568	$ 350.00	1,598,630
	BRIDGE REHABILITATION	SQ.FT.		$ 156.00	
	BOX CULVERT	L.FT./CELL		$ 1,712.00	
	SIGN STRUCTURES	EACH	8	$ 90,000.00	720,000
	ITS STRUCTURE AND PANEL	EACH		$ 266,000.00	
	O&M CROSSING	EACH		$ 403,900.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 600				7,776,360
700	**TRAFFIC ENGINEERING**				
	SIGNING (FREEWAY)	MILE/DIR	2	$ 48,000.00	96,000
	SIGNING (STREET)	MILE	0.50	$ 110,000.00	55,000
	PAVEMENT MARKING	LANE-MILE	12.00	$ 5,000.00	60,000
	LIGHTING	MILE	2.50	$ 550,000.00	1,375,000
	TRAFFIC SIGNAL	EACH	2	$ 400,000.00	800,000
	INTELLIGENT TRANSPORTATION SYSTEM (ITS)	MILE		$ 700,000.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 700				2,386,000
800	**ROADSIDE DEVELOPMENT**				
	LANDSCAPING AND TOPSOIL	SQ.YD.		$ 20.00	
	UTILITY RELOCATION	L.SUM	1	$ 500,000.00	500,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 800				500,000

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Southbound Triple Lefts - Braid
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 67th Ave
LENGTH: 3 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
900	**INCIDENTALS**				
	RETAINING WALLS	SQ.FT.	92,876	$ 100.00	9,287,570
	SOUND WALLS	SQ.FT.		$ 59.00	
	ROADWAY APPURTENANCES	L.SUM	1	$ 2,200,000.00	2,200,000
	ADA IMPROVEMENTS	EACH	6	$ 10,000.00	60,000
	TRANSIT APPURTENANCES	L.SUM			
	RAILROAD ACCOMMODATIONS	L.SUM			
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 900				11,547,570
	SUBTOTAL A (ITEM SUBTOTAL)				**$31,044,900**
PW	**PROJECT WIDE**				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)			8.0%	2,483,600
	DUST PALLIATIVE (0% OF SUBTOTAL A) (INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	310,400
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	465,700
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	310,400
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	2,483,600
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	6,209,000
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				**$43,307,600**
OTHER PROJ	**OTHER PROJECT COSTS**				
	DPS TRAFFIC CONTROL				0
	JOINT PROJECT AGREEMENT ITEMS				0
	CONTRACTOR INCENTIVES				0
	ENVIRONMENTAL MITIGATION				0
	BASE YEAR CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$43,307,600**
BELOW	**BELOW THE LINE ITEMS**				
	POST DESIGN SERVICES (1% OF BASE YEAR CONSTRUCTION COST)			1.0%	433,100
	CONSTRUCTION CONTINGENCIES (5% OF BASE YEAR CONSTRUCTION COST)			5.0%	2,165,400
	CONSTRUCTION ENGINEERING (14% OF BASE YEAR CONSTRUCTION COST)			14.0%	6,063,100
	SUBTOTAL BASE YEAR CONSTRUCTION				**51,969,200**
	INDIRECT COST ALLOCATION (10.5% OF BASE YEAR CONSTRUCTION+BELOW THE LINE ITEMS)			10.50%	5,456,800
	BASE YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$57,426,000**
DES	**PREDESIGN AND FINAL DESIGN**				
	PREDESIGN/NEPA/PI SERVICES (3% OF BASE YEAR CONSTRUCTION COST)			3.0%	1,299,200
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	136,400
	SUBTOTAL PREDESIGN				**1,435,600**
	FINAL DESIGN SERVICES (8% OF BASE YEAR CONSTRUCTION COST)			8.0%	3,464,600
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	363,800
	SUBTOTAL FINAL DESIGN				**3,828,400**
	TOTAL ESTIMATED DESIGN COST				**$5,264,000**
UTIL	**UTILITY RELOCATION**				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				
	INDIRECT COST ALLOCATION (10.5% OF ALL UTILITY COSTS)			10.50%	0
	TOTAL ESTIMATED UTILITY COST				**$0**
R/W	**RIGHT-OF-WAY**				
	RIGHT-OF-WAY				50,000
	INDIRECT COST ALLOCATION (10.5% OF ALL RIGHT-OF-WAY COSTS)			10.50%	5,300
	TOTAL ESTIMATED RIGHT-OF-WAY COSTS				**$55,300**
	TOTAL ESTIMATED PROJECT COST				**$62,745,000**

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Southbound Triple Lefts - Lane Add
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 67th Ave
LENGTH: 3 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	**EARTHWORK**				
	CLEARING & REMOVALS	L.SUM	1	$ 1,200,000.00	1,200,000
	ROADWAY EXCAVATION	CU.YD.	1,500	$ 50.00	75,000
	DRAINAGE EXCAVATION	CU.YD.		$ 20.00	
	BORROW	CU.YD.		$ 17.00	
	SUBGRADE TREATMENT	SQ.YD.		$ 17.00	
	FURNISH WATER	L.SUM	1	$ 95,000.00	95,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 200				1,370,000
300 & 400	**BASE AND SURFACE TREATMENT**				
	AGGREGATE BASE	SQ.YD.	11,100	$ 16.00	177,600
	CONCRETE PAVEMENT	SQ.YD.	9,975	$ 150.00	1,496,250
	ASPHALT PAVEMENT	SQ.YD.	1,125	$ 80.00	90,000
	ARAC SURFACE	SQ.YD.		$ 8.00	
	MILLING & OVERLAY	SQ.YD.	6,465	$ 35.00	226,280
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 300 & 400				1,990,130
500	**DRAINAGE**				
	DRAINAGE SYSTEM (CLOSED)	L.FT.	1,000	$ 400.00	400,000
	DRAINAGE SYSTEM (OPEN)	L.FT.		$ 220.00	
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	50	$ 500.00	25,000
	PUMP STATION (NEW)	EACH		$ 2,885,000.00	
	PIPE CULVERTS	L.FT.		$ 460.00	
	MISCELLANEOUS ITEMS (CATCH BASIN/MH ADJUSTMENTS)	EACH	50	$ 12,000.00	600,000
	TOTAL ITEM 500				1,025,000
600	**STRUCTURES**				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.		$ 211.00	
	FLYOVER HOV RAMP	SQ.FT.		$ 274.00	
	OVERPASS TI BRIDGE	SQ.FT.		$ 219.00	
	RIVER CROSSING BRIDGE	SQ.FT.		$ 227.00	
	PEDESTRIAN BRIDGE	SQ.FT.		$ 282.00	
	BRIDGE WIDENING	SQ.FT.	4,568	$ 350.00	1,598,630
	BRIDGE REHABILITATION	SQ.FT.		$ 156.00	
	BOX CULVERT	L.FT./CELL		$ 1,712.00	
	SIGN STRUCTURES	EACH	6	$ 90,000.00	540,000
	ITS STRUCTURE AND PANEL	EACH		$ 266,000.00	
	O&M CROSSING	EACH		$ 403,900.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 600				2,138,630
700	**TRAFFIC ENGINEERING**				
	SIGNING (FREEWAY)	MILE/DIR	1	$ 48,000.00	48,000
	SIGNING (STREET)	MILE	0.75	$ 110,000.00	82,500
	PAVEMENT MARKING	LANE-MILE	5.50	$ 5,000.00	27,500
	LIGHTING	MILE	0.75	$ 550,000.00	412,500
	TRAFFIC SIGNAL	EACH	2	$ 400,000.00	800,000
	INTELLIGENT TRANSPORTATION SYSTEM (ITS)	MILE		$ 700,000.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 700				1,370,500
800	**ROADSIDE DEVELOPMENT**				
	LANDSCAPING AND TOPSOIL	SQ.YD.	850	$ 20.00	17,000
	UTILITY RELOCATION	L.SUM	1	$ 350,000.00	350,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 800				367,000

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Southbound Triple Lefts - Lane Add
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 67th Ave
LENGTH: 3 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
900	**INCIDENTALS**				
	RETAINING WALLS	SQ.FT.		$ 100.00	
	SOUND WALLS	SQ.FT.		$ 59.00	
	ROADWAY APPURTENANCES	L.SUM	1	$ 1,200,000.00	1,200,000
	ADA IMPROVEMENTS	EACH	6	$ 10,000.00	60,000
	TRANSIT APPURTENANCES	L.SUM			
	RAILROAD ACCOMMODATIONS	L.SUM			
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 900				1,260,000
	SUBTOTAL A (ITEM SUBTOTAL)				**$9,521,300**
PW	**PROJECT WIDE**				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)			8.0%	761,700
	DUST PALLIATIVE (0% OF SUBTOTAL A) (INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	95,200
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	142,800
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	95,200
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	761,700
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	1,904,300
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				**$13,282,200**
OTHER PROJ	**OTHER PROJECT COSTS**				
	DPS TRAFFIC CONTROL				0
	JOINT PROJECT AGREEMENT ITEMS				0
	CONTRACTOR INCENTIVES				0
	ENVIRONMENTAL MITIGATION				0
	BASE YEAR CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$13,282,200**
BELOW	**BELOW THE LINE ITEMS**				
	POST DESIGN SERVICES (1% OF BASE YEAR CONSTRUCTION COST)			1.0%	132,800
	CONSTRUCTION CONTINGENCIES (5% OF BASE YEAR CONSTRUCTION COST)			5.0%	664,100
	CONSTRUCTION ENGINEERING (14% OF BASE YEAR CONSTRUCTION COST)			14.0%	1,859,500
	SUBTOTAL BASE YEAR CONSTRUCTION				**15,938,600**
	INDIRECT COST ALLOCATION (10.5% OF BASE YEAR CONSTRUCTION+BELOW THE LINE ITEMS)			10.50%	1,673,600
	BASE YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$17,612,200**
DES	**PREDESIGN AND FINAL DESIGN**				
	PREDESIGN/NEPA/PI SERVICES (3% OF BASE YEAR CONSTRUCTION COST)			3.0%	398,500
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	41,800
	SUBTOTAL PREDESIGN				**440,300**
	FINAL DESIGN SERVICES (8% OF BASE YEAR CONSTRUCTION COST)			8.0%	1,062,600
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	111,600
	SUBTOTAL FINAL DESIGN				**1,174,200**
	TOTAL ESTIMATED DESIGN COST				**$1,614,500**
UTIL	**UTILITY RELOCATION**				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				
	INDIRECT COST ALLOCATION (10.5% OF ALL UTILITY COSTS)			10.50%	0
	TOTAL ESTIMATED UTILITY COST				**$0**
R/W	**RIGHT-OF-WAY**				
	RIGHT-OF-WAY				50,000
	INDIRECT COST ALLOCATION (10.5% OF ALL RIGHT-OF-WAY COSTS)			10.50%	5,300
	TOTAL ESTIMATED RIGHT-OF-WAY COSTS				**$55,300**
	TOTAL ESTIMATED PROJECT COST				**$19,282,000**

ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Additional Lanes
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 59th Ave
LENGTH: 1 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
200	**EARTHWORK**				
	CLEARING & REMOVALS	L.SUM	1	$ 550,000.00	550,000
	ROADWAY EXCAVATION	CU.YD.	1,100	$ 50.00	55,000
	DRAINAGE EXCAVATION	CU.YD.		$ 20.00	
	BORROW	CU.YD.		$ 17.00	
	SUBGRADE TREATMENT	SQ.YD.		$ 17.00	
	FURNISH WATER	L.SUM	1	$ 40,000.00	40,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 200				645,000
300 & 400	**BASE AND SURFACE TREATMENT**				
	AGGREGATE BASE	SQ.YD.	3,500	$ 16.00	56,000
	CONCRETE PAVEMENT	SQ.YD.	3,100	$ 150.00	465,000
	ASPHALT PAVEMENT	SQ.YD.	400	$ 80.00	32,000
	ARAC SURFACE	SQ.YD.		$ 8.00	
	MILLING & OVERLAY	SQ.YD.	1,600	$ 35.00	56,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 300 & 400				609,000
500	**DRAINAGE**				
	DRAINAGE SYSTEM (CLOSED)	L.FT.	200	$ 400.00	80,000
	DRAINAGE SYSTEM (OPEN)	L.FT.		$ 220.00	
	DRAINAGE SYSTEM (CONVEYANCE CHANNEL)	L.FT.	20	$ 500.00	10,000
	PUMP STATION (NEW)	EACH		$ 2,885,000.00	
	PIPE CULVERTS	L.FT.		$ 460.00	
	MISCELLANEOUS ITEMS (CATCH BASIN/MH ADJUSTMENTS)	EACH	10	$ 12,000.00	120,000
	TOTAL ITEM 500				210,000
600	**STRUCTURES**				
	FLYOVER RAMP (NEW SYSTEM TI)	SQ.FT.		$ 211.00	
	FLYOVER HOV RAMP	SQ.FT.		$ 274.00	
	OVERPASS TI BRIDGE	SQ.FT.		$ 219.00	
	RIVER CROSSING BRIDGE	SQ.FT.		$ 227.00	
	PEDESTRIAN BRIDGE	SQ.FT.		$ 282.00	
	BRIDGE WIDENING	SQ.FT.	1,414	$ 350.00	494,730
	BRIDGE REHABILITATION	SQ.FT.		$ 156.00	
	BOX CULVERT	L.FT./CELL		$ 1,712.00	
	SIGN STRUCTURES	EACH	4	$ 90,000.00	360,000
	ITS STRUCTURE AND PANEL	EACH		$ 266,000.00	
	O&M CROSSING	EACH		$ 403,900.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 600				854,730
700	**TRAFFIC ENGINEERING**				
	SIGNING (FREEWAY)	MILE/DIR		$ 48,000.00	
	SIGNING (STREET)	MILE	0.40	$ 110,000.00	44,000
	PAVEMENT MARKING	LANE-MILE	3.20	$ 5,000.00	16,000
	LIGHTING	MILE	0.40	$ 550,000.00	220,000
	TRAFFIC SIGNAL	EACH	2	$ 400,000.00	800,000
	INTELLIGENT TRANSPORTATION SYSTEM (ITS)	MILE		$ 700,000.00	
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 700				1,080,000
800	**ROADSIDE DEVELOPMENT**				
	LANDSCAPING AND TOPSOIL	SQ.YD.	450	$ 20.00	9,000
	UTILITY RELOCATION	L.SUM	1	$ 250,000.00	250,000
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 800				259,000

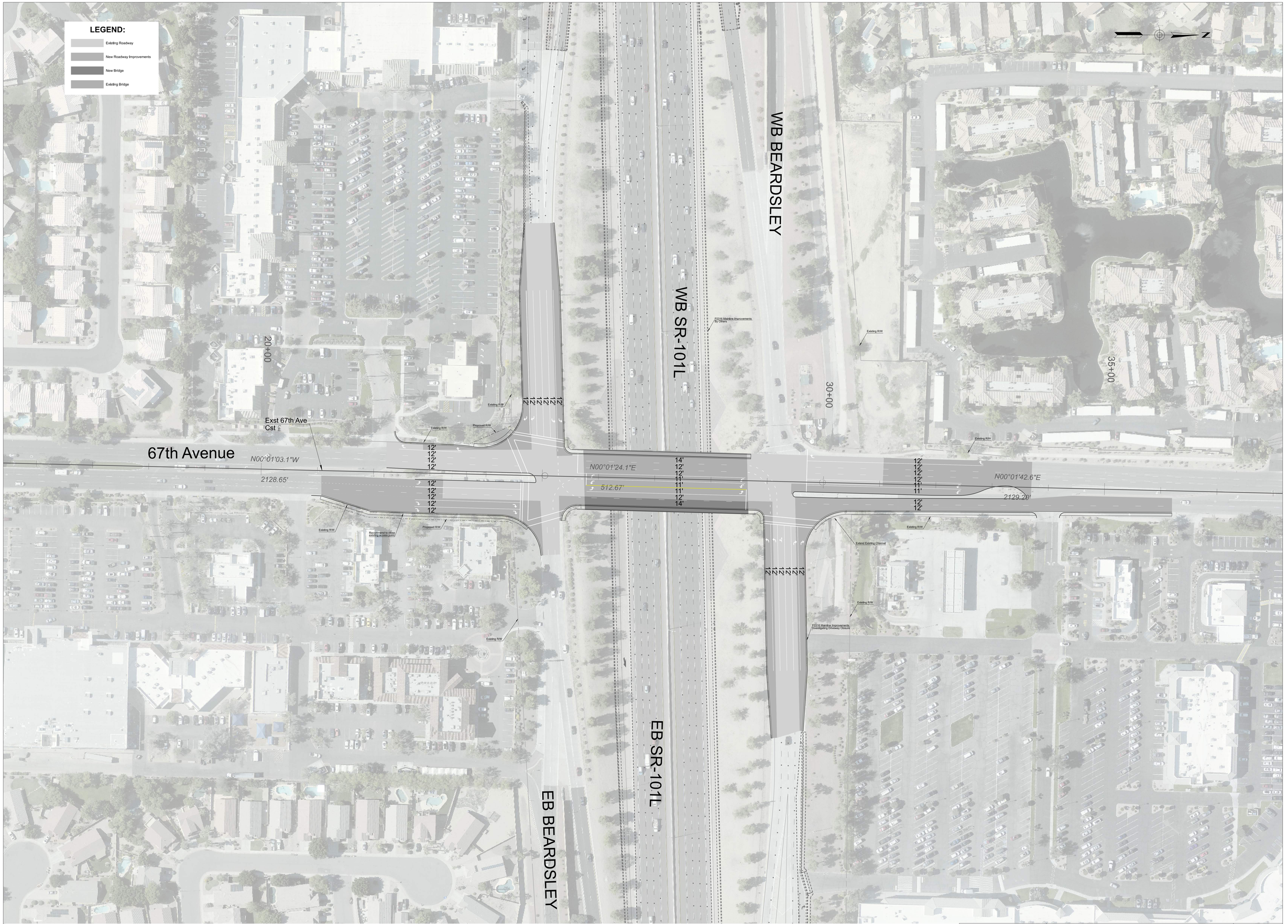
ARIZONA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION COST ESTIMATE SUMMARY

PROJECT NAME: SR-101L: 67th/59th Ave TIs
PROJECT DESCRIPTION: Additional Lanes
ROUTE: SR-101L
ESTIMATE LEVEL: 20%
PROJECT LIMITS: 59th Ave
LENGTH: 1 Mile
DATE: 2/15/2023

ITEM	MAJOR ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
900	**INCIDENTALS**				
	RETAINING WALLS	SQ.FT.		$ 100.00	
	SOUND WALLS	SQ.FT.		$ 59.00	
	ROADWAY APPURTENANCES	L.SUM	1	$ 350,000.00	350,000
	ADA IMPROVEMENTS	EACH	6	$ 10,000.00	60,000
	TRANSIT APPURTENANCES	L.SUM			
	RAILROAD ACCOMMODATIONS	L.SUM			
	MISCELLANEOUS ITEMS	L.SUM			
	TOTAL ITEM 900				410,000
	SUBTOTAL A (ITEM SUBTOTAL)				**$4,067,700**
PW	**PROJECT WIDE**				
	TRAFFIC CONTROL (8% OF SUBTOTAL A)			8.0%	325,400
	DUST PALLIATIVE (0% OF SUBTOTAL A) (INCLUDED IN FURNISH WATER)			0.0%	0
	QUALITY CONTROL (1% OF SUBTOTAL A)			1.0%	40,700
	CONSTRUCTION SURVEYING (1.5% OF SUBTOTAL A)			1.5%	61,000
	EROSION CONTROL (1% OF SUBTOTAL A)			1.0%	40,700
	MOBILIZATION (8% OF SUBTOTAL A)			8.0%	325,400
	UNIDENTIFIED ITEMS (20% OF SUBTOTAL A)			20.0%	813,500
	SUBTOTAL B (SUBTOTAL A + PROJECT WIDE)				**$5,674,400**
OTHER PROJ	**OTHER PROJECT COSTS**				
	DPS TRAFFIC CONTROL				0
	JOINT PROJECT AGREEMENT ITEMS				0
	CONTRACTOR INCENTIVES				0
	ENVIRONMENTAL MITIGATION				0
	BASE YEAR CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$5,674,400**
BELOW	**BELOW THE LINE ITEMS**				
	POST DESIGN SERVICES (1% OF BASE YEAR CONSTRUCTION COST)			1.0%	56,700
	CONSTRUCTION CONTINGENCIES (5% OF BASE YEAR CONSTRUCTION COST)			5.0%	283,700
	CONSTRUCTION ENGINEERING (14% OF BASE YEAR CONSTRUCTION COST)			14.0%	794,400
	SUBTOTAL BASE YEAR CONSTRUCTION				**6,809,200**
	INDIRECT COST ALLOCATION (10.5% OF BASE YEAR CONSTRUCTION+BELOW THE LINE ITEMS)			10.50%	715,000
	BASE YEAR DEPARTMENT CONSTRUCTION COST (EXCLUDING UTILITIES & R/W)				**$7,524,200**
DES	**PREDESIGN AND FINAL DESIGN**				
	PREDESIGN/NEPA/PI SERVICES (3% OF BASE YEAR CONSTRUCTION COST)			3.0%	170,200
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	17,900
	SUBTOTAL PREDESIGN				**188,100**
	FINAL DESIGN SERVICES (8% OF BASE YEAR CONSTRUCTION COST)			8.0%	454,000
	INDIRECT COST ALLOCATION (10.5% OF ALL DESIGN COSTS)			10.50%	47,700
	SUBTOTAL FINAL DESIGN				**501,700**
	TOTAL ESTIMATED DESIGN COST				**$689,800**
UTIL	**UTILITY RELOCATION**				
	PRIOR RIGHT UTILITY RELOCATIONS & SERVICE AGREEMENTS				
	INDIRECT COST ALLOCATION (10.5% OF ALL UTILITY COSTS)			10.50%	0
	TOTAL ESTIMATED UTILITY COST				**$0**
R/W	**RIGHT-OF-WAY**				
	RIGHT-OF-WAY				15,000
	INDIRECT COST ALLOCATION (10.5% OF ALL RIGHT-OF-WAY COSTS)			10.50%	1,600
	TOTAL ESTIMATED RIGHT-OF-WAY COSTS				**$16,600**
	TOTAL ESTIMATED PROJECT COST				**$8,231,000**

Appendix B

Roll Plot Schematics



ADOT

BURGESS & NIPLE
ONE N. PRESTON DR. SUITE 105
TEMPE, AZ 85281

	NAME	DATE
DESIGN	WWS	02/23
DRAWN	EEI	02/23
CHECKED	DCL	02/23

SR 101L: 67TH AVENUE AND 59TH AVENUE TRAFFIC INTERCHANGE IMPROVEMENTS

ALTERNATIVE 67-1

PRELIMINARY
STAGE 1
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

LEGEND:

- Existing Roadway
- New Roadway Improvements
- New Bridge
- Existing Bridge

WB BEARDSLEY

WB SR-101L

EB BEARDSLEY

EB SR-101L

59th Avenue

Exst 59th Ave
Cst ℄

N01°21'15.5"W
2651.42'

N01°27'49"E
2636.62'

2031E Mainline Improvements
By Others

Existing R/W

Proposed R/W

12'
12'
12'
12'
12'

14'
12'
11'
11'
11'
11'
12'
14'

11'
11'
11'
11'
12'
12'

12'
12'
12'
12'
12'
12'

BURGESS & NIPLE		
1500 N. PRIEST DR. SUITE 102 TEMPE, AZ 85281		
	NAME	DATE
DESIGN	WWS	02/23
DRAWN	EEI	02/23
CHECKED	DCL	02/23

ADOT

SR 101L: 67TH AVENUE AND 59TH AVENUE TRAFFIC INTERCHANGE IMPROVEMENTS

ALTERNATIVE 59-1

PRELIMINARY
STAGE II
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

LEGEND:

- Existing Roadway
- New Roadway Improvements
- New Bridge
- Existing Bridge

WB BEARDSLEY

WB SR-101L

EB SR-101L

EB BEARDSLEY

67th Avenue

Exst 67th Ave
Cst ℄

Existing R/W

Existing R/W

Existing R/W

Existing R/W

50+00

45+00

40+00

35+00

30+00

25+00

20+00

15+00

10+00

5+00

0+00

N

BURGESS & NIPLE
1500 N. PRIEST DR. SUITE 102
TEMPE, AZ 85281

	NAME	DATE
DESIGN	WWS	02/23
DRAWN	EEI	02/23
CHECKED	DCL	02/23

ADOT

SR 101L: 67TH AVENUE AND 59TH AVENUE TRAFFIC INTERCHANGE IMPROVEMENTS

ALTERNATIVE 67-2A

PRELIMINARY
STAGE II
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

LEGEND:

- Existing Roadway
- New Roadway Improvements
- New Bridge
- Existing Bridge

WB BEARDSLEY

WB SR-101L

EB SR-101L

EB BEARDSLEY

67th Avenue

59th Avenue

Exst 67th Ave
Cst ℄

Existing R/W

50+00

45+00

40+00

35+00

30+00

25+00

20+00

15+00

10+00

5+00

N

ADOT

BURGESS & NIPLE
1500 N. PRIEST DR. SUITE 102
TEMPE, AZ 85281

	NAME	DATE
DESIGN	WWS	02/23
DRAWN	EEI	02/23
CHECKED	DCL	02/23

SR 101L: 67TH AVENUE AND 59TH AVENUE TRAFFIC INTERCHANGE IMPROVEMENTS

ALTERNATIVE 67-2B

PRELIMINARY
STAGE II
REVIEW
NOT FOR CONSTRUCTION OR RECORDING