Final Design Concept Report

SR 303L, Lake Pleasant Parkway to I-17

TRACS No. M698701X

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Arizona Department of Transportation

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EXECUTIVE SUMMARY

This Design Concept Report (DCR) updates the previously prepared 2006 *Final Design Concept Report Estrella Freeway (SR 303L), Happy Valley Road to I-17* (referred to as the 2006 DCR). The 2006 DCR identified the ultimate footprint and alignment for State Route (SR) 303L (SR 303L) from Happy Valley Road to Interstate 17 (I-17). 303L (Bob Stump Memorial Freeway) is located in the Northern Phoenix Metropolitan area within Maricopa County, Arizona, and the ADOT Central District.

ADOT, the Maricopa Association of Governments (MAG) and the Regional Public Transportation Authority (Valley Metro/RPTA) have worked together for many years to develop a comprehensive plan for the Regional Freeway System which is included in the Regional Transportation Plan (RTP) adopted by the MAG Regional Council in November 2003.

The voters of Maricopa County passed Proposition 400 in November 2004, which authorized the continuation of an existing half-cent sales tax for 20 years to be used for implementing the MAG RTP. A portion of the revenues collected from the half-cent sales tax extension are deposited into the Regional Area Road Fund (RARF) to fund the RTPFP.

SR 303L is a major element of the MAG adopted RTPFP. This segment of SR 303L accommodates traffic from the Maricopa Freeway (I-10) to the Black Canyon Freeway (I-17). SR 303L serves several west valley communities, including the Cities of Goodyear, Glendale, Surprise, Peoria and Phoenix, and portions of unincorporated Maricopa County.

Maricopa County has been one of the fastest growing regions in the United States for many years. Projections predict the population of Maricopa County will increase by nearly 30 percent between 2020 and 2040. Several west valley communities rank among the fastest growing in the United States and this growth is contributing to increasing traffic congestion during the morning and evening peak travel periods throughout the region, including along the SR 303L corridor. This growth, along with the rapidly developing parcels north of the SR 303L between 43rd Avenue and west of 51st Avenue will further contribute to deteriorating traffic operational performance. Additional general-purpose lanes would increase the freeway capacity and help alleviate this increased traffic congestion.

As described in the 2006 DCR, the ultimate SR 303L facility is planned to provide four general-purpose lanes and one high occupancy vehicle lane (HOV) lane in each direction of travel, include service traffic interchanges (TI's) at major cross streets, and a full system TI at I-17 with direct connecting ramps between I-17 and SR 303L. The purpose of this DCR update is to supplement the 2006 DCR with updated background information for the segment of SR 303L between Lake Pleasant Parkway and I-17, will consider the addition of a third general-purpose lane in each direction of travel, develop and evaluate service interchange alternatives at 67th Avenue, and determine the timing of when the I-17/SR 303L system TI ramps will be needed.

For SR 303L mainline, the only alternative considered includes providing one additional general-purpose lane in each direction of travel. Three alternatives for interchange types were considered for the TI at 67th Avenue: a diamond TI, a single-point urban interchange (SPUI) and a diverging diamond interchange (DDI). These alternatives were screened based on qualitative and quantitative criteria and performance measures. All of the alternatives operate at an acceptable level of service; however, the diamond and DDI configurations operate slightly better than the SPUI, and the total construction costs are relatively similar for the diamond and DDI, while the SPUI is the highest cost alternative. Although frontage roads are not planned in this area, the diamond TI configuration would best accommodate their implementation in the future should the need arise. The diamond configuration ranked highest or equal to the SPUI and DDI in every other category with the exception of the number of potential vehicle conflicts, but this is offset by an improvement in driver expectancy with the diamond configuration. Based on the results of the comparative analysis, the Diamond TI is the recommended alternative.

The project would be constructed in multiple phases:

- Phase 1 – Construct 51st and 43rd Avenue TIs
- Phase 2 – Construct the I-17/SR303L system interchange direct connecting ramps
    - Construct the third general-purpose lane from 51st Avenue to I-17
    - Construct the 303L/I-17 Ramp ES for two lanes of traffic
    - Construct the 303L/I-17 Ramp EN for two lanes of traffic but stripe for one lane of traffic
    - Construct the I-17/303L Ramp NW for two lanes of traffic
    - Construct the I-17/303L Ramp SW for two lanes of traffic but stripe for one lane of traffic
- Phase 3 – Construct a third general-purpose lane on SR 303L in each direction of travel from Lake Pleasant Parkway to 51st Avenue, including the through lanes and bridges at the future 67th Avenue TI location
    -

Phase 1 began design in 2021 and construction is anticipated to commence in 2022 with the TIs open to traffic by Summer 2023. The estimate of probable project costs for Phases 2 and 3 is approximately $261,606,000 in 2022 dollars. The estimated cost for SR 303L/I-17 System Interchange and third general purpose lane from 51st Avenue to I-17 is $217,778,700.The estimated cost for SR 303L mainline and bridges at 67th Avenue and third general purpose lane from Lake Pleasant Parkway to 51st Avenue is $43,827,300.

Future phases include:

- SR 303L mainline paving and striping to 4 general purpose lanes from Lake Pleasant Parkway to the I-17 system interchange ramps
- Widen I-17 NB to accommodate the 303L/I-17 Ramp EN for two lanes
- Widen I-17 SB to accommodate the I-17/303L Ramp SW for two lanes
- Restripe the 303L/I-17 Ramp EN for two lanes of traffic
- Restripe the I-17/303L Ramp SW for two lanes
- SR 303L mainline paving and striping to add HOV lanes from Lake Pleasant Parkway to the I-17 system interchange ramps
- Construct SR 303L/I-17 DHOV ramp
- Construct median barrier and lighting on SR 303L
- Construct the 67th Avenue cross street

Development of the future phases would depend on funding and travel demand beyond 2040. Traffic analysis indicates a need for the 67th Avenue traffic interchange by the year 2040, but timing of construction of the 67th Avenue cross street though the TI area will be dependent on implementation of City streets, area development and traffic need.

1.0 INTRODUCTION

1.1 Foreword

The Arizona Department of Transportation (ADOT) has initiated this Design Concept Report (DCR) to update the previously prepared 2006 *Final Design Concept Report Estrella Freeway (SR 303L), Happy Valley Road to I-17* (hereinafter referred to as the 2006 DCR). The 2006 DCR identified the ultimate footprint and alignment for State Route (SR) 303L (SR 303L) from Happy Valley Road to Interstate 17 (I-17). As described in the 2006 DCR, the ultimate SR 303L facility is planned to provide four general-purpose lanes and one high occupancy vehicle lane (HOV) lane in each direction of travel (4+1), includes service traffic interchanges (TI's) at major cross streets, and a full system TI at I-17 with direct connecting ramps between I-17 and SR 303L to the west.

Since the completion of the 2006 DCR, there have been several projects to develop the corridor. An interim facility was implemented as a first phase of construction of the segment from Happy Valley Road (now referred to as Happy Valley Parkway) to I-17 and provides two lanes in each direction of travel. At the future service TI locations, the freeway was constructed to accommodate phased implementation of the service and system TI's, and the current freeway traffic is using the ultimate ramp locations, with future phases anticipated to construct the mainline segments through the TIs.

A construction project is currently underway between Happy Valley Parkway and Lake Pleasant Parkway that will add a third general purpose lane on SR 303L, toward the median, and will also construct the Jomax Road TI.

In 2021 ADOT prepared the SR 303L, 51st Avenue and 43rd Avenue Traffic Interchanges Project Assessment (PA) in response to the need to provide access to the developing parcels north of the SR 303L between 43rd Avenue and west of 51st Avenue. The PA evaluated the interchanges at 51st Avenue and 43rd Avenue, including shifting the 51st Avenue alignment approximately 1,000 feet west of the proposed location shown in the 2006 DCR, revised the 51st Avenue ramps, adjusted the SR 303L mainline profile at 51st Avenue, added the mainline paving through the 51st Avenue and 43rd Avenue TI locations, and includes temporary connectors from the new mainline paving at 43rd Avenue to the existing frontage roads between 43rd Avenue and the I-17/Sonoran Desert Drive TI. The project is currently in final design with construction anticipated to begin in 2022, with the TIs anticipated to be open to traffic in mid to late 2023 and now includes a frontage road on the north side of SR 303L between 43rd and 51st Avenues. The facilities proposed in the PA are assumed to be existing, or "by others" for this DCR update.

SR 303L (Bob Stump Memorial Freeway) is located in the Northern Phoenix Metropolitan area within Maricopa County, Arizona, within the ADOT Central District as shown on Figure 1 – Project Location Map. SR 303L is an urban freeway on the National Highway System with an open/unpaved median between Lake Pleasant Parkway and I-17. The purpose of this DCR update is to supplement the 2006 DCR with current background information for the segment of SR 303L between Lake Pleasant Parkway and I-17 as shown on Figure 2 – Project Vicinity Map, and will consider the addition of a third general-purpose lane in each direction of travel, develop and evaluate service interchange alternatives at 67th Avenue, and determine the timing of when the I-17/SR 303L system TI ramps will be needed.

Figure 1. Project Location

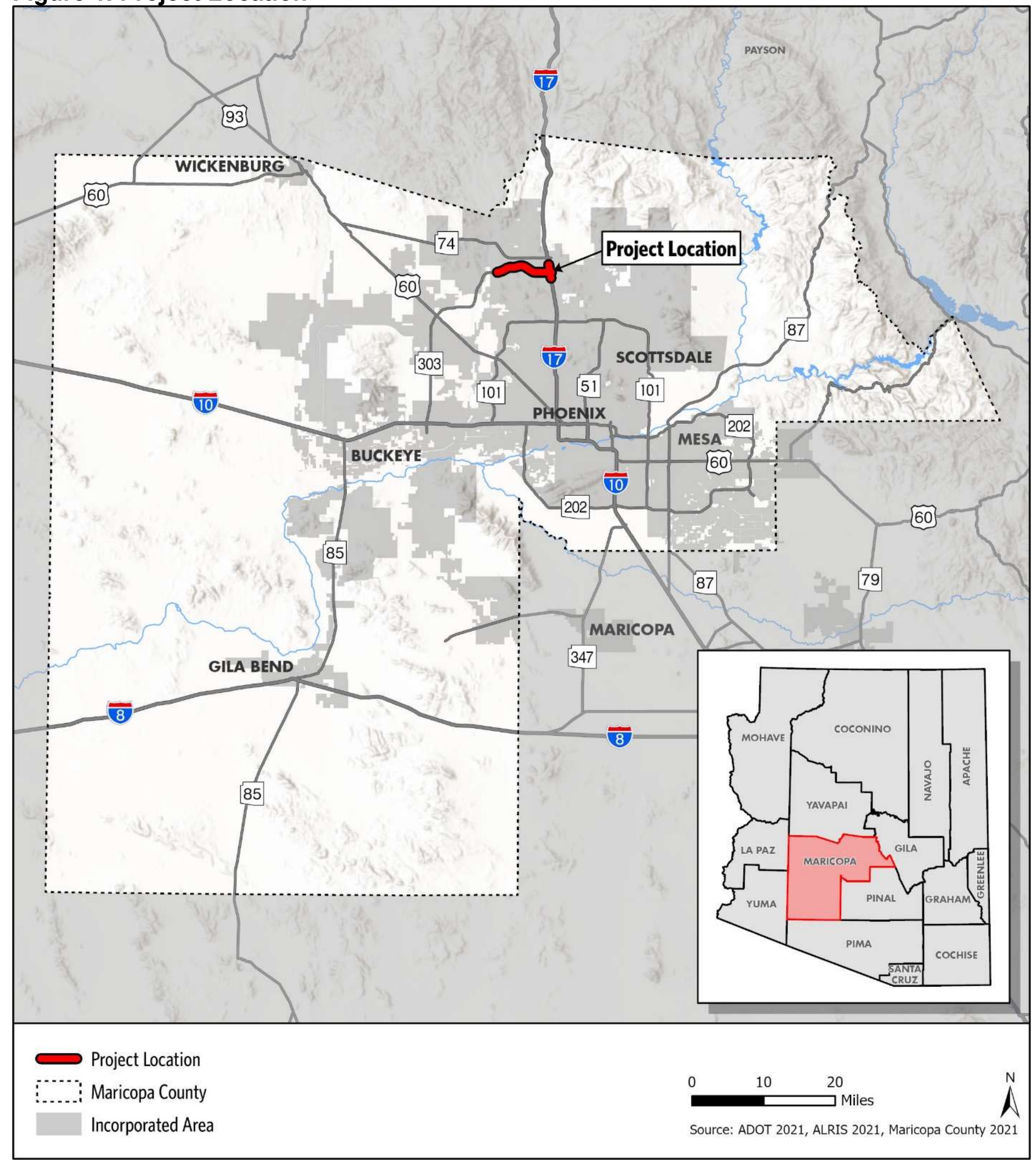
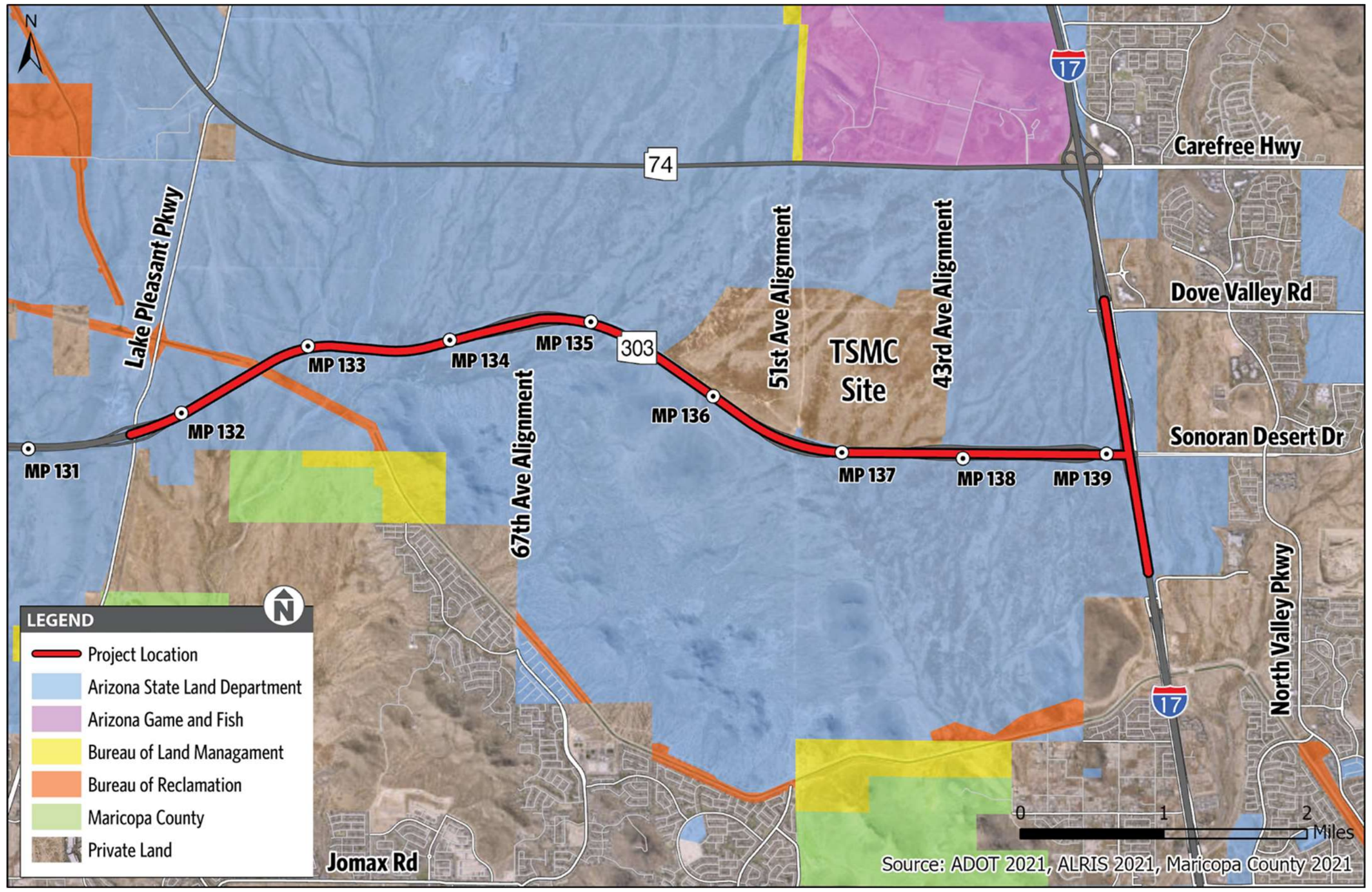


Figure 2. Project Vicinity Map



1.2 Need for the Project

ADOT, the Maricopa Association of Governments (MAG) and the Regional Public Transportation Authority (Valley Metro/RPTA) have worked together for many years to develop a comprehensive plan for the Regional Freeway System which is included in the Regional Transportation Plan (RTP) adopted by the MAG Regional Council in November 2003.

The voters of Maricopa County passed Proposition 400 in November 2004, which authorized the continuation of an existing half-cent sales tax for 20 years to be used for implementing the MAG RTP. A portion of the revenues collected from the half-cent sales tax are deposited into the Regional Area Road Fund (RARF) to fund the RTP Freeway Program (RTPFP).

SR 303L is a major element of the MAG adopted RTPFP. This segment of SR 303L accommodates traffic from the Maricopa Freeway (I-10) to the Black Canyon Freeway (I-17). SR 303L serves several west valley communities, including the Cities of Goodyear, Glendale, Surprise, Peoria and Phoenix, and portions of unincorporated Maricopa County.

Maricopa County has been one of the fastest growing regions in the United States for many years. Projections predict the population of Maricopa County will increase by nearly 30 percent between 2020 and 2040. Several west valley communities rank among the fastest growing in the United States and this growth is contributing to increasing traffic congestion throughout the region, including along the SR 303L corridor, during the morning and evening peak travel periods. This background growth, along with the rapidly developing Taiwan Semiconductor Manufacturing Corporation (TSMC) site generally located north of SR 303L to south of Dove Valley Road, and between 43rd Avenue and the Deadman Wash Tributary No. 2 (west of 51st Avenue) will further contribute to deteriorating traffic operational performance. Additional general-purpose lanes would increase the freeway capacity and help alleviate this increased traffic congestion.

A construction project is currently underway on SR 303L between Happy Valley Parkway and Lake Pleasant Parkway that will add a third general purpose lane on SR 303L, toward the median, and will also construct the Jomax Road TI. The SR 303L Lake Pleasant Parkway to I-17 project would also add one additional general-purpose lane in each direction of travel and includes potential implementation of direct-connecting ramps at the I-17/SR303L system interchange, which would be consistent with the SR 303L segments to the south and would also continue the implementation of the overall system planned throughout the Regional Freeway System.

The SR 303L general-purpose lane widening project is not currently included in the RTPFP; however, it may be funded in the future using the current funding secured through the Regional Area Road Fund, or through other funding sources including a potential continuing extension of the half-cent sales tax, federal funding, state funding, or other funding sources.

1.3 Characteristics of the Corridor

1.3.1 Roadway Characteristics

The SR 303L freeway has been constructed as an interim facility with two 12-foot lanes in each direction of travel with 10-foot outside shoulders and 12-foot inside shoulders. At the future service traffic interchange locations, the freeway was constructed to accommodate future implementation of the service TI's at 67th, 51st and 43rd Avenues. The current freeway traffic is using the ultimate ramp locations. At these future crossroad locations, the mainline lanes have not been constructed and the mainline traffic is using the existing crossroad ramps.

The existing ramps for 67th Avenue have two 12-foot travel lanes and a two-foot inside and outside shoulder, with temporary connections from exit ramp to entrance ramps in place of crossroad pavement. The southbound frontage road between 43rd Avenue and I-17 has two 12-foot travel lanes, a two-foot inside shoulder, and a four-foot outside shoulder, while the northbound frontage road has been widened for three 12-foot travel lanes with a lane drop prior to Sonoran Desert Drive, a two-foot inside shoulder, and a four-foot outside shoulder.

The SR 303L mainline improvements for 51st Avenue and 43rd Avenue, the 51st and 43rd Avenue crossroads and ramps, and the temporary connectors with the existing frontage road system from 43rd Avenue to the I-17/Sonoran Desert Drive TI are currently in final design with construction to begin in 2022, and are, therefore, assumed to be in place and functional for the purposes of this DCR.

Approaching I-17 current SR 303L traffic is using the existing frontage roads that transition into Sonoran Desert Drive. SR 303L traffic destined to I-17 is currently using the I-17/Sonoran Desert Drive TI.

At the future TI locations, including the New River Corridor System TI, 67th, 51st, and 43rd TIs, SR 303L ramp gore paving has been constructed to provide for the future connections of ramps and mainline paving.

I-17 currently provides sufficient width and ramp gore paving to accommodate the future I-17/SR303L system TI ramps.

1.3.2 Existing Land Use and Ownership

The corridor is comprised primarily of undeveloped Arizona State Trust Land managed by the Arizona State Land Department (ASLD) within the Cities of Peoria and Phoenix. A small portion of the corridor is used for utility purposes. Minimal agricultural uses occur near the proposed project, mainly west of Lake Pleasant Parkway.

There are several trails identified within the SR 303L corridor, including:

- The Maricopa Trail along the west side of North Lake Pleasant Parkway near milepost (MP) 131.5
- A trail extending from the CAP Canal and intersecting the highway near MP 134
- A trail extending from the CAP Canal and intersecting the highway near MP 134
- Two trails along Deadman Wash intersecting the highway near MP 134
- A trail along the unpaved portion of 51st Avenue intersecting the highway near MP 136.7

The Cities of Peoria and Phoenix have trail masterplans, which should be reviewed during final design to determine if additional accommodations should be included. Based on communication with ASLD trail easements are not present within the project corridor.

TSMC is a planned facility located on the north side of SR 303L. The TSMC land generally covers the area located from about the midpoint between the 67th Avenue alignment and 51st Avenue alignment to the 43rd Avenue alignment to the west and east, respectively, and SR 303L to the Dove Valley Road alignment from the south and north, respectively. TSMC began construction of their new facility in April 2021. Access to the TSMC facility from the ADOT freeway system is planned through a combination of TI and arterial streets at I-17/Dove Valley Road, and the planned SR 303L TIs at 51st Avenue and 43rd Avenue described in the PA. The City of Phoenix is planning arterial street improvements that would construct the portions of Dove Valley Parkway, 51st Avenue and 43rd Avenue from the three TIs (SR303L/51st Avenue TI, SR303L/43rd Avenue TI, ant the I-17/Dove Valley Road TI) to the TSMC facility. All other land within the project vicinity is managed by ASLD.

The TSMC facility is under construction with the fabrication plants being implemented over the course of several years. All other land within the project limits is undeveloped.

1.3.3 Existing Horizontal and Vertical Alignments

The normal roadway cross slope on the mainline, ramps, and frontage roads is 2.00%.

There are six mainline horizontal curves within the project limits. One near Lake Pleasant Parkway has a normal 2.00% cross slope. Two near the future New River system interchange near Sta. 1865+00 are superelevated to 4.1%. There are three mainline curves superelevated to 3.00%. The superelevation rates on all the existing mainline horizontal curves within the project limits meet the current ADOT Roadway Design Guidelines using the 6% maximum superelevation table which is based on AASHTO method 5.

There are sixteen mainline vertical curves within the project limits, and all meet the stopping sight distance for 65 mph when adjusted for grade.

Within the project limits there are two horizontal curves on the northbound frontage road with 2.00% cross slope, one horizontal curve with 4.00% superelevation and one horizontal curve with 3.90% superelevation. Within the project limits there is one horizontal curve on the southbound frontage road with 2.00% cross slope, one horizontal curve with 2.70% superelevation, one horizontal curve with 3.90% superelevation, and one horizontal curve with 2.90% superelevation. One northbound frontage road curve and one southbound frontage road curve do not meet the current method 5 superelevation rate for a 45-mph design speed as they were designed for a higher speed for the interim condition or are approaching the I-17/Sonoran Desert Drive TI with a reduced design speed.

The existing 67th Avenue ramps have a total of five horizontal curves with superelevation ranging between 2.00% and 3.60%. The cross slope of ramp C is controlled by the mainline gore with a 3.00% adverse slope in a tangent section with insufficient distance to return to normal crown before the adjacent curve will require superelvation transition.

The existing 51st Avenue ramps have a total of seven horizontal curves with superelevation ranging between 2.00% and 4.40%, and one horizontal curve on ramp D controlled by the mainline gore as it approaches SR 303L with a 3.00% adverse slope. One horizontal curve on ramp C and one horizontal curve on ramp D do not meet the current method 5 superelevation rate for a 50-mph design speed as they were designed for a higher speed for the interim condition.

The existing 43rd Avenue ramps have a total of two curves, both have a 2.00% normal cross slope.

The superelevation rates on all the existing ramp horizontal curves within the project limits meet the current ADOT Roadway Design Guidelines rates for the various design speeds using the 6% maximum superelevation table except the 51st Avenue ramp D curve where it is controlled by mainline and the two Ramp C and D curves that were designed for higher speeds.

There are twenty-five vertical curves total on the interchange ramps, and all meet the stopping sight distance for the appropriate design speed when adjusted for grade. The AASHTO Controlling Design Criteria is included as Appendix A.

1.3.4 Existing Right-of-Way

The existing SR 303L facility resides within a Highway Use Easement (HUE) acquired from ASLD prior to the initial construction phase, and the ASLD continues to be the underlying landowner. The right-of-way easements documented as KE 16-112646 and KE 16-112647 provide detailed descriptive information related the HUE between ADOT and ASLD. The existing right-of-way (ROW) width is highly variable due to the significant number of drainage channels, drainage outfall energy dissipators, and the original ramps and frontage roads. Maximum and minimum existing ROW widths between each traffic interchange within the project limits are identified in Table 1.

Table 1. Existing ROW Widths

From	To	ROW Width (ft)	Comments
Sta 1802+40 Lt	Sta 1940+64.02 Lt	147.47 – 662.76	Begin project to 67th Ave
Sta 1802+40 Rt	Sta 1937+61.33 Rt	182.15 - 640.58	Begin project to 67th Ave
Sta 1940+64.02 Lt	Sta 2040.65.11 Lt	132.63 – 647.10	67th Ave to 51st Ave
Sta 1937+61.33 Rt	Sta 2044+28.28 Rt	147.48 – 686.40	67th Ave to 51st Ave
Sta 2040.65.11 Lt	Sta 2109+48.95 Lt	161.21 – 643.76	51st Ave to 43rd Ave
Sta 2044+28.28 Rt	Sta 2109+14.32 Rt	130.75 – 615.72	51st Ave to 43rd Ave
Sta 2109+48.95 Lt	Sta 2160+91.26 Lt	248.75 – 639.80	43rd Ave to I-17
Sta 2109+14.32 Rt	Sta 2160+92.98 Rt	239.61 – 618.67	43rd Ave to I-17

1.3.5 Existing Drainage

On-site freeway drainage is collected and conveyed through a system of catch basins, lateral pipes and trunk lines discharging into the freeway offsite drainage systems. Final drainage reports prepared for the original freeway projects were reviewed along with the Design Concept Report Concept Drainage Report (2005) and regional flood control district area drainage master studies.

In tangent sections with a “normal crown” pavement cross-section, runoff flows away from the inside travel lanes to curb inlets on the outside edge of the roadways. The existing open median areas collect runoff in ADOT C-15.80 median catch basins.

In curved sections with a superelevated pavement cross-section, the freeway has median curbs and gutters with catch basins where the low side of the roadway in superelevated areas are adjacent to the median. Existing bridge areas have concrete barriers approaching and departing the bridges.

Pavement runoff in superelevated areas is currently collected in median catch basins. In several areas, temporary pipe stubs were placed along ramps for connecting to future mainline pavement inlets.

SR 303 corridor offsite flows are managed a series of interceptor channels paralleling westbound and freeway interchange ramps along with large waterway spur dikes and levees. Large washes and rivers drain through existing bridge structures. Smaller local washes drain to cross culvert circular pipe conduits or box culvert crossings. There are 16 reinforced concrete box culverts that cross SR 303 from north to south and 2 proposed box culverts that cross 67th Avenue.

The reinforced concrete box culvert (RCBC) crossings for storm water are multi-barrel reinforced box culverts that are located on SR 303 crossing the freeway. These RCBC crossings convey storm water from the north channel system into the river/washes crossing the freeway, which can be found in Table 3. Review of Cross culverts and waterway bridge structures were planned and constructed for the ultimate condition with additional inside lane general purpose pavement. The proposed box culverts crossing proposed 67th Avenue are discussed in Section 1.5.1 The existing RCBCs are shown in Table 2.

Table 2. Existing Cross Culverts Summary Table

SR 303 Centerline Station	Barrels (No.)	Size (ft)	Skew (Lt/Rt)	Length (ft)	Design Flow Q50 (cfs)	Max Flow Q100 (cfs)	Upstream Invert Elev (ft)
1814+10.00	2	6’ x 6' RCBC	Right	293’	278	-	1479
1824+81.79	1	8’ x 6' RCBC	-	318’	106	115	1477
1833+83.95	1	48" CMP	Right	487’	45	52	1481.95
1856+25.00	1	10’ x 12' RCBC	Right	452’	447	524	1482.75
1879+57.00	1	36" RCP	-	337’	50.62	54.17	1493.58
1889+51.52	1	36" RCP	Left	326’	48.65	52.67	1490.33
1893+80.70	1	36" RCP	Right	337’	44.06	48.16	1494.03
1909+35.39	2	27.75’ x 6' Super-Box	-	266’	1,797	2,064	1495.05
2073+70.50	2	36’ x 10' Super-Box	-	200’	829	948	1551.2
2091+53.44	4	10’ x 6' RCBC	Right	355’	579	662	1559.3
2120+14.02	2	10’ x 6' RCBC	-	440’	265	302	1576.45
2142+70.77	2	6’ x 6' RCBC	-	438’	183	209	1583.78
2160+36.03	2	10’ x 6' RCBC	Left	602’	587	683	1584.32

The previous DCR report identified off-site drainage improvements along the DCR corridor limits. These included large bridge crossings at the Central Arizona Project (CAP) wash, CAP siphon, Agua Fria River, New River, Deadman Wash, Upper Buchanan Wash, and other Biscuit Flash washes. These bridges, interceptor drainage channels, and cross culverts were designed and constructed in the two interim roadway projects (H7156 and H7157). The New River bridge and Deadman Wash bridge crossings include levees, spur dikes, finger dikes, and abutment protection measures at the river crossing. The proposed widening and new lanes associated with the Build Alternative were reviewed to identify offsite drainage facilities that would be impacted by the improvements. The primary area with offsite drainage impacts is along the north side and south side of the SR 303 where the system of concrete lined channels and reinforced concrete box culverts are located. Table 2 identifies existing offsite drainage channels along SR 303. In general, the area along the outside edge of the concrete channel has continuous maintenance access roads throughout the corridor.

Onsite drainage systems are a combination of closed conduit storm drain networks and open roadside ditches. Closed conduit systems are used throughout the project. On-site freeway drainage is collected and conveyed through a system of catch basins, lateral pipes and trunk lines discharging into the freeway offsite drainage systems. Based on the roadway sections, storm drain catch basin type C-15.92 and C-15.91 were placed along the roadway curb edges. Lateral storm drains connect pavement inlets that drains to the concrete channels. The concrete channels are along the north or south sides of SR 303 and connects to large washes/river crossing the SR303. The channels are listed in Table 2. Some existing onsite drainage systems outfall to the nearby crossing RCBC between SR303 southbound and SR303 northbound, ADOT Standard median drop inlets C-15.80 were placed to drain the median runoff to the connected storm drain systems. Some of these directly outfall to the side ditch/small washes along SR 303, which flow to main river/washes. For the SR303/I-17 system interchange, storm drain systems outfall to large retention basins located northwest and southwest of the interchange. Part of storm drain systems north of the interchange, outfall to the retention basin northwest of the interchange. The northwest retention basin is connected to and outfalls to the southwest retention basin by the storm drain system crossing SR 303. Most of the storm drain systems near the interchange outfall to the southwest retention basin. The southwest retention basin outfalls to the 48-inch trunkline. Storm drain systems on I-17 SB and median, outfalls to the 48-inch crossing pipe north of Dove Valley Road to the east of I-17. Some storm drain systems on the I-17 and ramps outfall to ditches between I-17 and ramps that outfall to the west or east sides of I-17. The other small storm drain systems on the interchange ramps directly outfalls to the small creeks or ditches along I-17 which ultimately drain east to Skunk Creek.

Table 3. Existing Concrete Channels Summary Table

Channel ID	Start Stationing	End Stationing	Length (ft)	Left/Right	Design 50-Year Flow (cfs)	Bottom Width (ft)	Depth (ft)	Side Slope (H:V)
S1	10+00.00	23+00.00	1300	Right	483	35	3.3	2:1
	23+50.00	46+35.00	2285		416	30	3.3	2:1
	47+00.00	67+71.29	2071.29		96	10	2.6	2:1
N1	10+00.00	46+33.18	3633.18	Left	979	25	4.3	2:1
N2	10+00.00	37+50.00	2750	Left	3,226	78	6	2:1
	37+50.00	38+00.00	50			78	7.4	2:1
	38+00.00	38+50.00	50			78	7.4	2:1
	38+50.00	47+88.63	938.63		1,483	40	5.1	2:1
N3	13+43.53	14+43.53	100	Left		25	4.1	2:1
	14+43.53	14+92.71	49.18			25	3.9	2:1
	18+92.71	20+92.71	200			25	3.5	2:1
	20+92.71	24+42.71	350			25	3.2	2:1

Channel ID	Start Stationing	End Stationing	Length (ft)	Left/Right	Design 50-Year Flow (cfs)	Bottom Width (ft)	Depth (ft)	Side Slope (H:V)
	24+42.71	28+92.16	449.45		278	25	2	2:1
N4	10+06.50	26+25.00	1618.5	Left	58.6	8	4	2:1
	26+55.93	29+28.49	272.56			8	2.5	2:1
N5	10+00.00	10+90.00	90	Left	41	8	3.16	2:1
	11+89.69	19+46.00	756.31			8	2	2:1
N6	10+00.00	15+65.00	565	Left	64	8	4	2:1

1.3.6 Existing Utilities

Few utilities exist within the project area along SR303L between Lake Pleasant Parkway and I-17 due to the limited amount of development that has taken place surrounding the project corridor. Major utilities that cross the freeway include a El Paso Natural Gas pipeline, the Beardsley Canal, Arizona Public Service (APS) overhead power lines, City of Peoria water and sewer lines, and the CAP canal. The majority of the remaining utilities are within the vicinity of the I-17 system interchange, which include, but are not limited to, APS, Southwest Gas, AT&T, COX Communications, and Lumen (Qwest).

At the time of construction of the interim SR303L, utility crossings were addressed to ensure that future relocations of those facilities would not be required during subsequent construction phases:

- Bridge crossing the CAP canal was constructed at the ultimate condition width, so there is no opportunity for conflict at this location
    - It was verified with CAP that there are no planned improvements for the CAP Siphon located at Station 1844+00
- An Arizona Public Service (APS) underground primary power line east of Lake Pleasant Parkway was re-routed over the SR303L
- Facilities within the I-17 corridor have been addressed during the interim phase of the SR303L

In April 2021, the City of Phoenix began construction of water and sewer lines along the north side of the SR 303L ROW from a lift station at the northwest quadrant of the shifted 51st Avenue TI to I-17 and crossing I-17 to the north of the future I-17/SR303L system interchange.

As of February 2022, APS has also relocated facilities near the 51st Avenue TI including an overhead 69kV crossing which was moved approximately 6,650 feet west. Along with this, the undermount 12kV distribution and 1kV neutral crossings at this location will be removed prior to October 31, 2022.

1.3.7 Site Topography and Geology

Within the study limits, SR 303L is a four-lane divided highway consisting of two 12-foot lanes in each direction, with variable width inside and outside shoulders. The natural topography generally slopes from east to west and north to south. The average project elevation is 1,520 feet and the terrain is level. Some small hills are located to the south, though the overall terrain is relatively flat, except some man-made cuts slopes and fill embankments and dissecting smaller washes. The overall site slopes to the south and west.

The SB and NB lanes are separated by a relatively wide unpaved median. The interim mainline traffic in the TI areas is accommodated by future frontage roads and ramps for the ultimate configuration. Per the as-built plans, the mainline SR 303L pavement is Portland cement concrete pavement (PCCP).

The project site is located in the Basin and Range Geologic Province of the southwestern United States. The Basin and Range Province is characterized by a modern landscape consisting of broad alluvial valleys interspersed with and bounded by uplifted and fault-block mountain ranges, often with well-developed pediments and alluvial fans. Generally, the mountain ranges and valleys trend in a north-south to northwest-southeast direction. Light to moderate vegetation consisting of desert trees, shrubs, wild grasses, and cacti exist within the SR 303L median and surrounding area.

The modern landscape was formed by late Tertiary (Miocene-Pliocene) extensional tectonism and high-angle normal faulting, followed by subsequent erosion of the uplifted mountains and deposition of the sediments in the newly formed basins. The project site is located in south-central Arizona which is an area of generally low seismic activity.

1.3.8 Existing Structures

The structures shown in Table 4 are located along SR 303L and I-17 system and within the study area. The proposed 51st Avenue and 43rd Avenue overpasses will be constructed during the development of this DCR update and are not listed as existing. There are five (5) existing bridges at the SR 303L/I-17 system interchange, including two (2) ramp bridges for the future Ramp EN.

(Continued on Page 6)

Table 4. Existing Major Structures

Structure Name	Route	MP	Str. No.	Spans	Length (ft)	Max. Span (ft)	Condition	Sufficiency Rating	Q100yr (cfs)
Lake Pleasant Pkwy TI UP	SR303L	131.74	2467	2	325	160	Good	85.0	
CAP Siphon Bridge NB[1]	SR303L	132.73	2915	3	444	153	Good	98.0	
CAP Siphon Bridge SB[2]	SR303L	132.73	2916	3	444	153	Good	98.0	
New River Bridge NB	SR303L	133.31	2913	7	893	127	Good	98.0	35,800
New River Bridge SB	SR303L	133.31	2914	7	890	127	Good	98.0	35,800
Channel N1 Bridge NB	SR303L	134.03	2922	2	78	38	Fair	96.0	2,064
Channel N1 Bridge SB	SR303L	134.03	2923	2	78	38	Fair	91.9	2,064
Deadman Wash Bridge NB	SR303L	135.18	2911	3	394	130	Good	98.0	9,600
Deadman Wash Bridge SB	SR303L	135.18	2912	3	393	130	Good	96.0	9,600
Channel N3 Bridge NB	SR303L	137.14	2920	2	76	38	Good	96.0	948
Channel N3 Bridge SB	SR303L	137.14	2921	2	76	38	Good	96.0	948
RCB #3	SR303L	137.48	7249	4	83	14	Good	77.9	948
SR303 SB Over Ramp E-N	SR303L	138.93	2924	1	112	103	Good	78.4	
Sonoran Desert Dr TI OP NB	I-17	221.94	2877	2	201	98	Good	96.0	
Sonoran Desert Dr TI OP SB	I-17	221.94	2878	2	201	98	Good	96.0	
SB Fntg RD Over Ramp EN	I-17	222.06	2879	1	107	99	Good	82.8	
I17 SB Over Ramp EN	I-17	222.07	2876	3	332	144	Good	98.0	
I17 NB Over Ramp EN	I-17	222.11	2875	3	380	169	Good	98.0	
Dove Valley Rd SB On-Ramp	I-17	222.80	2903	2	355	175	Good	96.0	
Dove Valley TI	I-17	222.97	2314	2	289	175	Good	99.6	

[1]NB = northbound [2]SB= southbound

1.4 Description of the Project

The proposed configuration for SR 303L is three general purpose lanes in each direction of travel with 12-foot outside and 10-foot inside shoulders and will consider the implementation of the system ramps at the I-17/SR303L System TI.

Future projects would add a fourth general purpose lane and an HOV lane in each direction of travel, and a direct HOV connection between the south and west legs of the I-17/SR303L System TI.

The proposed configuration for 67th Avenue is a major arterial with three travel lanes, a bike lane, and a sidewalk in each direction. The 67th Avenue width and lane configuration is consistent with Cross Section B from the City of Phoenix Street Planning and Design Guidelines (December 1, 2009).

1.5 Agency and Public Scoping

A virtual public meeting was held on October 20, 2021, from 6 PM to 7 PM. This meeting provided the public with information about the purpose of the project, the project's scope of work, and the project schedule. The public was invited to ask questions, submit comments, or request information either via an online comment form at the project website, phone, email, or U.S. mail. The meeting presentation was bilingual, and a bilingual project information telephone line was also provided for commenters who spoke Spanish. Comments were accepted through November 3, 2021. ADOT informed the public about the meeting in a news release, posts on Nextdoor pages near the project area and on ADOT's social media pages, flyers posted in community centers, and on the project website (https://azdot.gov/projects/central-district-projects/loop-303-lake-pleasant-parkway-i-17-improvements). ADOT primarily received comments about other adjacent projects, City of Phoenix roads that would connect to SR303L, and concerns of increased traffic through neighborhoods. The Public Involvement Summary is provided in Appendix I.

2.0 TRAFFIC AND CRASH ANALYSIS

2.1 Crash Analysis

Historic crash data for the 5-year period from January 2015 to December 2019 was obtained from ADOT's Accident Location Identification Surveillance System (ASLISS) within the study limits. These limits include both travel directions for SR 303L, from Lake Pleasant Parkway to I-17. Further information regarding the crash analysis and traffic operational analysis can be found in the *Final Traffic Report: State Route 303 Loop, Lake Pleasant Parkway to Interstate 17*.

There were 142 crashes which took place within the SR 303L study limits between January 2015 and December 2019. Table 5 through Table 10 summarize various crash statistics including number of crashes by travel direction, crash severity, crash manner, month, day of the week and time in an effort to determine any existing crash trends which are discussed below.

- There was a total of 142 crashes that took place on SR 303L between Lake Pleasant Parkway and I-17 between the years 2015 and 2019.
- The number of crashes within the SR 303L study limits has increased every year from 2015 to 2019.
- The volume of crashes in the northbound direction are slightly higher at 54% when compared to southbound at 46%.
- A total of 73% of all crashes within the study limits were no injury. There were no fatal crashes on this segment.
- The majority of crashes on the segment were single vehicle crashes at 55%. Rear-end crashes account for the second most at 23% of total crashes on the segment and sideswipe crashes account for18%.
- Crashes were distributed fairly evenly by month showing no particular trend by season. The most crashes occurred in July and the least in June.
- The number of crashes on this segment are typically higher on weekdays. The least crashes occur on Tuesdays and the most on Mondays.
- Hourly crashes on this segment show a significant skew towards the AM hours, with a sharp peak at 6 AM and 7AM and then dropping down to an average value throughout the rest of the day.
- There were a total of 4 vehicle crashes with animals along this segment in the five-year period. Although this does not indicate a significant pattern, further evaluation of vehicle/animal crashes should be conducted during final design to determine if game fencing should be included with the project.

Table 5 shows the total number of crashes on SR 303L corridor by direction for each analysis year.

Table 5. Yearly Travel Direction Distribution

Travel Direction	2015	2016	2017	2018	2019	Grand Total
North/East	6	12	15	16	27	76
South/West	6	10	15	17	18	66
Grand Total	**12**	**22**	**30**	**33**	**45**	**142**

Table 6 indicates the crash severity of the crashes on SR 303L with the study limits. Of the 142 crashes, 103 (73%) resulted in no injury. A reported 23% resulted in a possible injury of minor injury and the remaining 6 (7%) of crashes resulted in a suspected serious injury. It should be noted there were no fatal crashes within the SR 303L study extents in the previous 5 years.

Table 6. Yearly Crash Injury Severity Distribution

Injury Severity	2015	2016	2017	2018	2019	Grand Total
No Injury	7	14	24	24	34	103
Possible Injury	2	3	1	2	6	14
Suspected Minor Injury	3	4	2	7	3	19
Suspected Serious Injury	0	1	3	0	2	6
Grand Total	**12**	**22**	**30**	**33**	**45**	**142**

Table 7 shows the crash manner distribution for the SR 303L study limits over the previous 5 years. Single vehicle crashes make up the largest number of crashes in the corridor at 78 (55%). Single vehicle crashes do not typically make up the most crashes on freeway segments, but in this case, it could perhaps be attributed to the lower vehicle volumes, which reduces the number of vehicle-to-vehicle crashes. The next two highest crash types are the most common crash types on freeway segments, rear-ends and sideswipes with a combined total of 58 (41%).

Table 7. Yearly Crash Manner Distribution

Crash Manner	2015	2016	2017	2018	2019	Grand Total
Angle (Front to Side) (Other Than Left Turn)	0	0	1	1	1	3
Other	0	0	0	2	1	3
Rear End	3	5	8	5	11	32
Sideswipe Same Direction	0	2	8	10	6	26
Single Vehicle	9	15	13	15	26	78
Grand Total	**12**	**22**	**30**	**33**	**45**	**142**

(Continued on Page 8)

The distribution of crashes by month is shown in Table 8. The table shows a fairly even distribution of crashes over the months. The highest occurs at 19 crashes (13%) in July and the lowest is 9 crashes (6%) in June. There is also an outlier month in November 2019 in which 10 crashes took place, significantly more than any other month.

Table 8. Yearly Crashes by Month

Month	2015	2016	2017	2018	2019	Grand Total
January	0	1	3	3	1	8
February	1	0	1	4	5	11
March	3	0	2	4	4	13
April	1	5	2	2	2	12
May	1	1	5	2	2	11
June	0	1	3	0	3	7
July	5	2	0	5	7	19
August	1	5	1	2	0	9
September	0	0	2	4	7	13
October	0	1	5	3	3	12
November	0	3	1	3	10	17
December	0	3	5	1	1	10
Grand Total	**12**	**22**	**30**	**33**	**45**	**142**

Crash distribution by day of week is shown in Table 9. The number of crashes is higher during weekdays when the traffic volumes are typically higher. The highest number of crashes take place on Mondays with a total of 28 (20%) and the lowest takes place on Tuesdays with a total of 13 (9%).

Table 9. Yearly Crashes by Day of Week

Day of Week	2015	2016	2017	2018	2019	Grand Total
Sunday	2	2	3	2	6	15
Monday	6	4	5	4	9	28
Tuesday	2	0	2	6	3	13
Wednesday	1	5	4	5	12	27
Thursday	0	3	6	6	10	25
Friday	1	4	5	6	4	20
Saturday	0	4	5	4	1	14
Grand Total	**12**	**22**	**30**	**33**	**45**	**142**

Table 10 shows the crash distribution by time of day. There is a significant spike in the number of crashes which take place during the AM hours at 6 AM and 8 AM. A total of 43 (30%) of crashes take place between 6 and 7 AM along SR 303L within the study limits. The crashes are fairly evenly distributed throughout the rest of the day outside of the significant AM peak.

Table 10. Yearly Crashes by Time of Day

Time of Day	2015	2016	2017	2018	2019	Grand Total
12:00 AM	0	0	1	0	1	2
1:00 AM	1	0	2	0	0	3
2:00 AM	0	1	1	1	0	3
3:00 AM	0	0	0	0	3	3
4:00 AM	0	1	0	0	0	1
5:00 AM	0	0	0	1	1	2
6:00 AM	0	1	5	2	6	14
7:00 AM	2	4	8	8	7	29
8:00 AM	0	2	0	4	3	9
9:00 AM	0	2	1	1	0	4
10:00 AM	0	0	1	2	1	4
11:00 AM	0	0	1	0	0	1
12:00 PM	0	2	0	3	2	7
1:00 PM	3	0	0	1	5	9
2:00 PM	0	2	1	0	1	4
3:00 PM	0	2	1	0	3	6
4:00 PM	1	1	0	3	2	7
5:00 PM	2	0	0	0	4	6
6:00 PM	1	1	2	2	1	7
7:00 PM	1	1	0	2	1	5
8:00 PM	1	0	2	1	1	5
9:00 PM	0	0	2	0	0	2
10:00 PM	0	1	2	1	2	6
11:00 PM	0	1	0	1	1	3

The crash density heat maps for SR 303L by direction is presented in Figure 3 (SB direction) and Figure 4 (NB direction). Currently there are no interchanges located on SR 303L between Lake Pleasant Parkway and I-17. These figures indicate most crash hotspots are located near the interchange of Sonoran Desert Drive and I-17. Figure 3 also indicates that the crashes are clustered at the locations of future interchanges for 51st Avenue and 67th Avenue where the mainline traffic is routed from mainline to the temporary roadway configurations for the future ramps at these interchanges. Figures 3 and 4 also depict the location of serious/fatal injuries on the SR303L corridor. As indicated in Figure 3, the serious injuries occurred in SB direction near Lake Pleasant Parkway, near MP 135 and near Sonoran Desert Drive interchange. However, in the NB direction, all the serious/fatal injuries occurred near MP 139 approaching the Sonoran Desert Drive interchange. It is anticipated that the number of crashes will increase further as the new interchanges (at 43rd Avenue, 51st Avenue and 67th Avenue) are constructed on SR 303L along with the addition of major new developments in the project vicinity.

Figure 3. SR 303L Crash Density Heat Map (SB Direction)

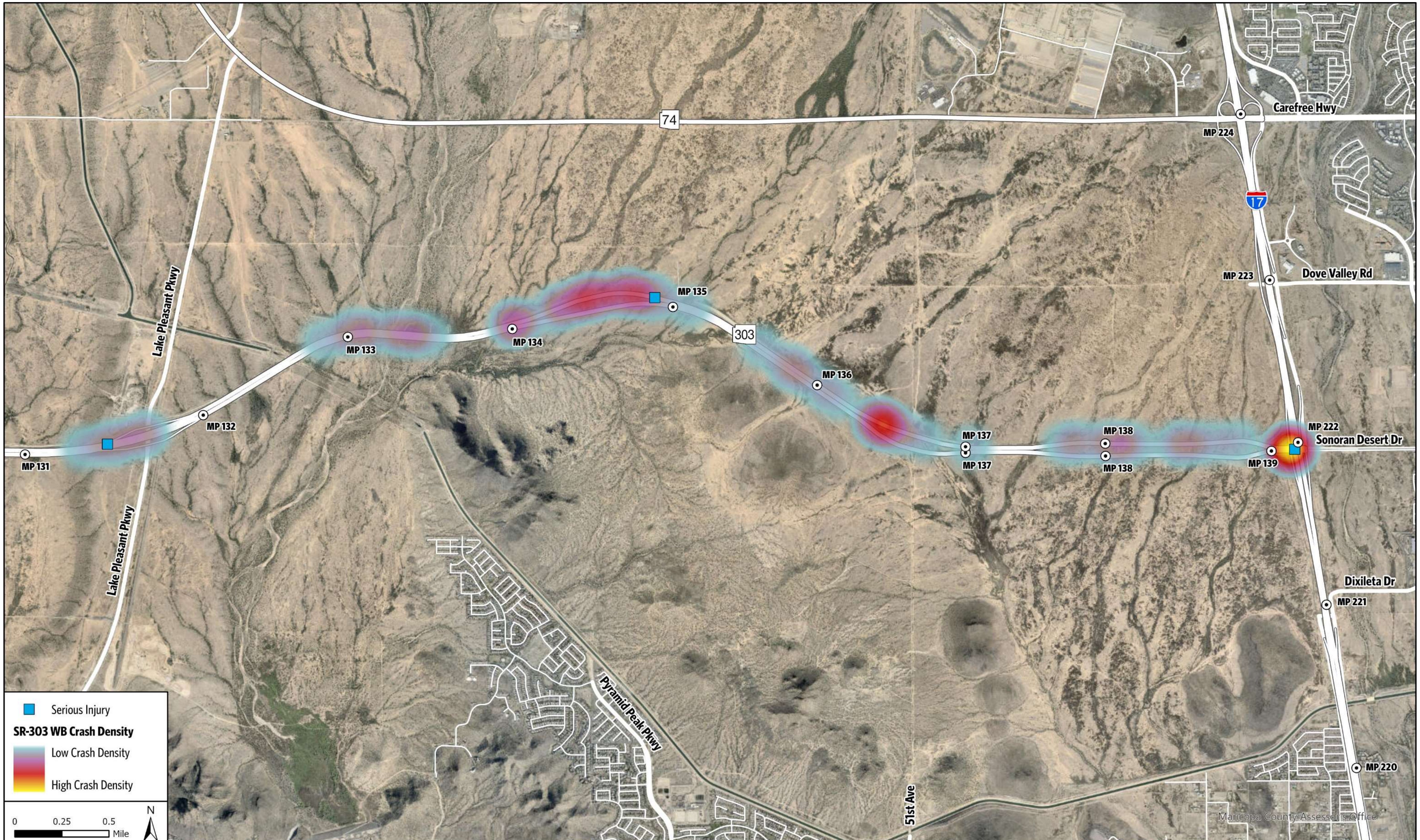


Figure 4. SR 303L Crash Density Heat Map (NB Direction)

2.2 Travel Demand Forecasting

2.2.1 Technical Process and Assumptions

A regional Travel Demand Model (TDM) is a planning tool used to evaluate the current and future transportation needs and assess alternative roadway improvement scenarios based on the land use, socioeconomic data and forecasted growth. It provides an order of magnitude of the travel demand to help identify the location, type and capacity of improvements and evaluate their impact on study roads and surrounding roadways. The current transportation system is often used as the initial roadway system and new improvements are identified based on future demand. The macro scale nature of this tool only provides a planning evaluation for the operation of roadway between intersections or interchanges.

The forecasts were conducted at each freeway interchange along SR 303L from Lake Pleasant Parkway to I-17, forecasts were also completed along the I-17 and freeway interchanges from Dixileta Drive to Dove Valley Road.

A major consideration in this forecast was the influence of the North Phoenix 3500 Planned Unit Development (PUD) (Z-37-20-1) site that is 3,720 acres of vacant State of Arizona Trust Land chosen for the future placement of the TSMC semiconductor manufacturing plant on approximately 1,130 acres. The primary campus for the TSMC production facilities will lie north of the SR 303L and south of Dove Valley Road between 43rd Avenue and the Deadman Wash Tributary No. 2 located west of 51st Avenue. The vacant land east of the main manufacturing campus is slated for mixed residential and commercial development. The PUD vacant land north and west of the TSMC site will become a technology park like the area surrounding the Intel Ocotillo Plant in Chandler, Arizona. These incoming developments will significantly impact traffic in the surrounding transportation network.

Currently the MAG TDM does not incorporate the land use changes associated with the TSMC development. The SR 303L Lake Pleasant Parkway to I-17 Final Traffic Report outlines in detail the changes to the TAZ based socioeconomic data sets used by the regional model to emulate the TSMC land use. Model assignments from the refined TDM were used in conjunction with traffic counts and Annual Average Daily Traffic (AADT) counts to arrive at horizon year traffic forecast for the project.

2.2.2 Related Studies

North Phoenix 3,500 Traffic Impact Study (September 2020)

City of Phoenix launched a study to evaluate the traffic impact due to the proposed North Phoenix 3,500 PUD on the surrounding street network. The study was prepared in conformance with City of Phoenix Street Planning and Design Guidelines Section 12.1.2 Traffic Impact Studies, December 2009 in tandem with information provided by the City of Phoenix Street Transportation Department. The objectives of the study were to determine whether the planned street system in the vicinity of the site is adequate to accommodate the increased traffic that results from the proposed development; to recommend additional street improvements or traffic control devices; and evaluate the internal site circulation and provide recommendations if necessary.

Traffic Impact Analysis Report TSMC Fab Site (January 2020)

TSMC in partnership with CTCI Americas Incorporated launched a traffic impact analysis of the proposed TSMC semiconductor fabrication sight. The key goal of the study was to conceptualize a Master Street Design and Phasing Plan, and to ensure the access to the site was built with the necessary capacity to perform at reasonable level of service. This study provides detailed recommendations of exit and entry road configurations into the site. Based on site specific trip generation and distribution estimates, the study identified intersection lane configuration in the vicinity of the TSMC development.

2.2.3 2020 Travel Demand Model Network

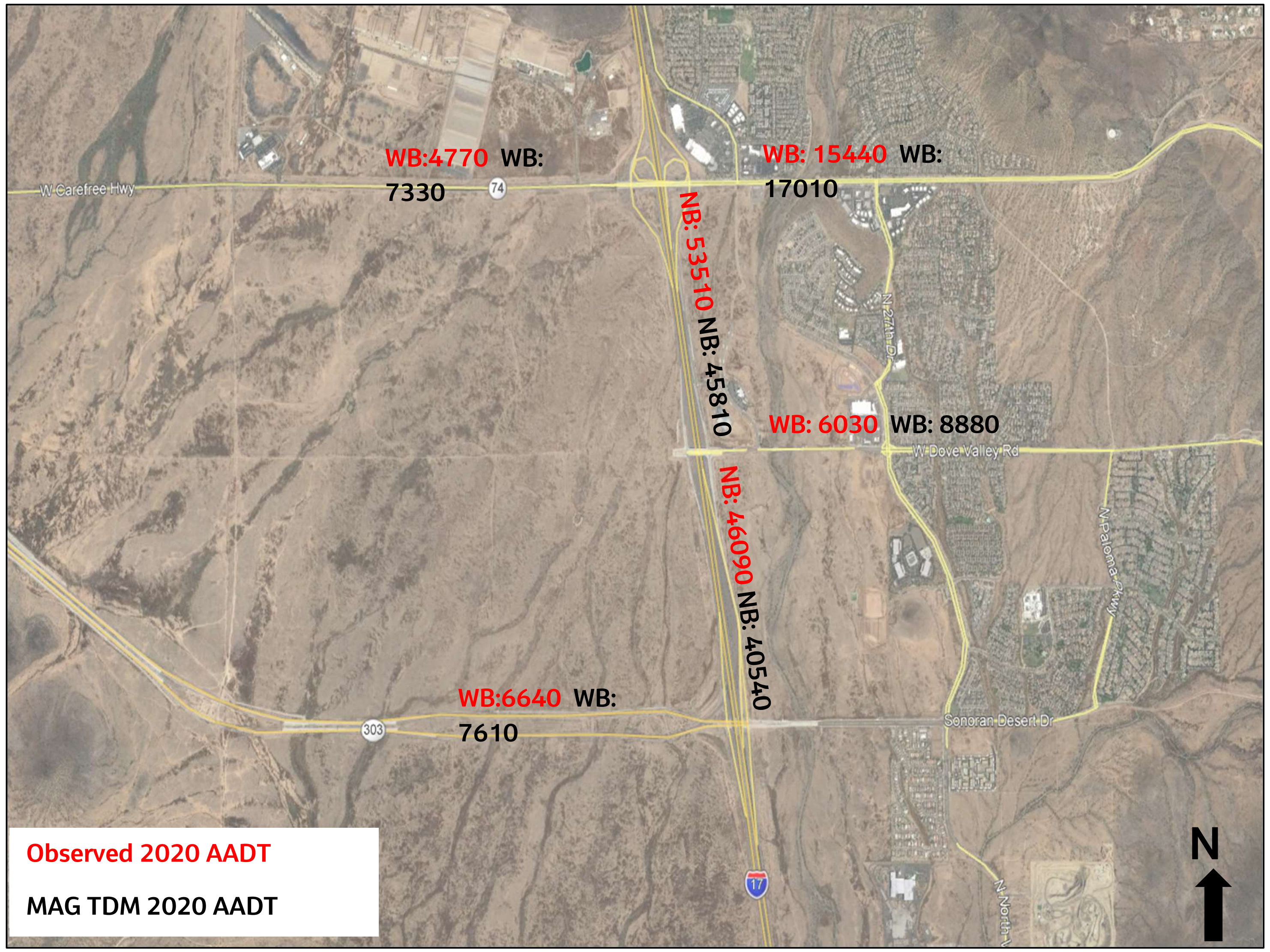
The TDM network in the project influence area includes SR 303L from Lake Pleasant Parkway to I-17, the interchange between SR 303L and I-17, and the intersection at Sonoran Desert Drive and North Valley Parkway. The network also includes the TIs at I-17 and Dixileta Drive and Dove Valley Road. The incoming TSMC site will be nested northwest of the SR 303L and I-17 traffic interchange. It is bounded by SR 74 to the north and the SR 303L to the south. Currently there are no interchanges on SR 303L along the site boundary, but there are interchanges along I-17 at SR 74 and an unconnected interchange at Dove Valley Road. There are currently no paved roads within the future TSMC site. Figure 5 shows the existing network as it is in the MAG TDM.

(Continued on Page 12)

Figure 5. MAG TDM Existing Network

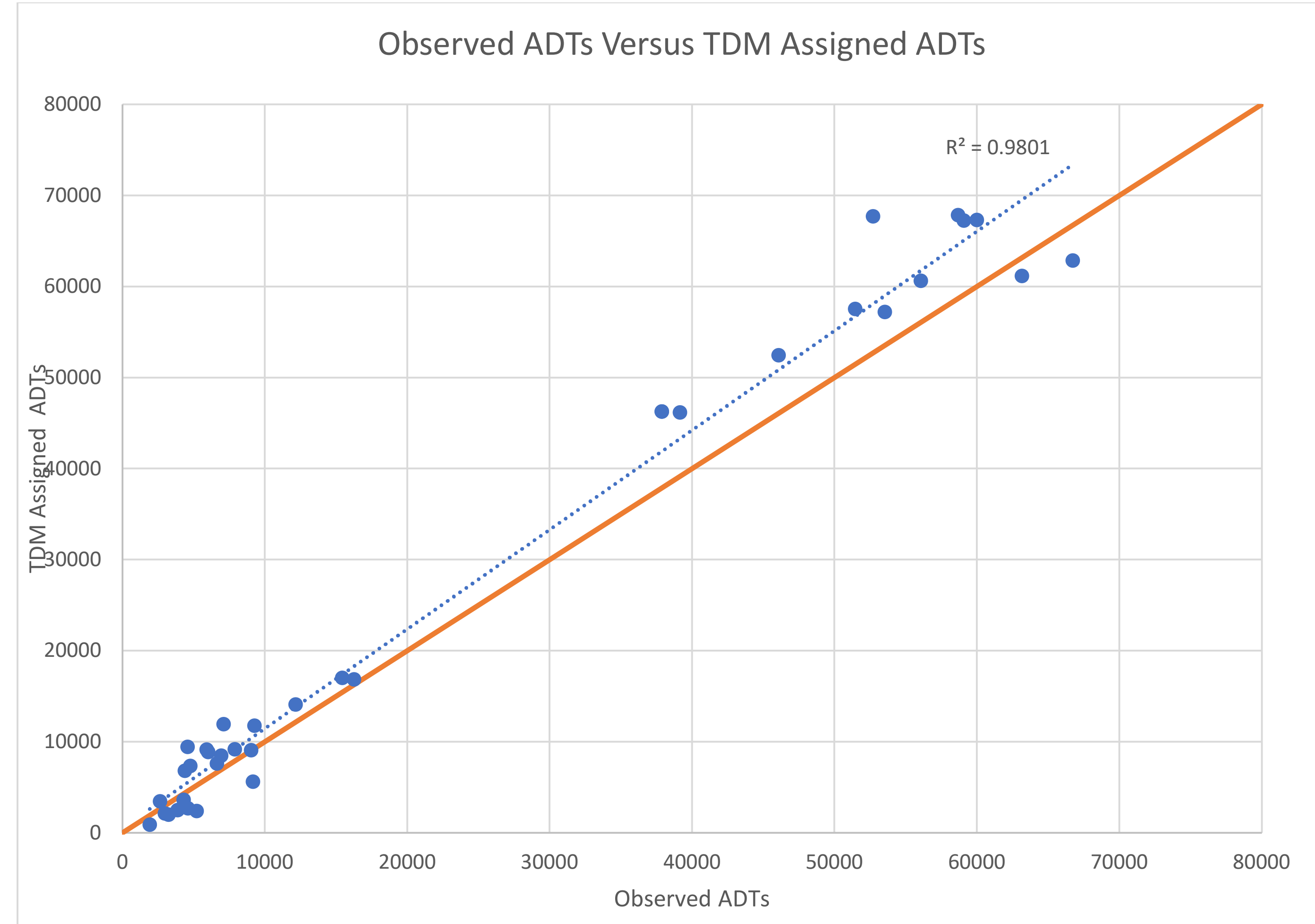
Figure 6 presents AADTs on the major roads surrounding the site comparing the MAG TDM AADTs to observed AADTs taken from the ADOT TCDS website. No data from the ADOT Traffic Data Management System (TDMS) older than 2018 were used while a growth factor of 2% per year was applied to any historic count.

Figure 6. Observed Versus Assigned 2020 AADTs Map



As shown in Figure 7, the MAG TDM tends to overestimate AADTs on higher volume roads within the study area.

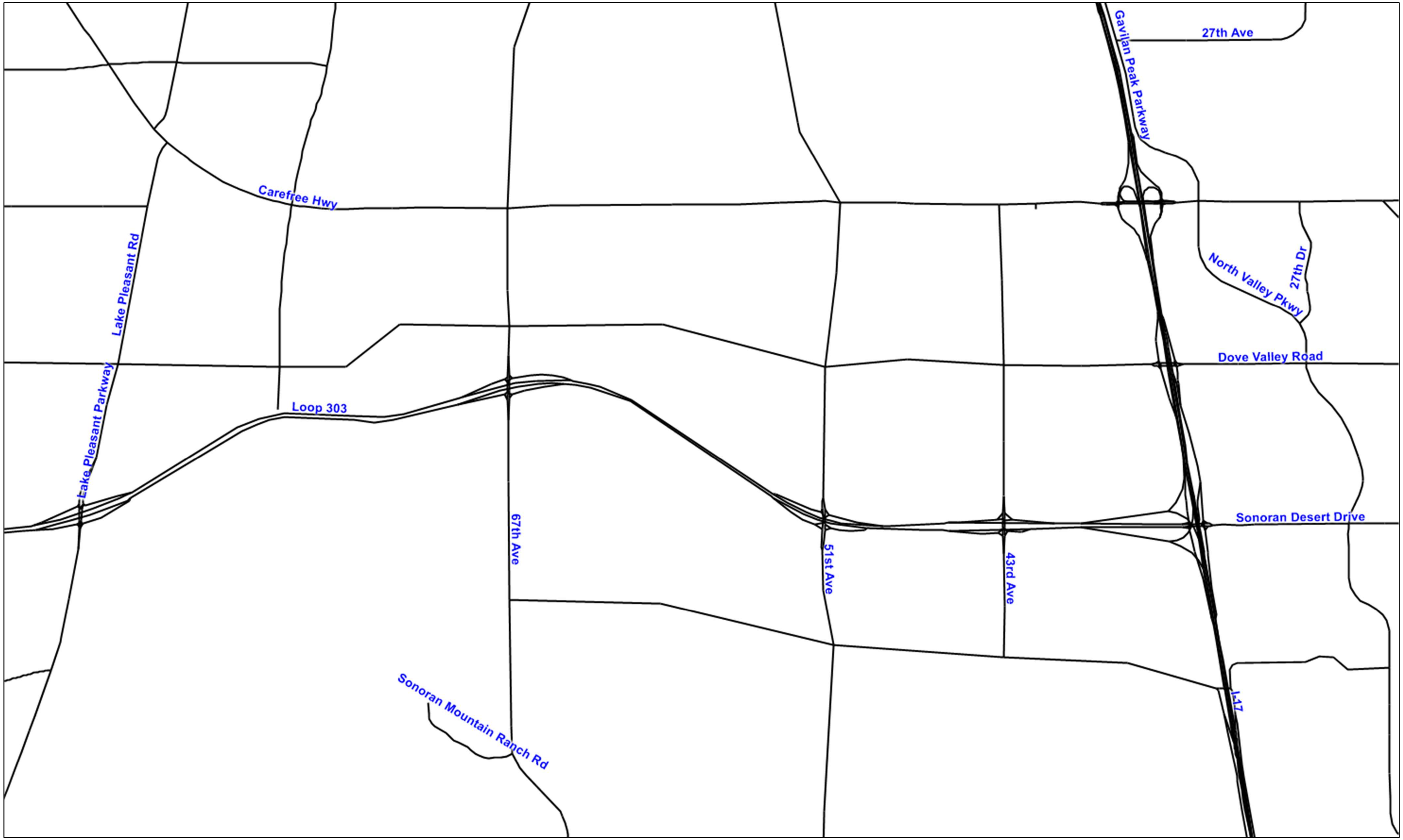
Figure 7. Observed AADTs Versus Modeled ADTs Goodness of Fit



2.2.4 Future Network

The proposed future network of the SR 303L and I-17 System Interchange is shown below in **Error! Reference source not found.**. Note that there will be new interchanges at 67th Avenue, 51st Avenue, and 43rd Avenue. There will also be flyover ramps between the freeways and frontage roads and will connect SR 303L to Sonoran Desert Drive.

Figure 8. 2040 MAG TDM Freeway Network



2.3 Traffic Volumes

The existing traffic volumes for the study were developed based on the AADT obtained from ADOT's TDMS for SR 303L between Lake Pleasant Parkway and I-17. Weekday data was taken from the mainline count system at the count stations along SR 303L and also along I-17 (in the vicinity of the existing I-17 / Sonoran Desert Drive TI) as identified in Table 11 below.

Table 11. AADT Data from ADOT TDMS (SR 303L)

Count Station ID	Freeway Segment	MP	AADT (2019)	K Factor (%)	D Factor (%)	T Factor (%)
101612	SR 303L, Between Lake Pleasant Pkwy and I-17	135.85	26,433	13	70	9.9
100394	I-17, Between Dixileta Dr and Sonoran Desert Dr	221.11	114,992	9	56	7.3
100395	I-17, Between Sonoran Desert Dr and Sonoran Blvd	222.46	97,424	9	53	7.3

Source: ADOT TDMS

The existing traffic volumes for the study area were developed based on the existing AADT data from ADOT, 2020 ADTs from MAG's TDM and other sources from City of Phoenix.

The traffic volumes have also been developed for the future 2040 analysis year for no-build and build conditions. These traffic volumes are developed based on the traffic forecasting methodology identified in Section 2.2 of this report. A detail approach for the development of the existing and the future year traffic volumes is further outlined in State Route 303L Lake Pleasant Parkway to I-17 Final Traffic Report.

2.4 Traffic Operations Analysis

The traffic operations analysis for the study corridor is categorized by the facility types (identified below) for each element of the study area:

- Basic Freeway Segment (segment of freeway between the on-ramp and the off-ramp of a TI)
- Merge/Diverge Segment
- Weaving Segment
- Ramp Segment
- Signalized Intersection
- Unsignalized Intersection

Operational analysis was conducted using forecasted AM and PM peak hour traffic volumes. Within the greater Phoenix area, the AM peak hour typically falls within the 6:00 AM to 9:00 AM duration and the PM peak hour falls within the 3:00 PM to 7:00 PM duration.

Microsimulation (VISSIM)

The traffic operations analysis was performed using VISSIM microscopic simulation software. VISSIM is a microscopic, time-step and behavior-based simulation software developed to model urban traffic, transit, rail, and pedestrian operations. The program analyzes traffic, transit, rail, and pedestrian operations under a series of constraints, such as lane configuration, traffic composition, traffic control types, and transit stops, among others. For traffic operations, it can provide a diverse array of measures of effectiveness (MOEs), such as average total delay, travel times and queue lengths.

The following key steps were applied to develop the base year VISSIM model:

- Scale and import background aerial image of the corridor
- Develop network geometry (number of lanes, lane widths, acceleration/deceleration lane lengths)
- Code Desired Speed Decisions
- Code Reduced Speed Areas where appropriate
- Code Priority Rules/ Conflict Areas
- Code input volumes and Routing Decisions (15 minutes of preload (also called as shoulder time period) and 60 min of actual peak hour)
- Run the model (for multiple iterations, 10 times) to extract results

From the model output, link evaluation and travel time metrics were used to assess the operational performance of existing and proposed roadway configurations. The link evaluation metrics include vehicular throughput, speeds and densities; the travel time metrics represent an aggregate travel time for all vehicles for different origin-destination pairs within the modeled network.

All the simulation models developed for the study included a 15 minute "shoulder period" in addition to the peak hour. The 'shoulder period" or "warm-up" period pre-loads the network and ensures the build-up and dissipation of congestion occurs during the modeled peak hour and is recommended by FHWA.

The FHWA recommends that project microsimulation models be calibrated to existing conditions prior to alternatives to operational analysis. The main objective of the calibration process is to replicate field observed traffic conditions in the simulation model. By adjusting driver parameters and lane change distance, the model was calibrated to traffic volumes and travel times. A detail approach for the calibration process and the results is further outlined in *State Route 303L Lake Pleasant Parkway to I-17 Final Traffic Report.*

(Continued on Page 16)

Criteria for Performance

The operations analysis was based on the procedures outlined in the Highway Capacity Manual (HCM) 6th Edition. HCM methodology was used to conduct the traffic operations analysis and to summarize the anticipated Level of Service (LOS) for various facilities identified previously. This manual defines six levels of LOS ranging from A (the best, most desirable operating conditions) to LOS F (the worst, most congested operating conditions).

The LOS criteria for various facilities such as freeway mainline, merge/diverge sections, weaving sections, ramps, signalized and unsignalized intersections are shown in Table 12, Table 13, Table 14, Table 15, Table 16 and Table 17 respectively.

Table 12. Basic Freeway Segment LOS Criteria

Level of Service	Description	Density (pc/mi/ln)
A	Free-flow operations allow vehicles to be almost completely unimpeded in their ability to maneuver within the traffic stream.	0 – 11
B	The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high.	> 11 – 18
C	Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 18 – 26
D	Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels.	> 26 – 35
E	Operating at capacity, there are virtually no usable gaps in the traffic stream leaving little room to maneuver.	> 35 – 45
F	Existing demand exceeds capacity causing excessive delay and breakdowns in vehicular flow.	> 45

Table 13. Merge/Diverge Segment LOS Criteria

Level of Service	Density (pc/mi/ln)
A	0 – 10
B	> 10 – 20
C	> 20 – 28
D	> 28 – 35
E	> 35
F	Demand Exceeds

Table 14. Weaving Segment LOS Criteria

Level of Service	FREEWAY DENSITY (pc/mi/ln)
A	< 10
B	> 10 – 20
C	> 20 – 28
D	> 28 – 35
E	> 35 – 43
F	> 43

Table 15. Ramp Segment LOS Criteria

Level of Service	Density (pc/mi/ln)
A	0 – 10
B	> 10 – 20
C	> 20 – 28
D	> 28 – 35
E	> 35 – 43
F	> 43

Table 16. Signalized Intersections LOS Criteria

Level of Service	Description	Average Control Delay (seconds/vehicle)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10 – 20
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20 – 35
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume to capacity (v/c) ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35 – 55
E	Operations with high delay values indicating poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55 – 80
F	Operations with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80

Table 17. Unsignalized Intersections LOS Criteria

Level of Service	Description	Average Control Delay (seconds/vehicle)
A	Little or no delay	0 – 10
B	Minor delays	> 10 – 15
C	Average delays	> 15 – 25
D	Moderate delays	> 25 – 35
E	Lengthy delays	> 35 – 50
F	Excessive delays/gridlock	> 50

The MOE's obtained from the VISSIM microsimulation model include delay, speed, volumes, and densities. These are then translated into a LOS description by facility type, based on the 2016 Highway Capacity Manual definitions. LOS is a qualitative measure of the operational efficiency or effectiveness of a roadway. Six (6) LOS are defined and are designated by letters ranging from A through F, with LOS A representing the best range of operating conditions and LOS F representing the worst.

Currently, the section of SR 303L between Lake Pleasant Parkway and I-17 is considered urban in character. ADOT Roadway Design Guidelines (RDG) acceptable LOS criteria by facility type are:

- Urban freeway/highway segments – LOS D or better
- Urban traffic interchanges (crossroads and ramps) – LOS D or better

The same LOS criteria apply for the future 2040 improvements.

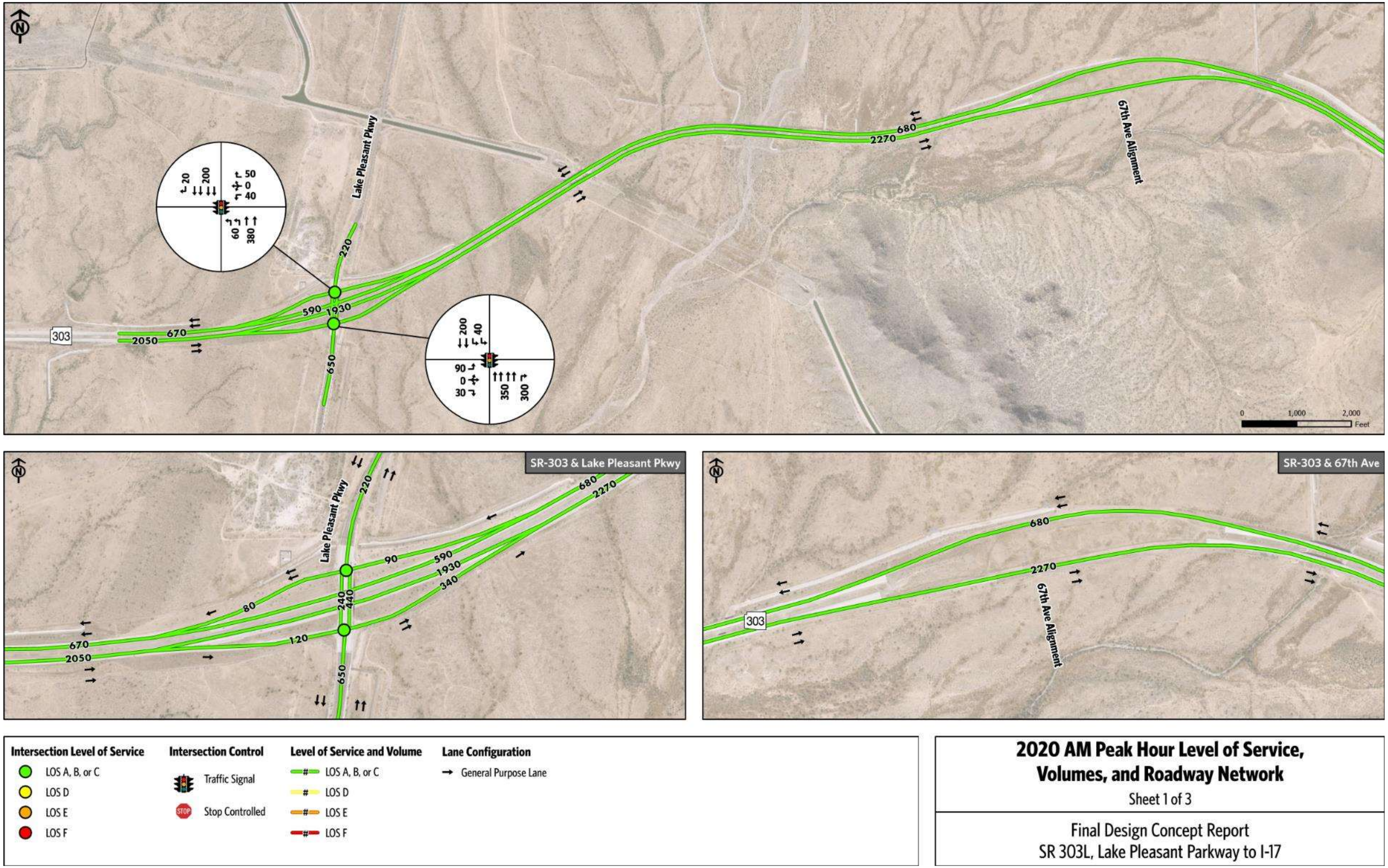
2.4.1 2020 Existing Conditions Traffic Operations

The traffic operations analysis for the existing conditions is based on the existing roadway network and the existing traffic volumes as described in the previous sections. The existing roadway network and existing traffic volumes are shown in Figure 9 through Figure 14. Figure 9 through Figure 14 also depict the operations of the freeway segments, merge/diverge areas, weaving areas (if any) and the ramp segments and the intersection LOS within the study area.

Table 18 depicts the approach Level of Service for the signalized and unsignalized intersections within the study area for 2020 existing conditions.

(Continued on Page 18)

Figure 9. 2020 AM Existing LOS, Volumes and Lane Configuration (Sheet 1 of 3)



2020 AM Peak Hour Level of Service, Volumes, and Roadway Network

Sheet 1 of 3

Final Design Concept Report
SR 303L, Lake Pleasant Parkway to I-17

Figure 10. 2020 AM Existing LOS, Volumes and Lane Configuration (Sheet 2 of 3)

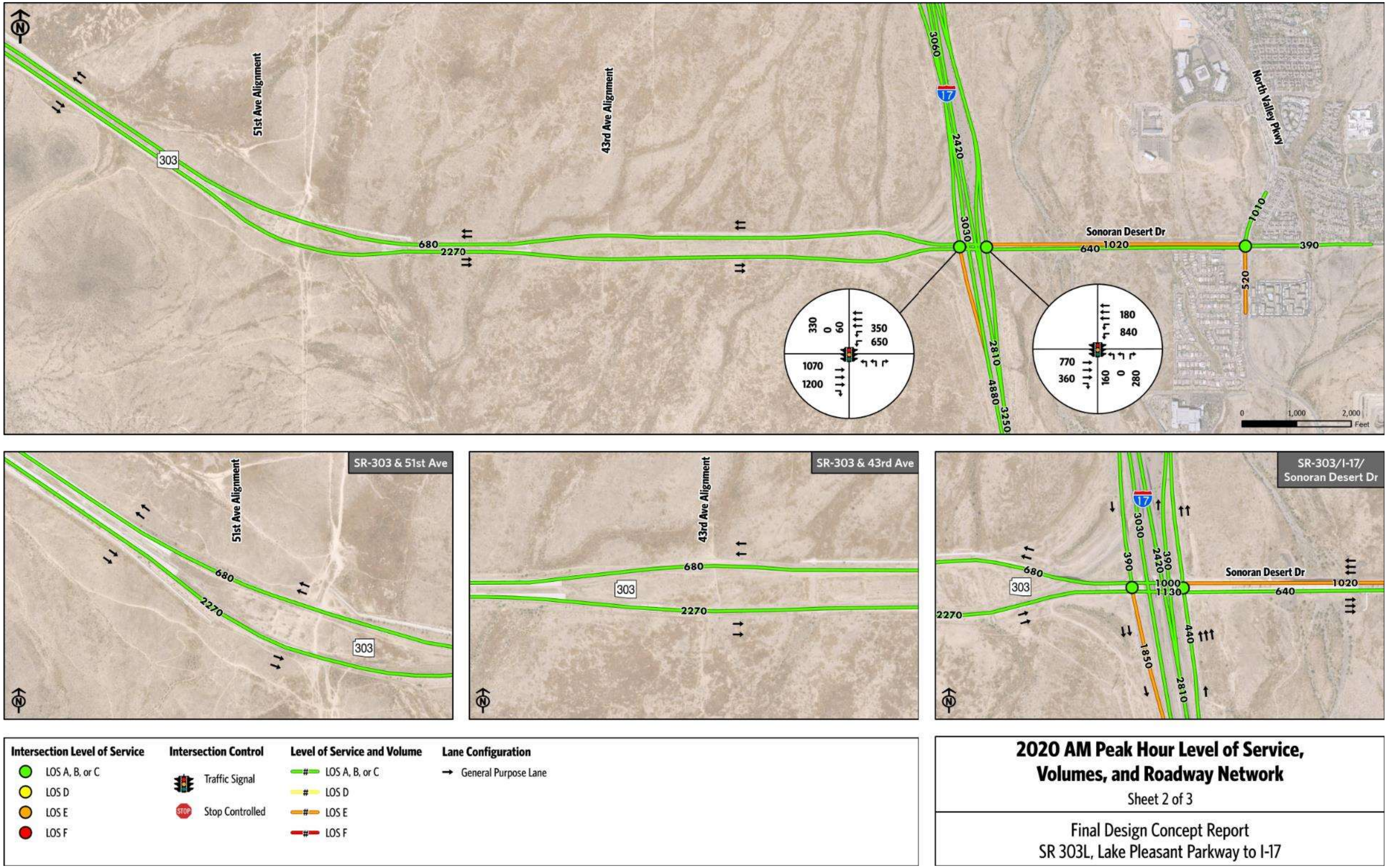


Figure 11. 2020 AM Existing LOS, Volumes and Lane Configuration (Sheet 3 of 3)

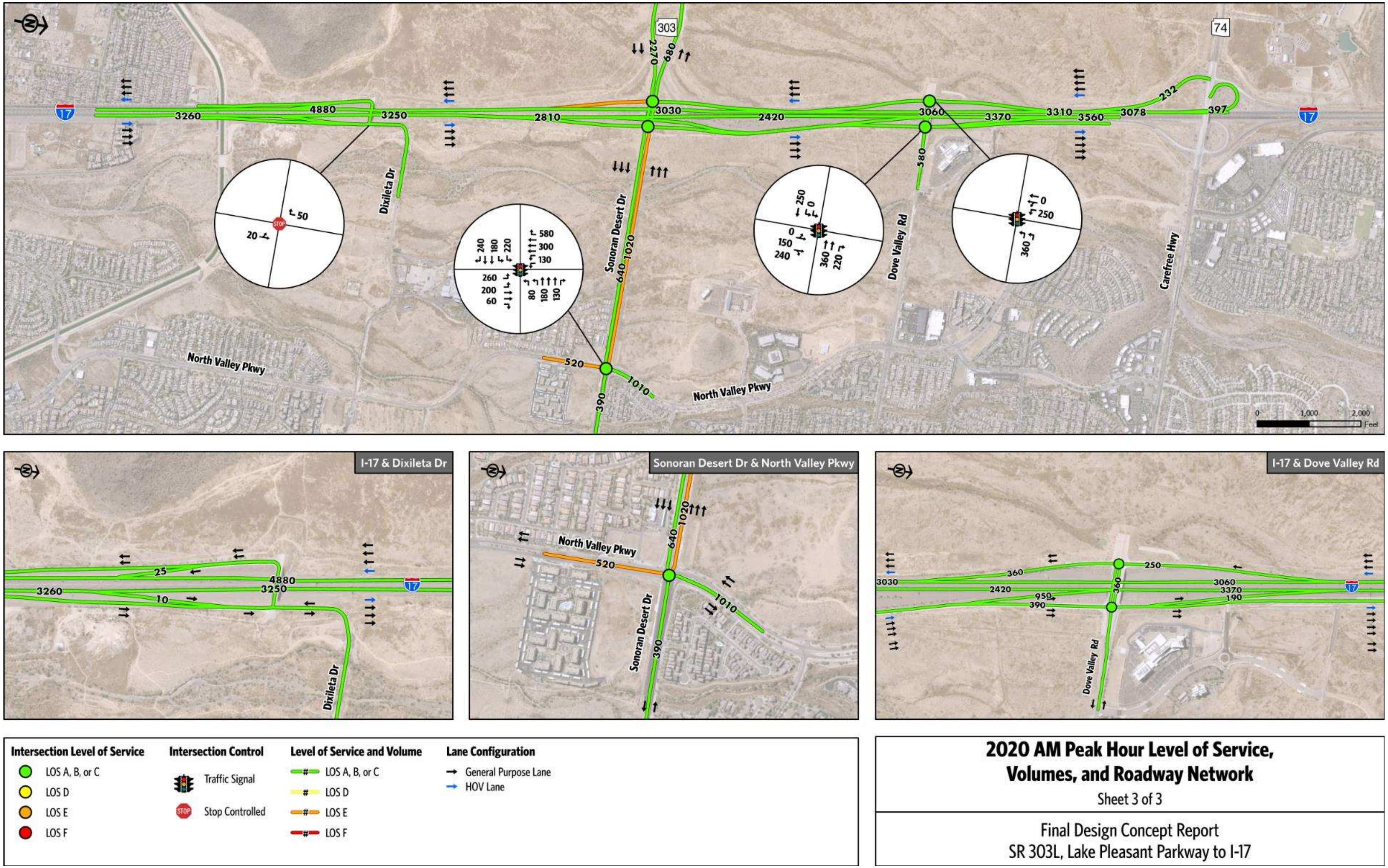


Figure 12. 2020 PM Existing LOS, Volumes and Lane Configuration (Sheet 1 of 3)

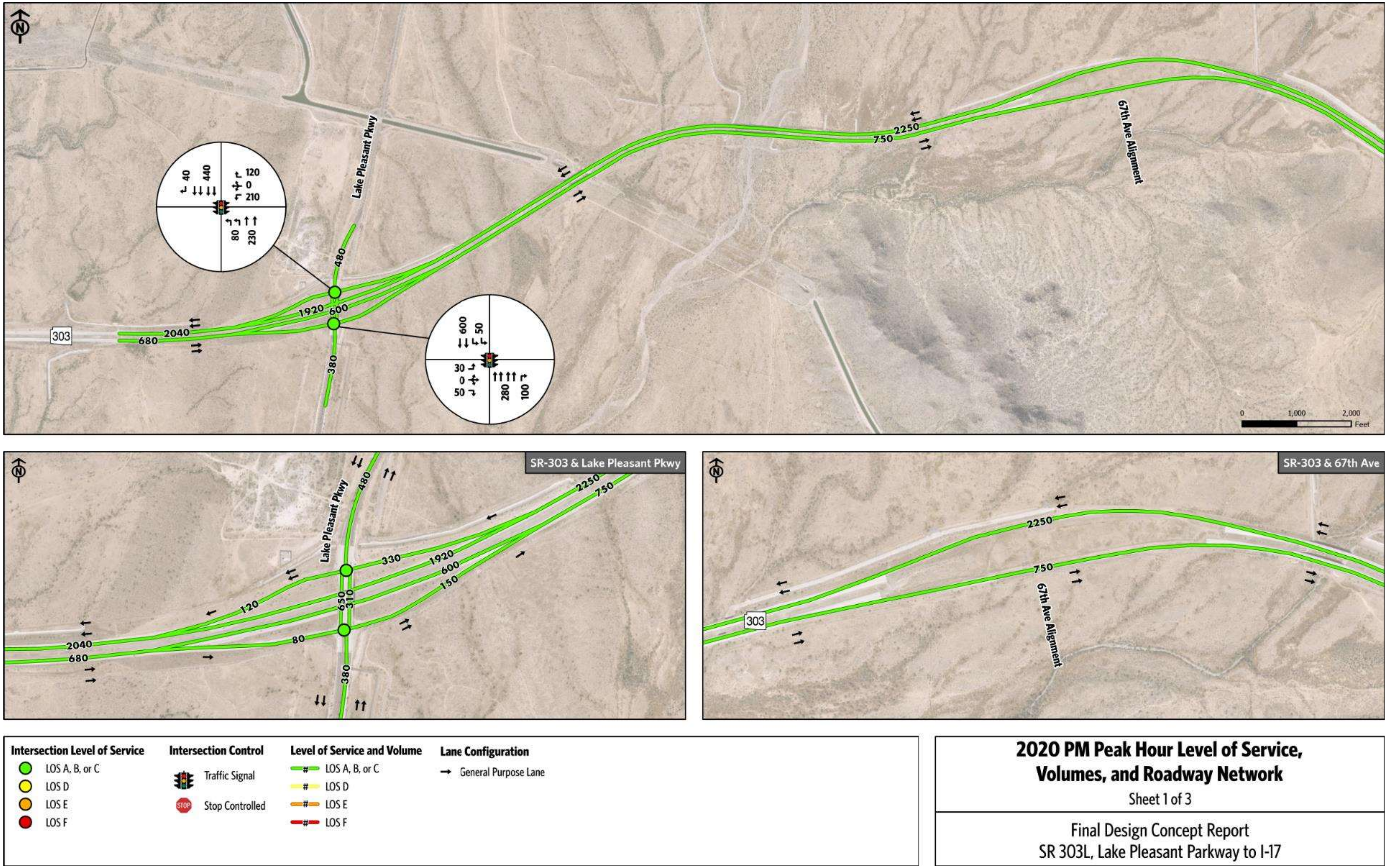


Figure 13. 2020 PM Existing LOS, Volumes and Lane Configuration (Sheet 2 of 3)

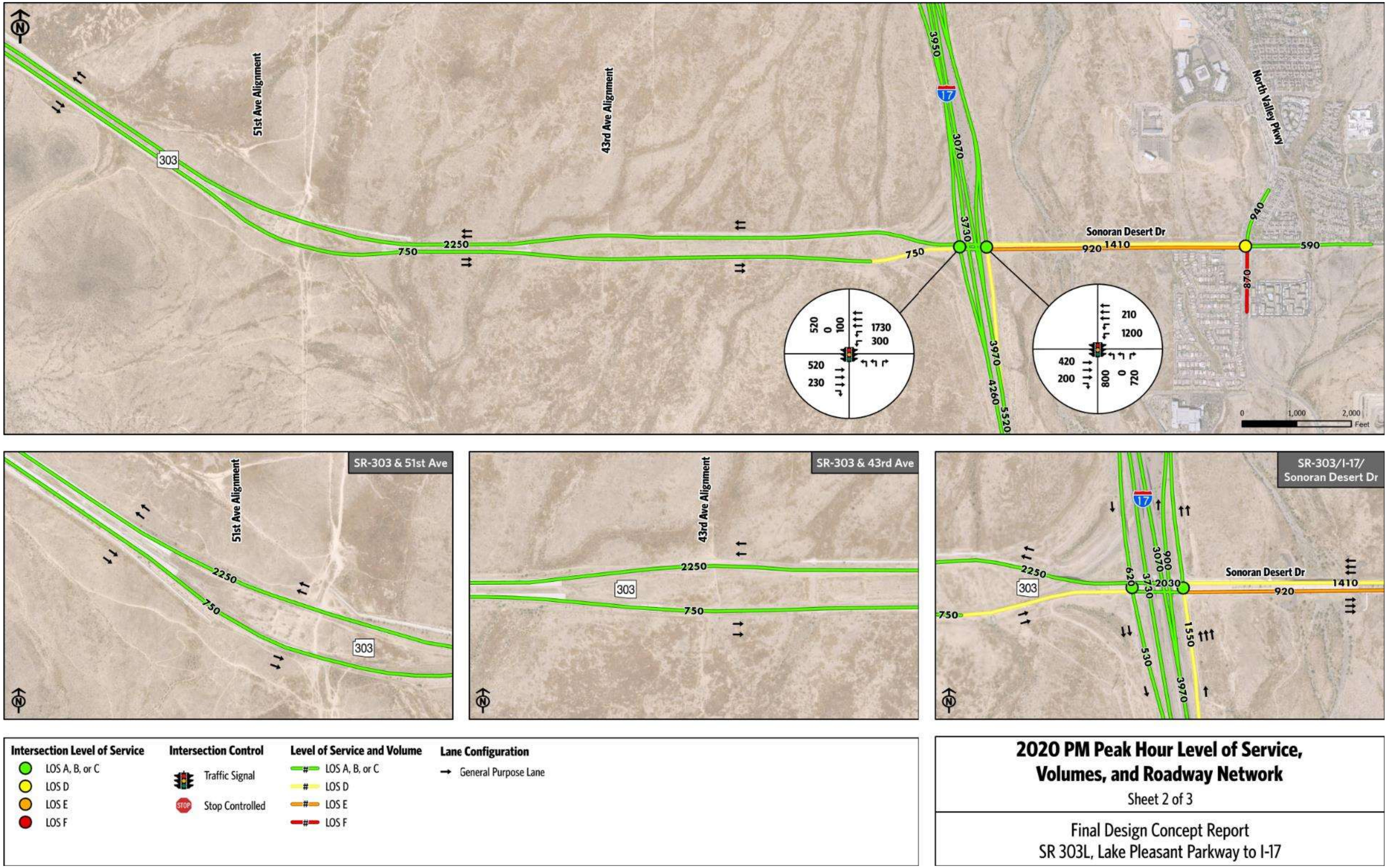
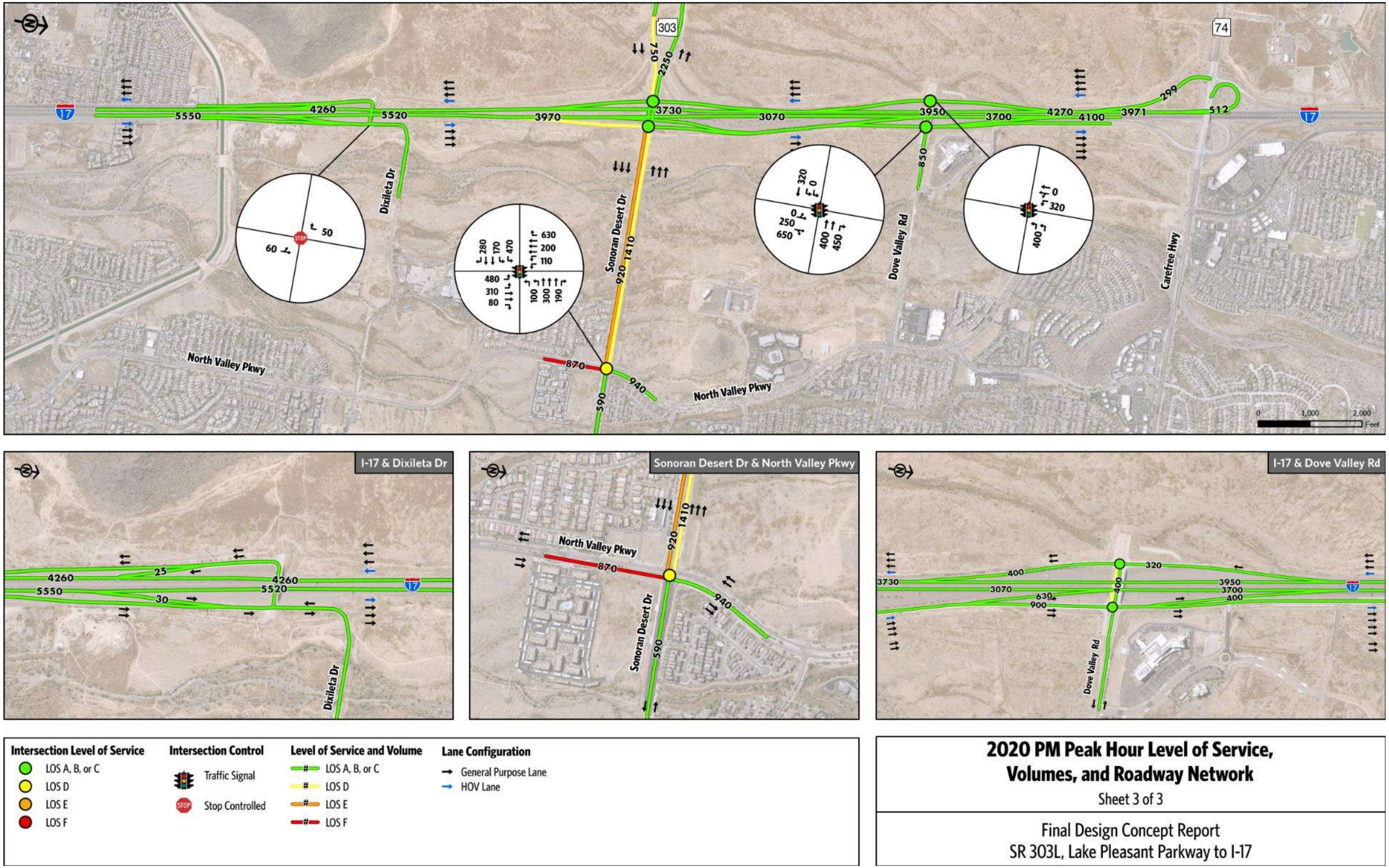


Figure 14. 2020 PM Existing LOS, Volumes and Lane Configuration (Sheet 3 of 3)



As shown in Table 18, the existing LOS for all the study intersections is 'D' or better during both the AM and PM peak hours. It should also be noted that each approach for all the study intersections is operating at LOS 'D' or better, except for the northbound and eastbound approaches at Sonoran Desert Drive and North Valley Parkway intersection during the PM peak hour.

Table 18: 2020 Existing Peak Hours LOS for Signalized and Unsignalized Intersections

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		Approach Delay	Approach LOS	Intersection Delay (seconds)	Intersection LOS	Approach Delay	Approach LOS	Intersection Delay (seconds)	Intersection LOS
I-17 SBFR and SR 303/Sonoran Desert Dr	SB	14.6	B	22.8	C	30.0	C	16.8	B
	WB	7.5	A			1.0	A		
	NB	-	-			-	-		
	EB	31.1	C			48.3	D		
I-17 NBFR and SR 303/Sonoran Desert Dr	SB	-	-	21.6	C	-	-	33.9	C
	WB	41.7	D			38.4	D		
	NB	23.9	C			42.9	D		
	EB	2.1	A			1.6	A		
SR 303 SBFR and Lake Pleasant Pkwy	SB	19.3	B	12.6	B	19.89	B	16.3	B
	WB	11.8	B			16.84	B		
	NB	9.5	A			10.19	B		
	EB	-	-			-	-		
SR 303 NBFR and Lake Pleasant Pkwy	SB	8.8	A	13.7	B	10.73	B	12.5	B
	WB	-	-			-	-		
	NB	15.1	B			15.79	B		
	EB	16.2	B			11.72	B		
Sonoran Desert Dr and North Valley Pkwy	SB	30.7	C	34.9	C	33.35	C	54.5	D
	WB	31.7	C			33.44	C		
	NB	46.1	D			87.20	F		
	EB	34.3	C			58.54	E		
I-17 SBFR and Dove Valley Rd	SB	26.4	C	11.3	B	20.39	C	9.8	A
	WB	1.1	A			1.39	A		
	NB	-	-			-	-		
	EB	-	-			-	-		
I-17 NBFR and Dove Valley Rd	SB	-	-	18.9	B	-	-	23.1	C
	WB	16.6	B			21.77	C		
	NB	14.6	B			18.78	B		
	EB	31.2	C			39.32	D		

2.4.2 67th Avenue Interchange Alternatives

Three types of interchanges were selected for consideration at 67th Avenue: A diamond TI, a single-point urban interchange (SPUI) and a diverging diamond interchange (DDI). Below is a brief description of each alternative and the traffic operational analysis. For more information on the 67th Avenue interchange analysis, refer to Section 3.0.

2.4.2.1 Diamond Interchange

67th Avenue will have two through lanes, a shared through/right-turn lane, and a right-turn lane in the SB direction approach to the SR 303L ramp terminals; and dual left-turn lanes between the SR 303L ramp terminals.

67th Avenue will have three through lanes, and a right-turn lane in the NB direction approach to the SR 303L ramp terminals; and dual left-turn lanes between the SR 303L ramp terminals.

On 67th Avenue, single left turn lanes are warranted by the traffic demand analysis, but dual left-turn lanes would be provided for consistency with the previous DCR.

The NB SR 303L off ramp will consist of a left-turn lane, a through/left-turn lane, and a right-turn lane. The SB SR 303L off ramp will consist of a left-turn lane, a through/left-turn lane, and a right-turn lane.

Figure 27 in Section 3.2.1 in shows the preliminary geometric layout of the Diamond Interchange alternative.

2.4.2.2 Single-Point Urban Interchange

67th Avenue, in both directions, will have three through lanes, a right-turn lane, and dual left-turn lanes. On 67th Avenue, single left-turn lanes are warranted by the traffic demand analysis, but dual left-turn lanes will be provided for consistency with the 2006 DCR and to provide for future capacity needs.

Both off-ramps will have a right-turn lane, and dual left-turn lanes.

Figure 28 in Section 3.2.2 shows the preliminary geometric layout of the SPUI alternative.

2.4.2.3 Diverging Diamond Interchange

67th Avenue, in both directions, will have three through lanes, a right-turn lane, and a left-turn lane. Both of-ramps will have a right-turn lane, and a left-turn lane. Figure 29 in Section 3.2.3 shows the preliminary geometric layout of the DDI Alternative.

These three interchange types were analyzed using Synchro/SimTraffic version 11 software. The AM and PM peak-hour traffic volumes for the three alternatives are the same and are shown in Table 19.

Table 19: 67th Avenue TI Peak Hour Traffic Volumes

Intersection	Movement	AM Peak Hour Volume	PM Peak Hour Volume
67th Avenue and SR 303 Southbound	SBR	760	250
	SBT	540	680
	NBT	1040	400
	NBL	50	120
	WBR	360	490
	WBL	70	120
67th Avenue and SR 303 Northbound	NBR	200	260
	NBT	450	370
	SBT	350	600
	SBL	180	280
	EBR	130	80
	EBL	640	150

Table 20: 67th Avenue Diamond Interchange Synchro Results through Table 22 shows the results of the Synchro/SimTraffic Analysis.

(Continued on Page 26)

Table 20: 67th Avenue Diamond Interchange Synchro Results

Diamond Interchange - 67th Avenue and State Route 303 SB Ramp - Year 2040 Operations									
67th Avenue and State Route 303 SB Ramp - Year 2040 Operations	Storage Length (feet)	AM Peak Hour				PM Peak Hour			
		Delay (s/vehicle)	LOS	Max Queue Length (feet)	95th Queue Length (feet)	Delay (s/vehicle)	LOS	Max Queue Length (feet)	95th Queue Length (feet)
Westbound Left	500	22.8	C	97	78	17.3	B	158	121
Westbound Through	500	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Westbound Right	500	36.9	D	98	79	24.2	C	54	31
Westbound Approach	**500**	**34.6**	**C**	**N/A**	**N/A**	**22.8**	**C**	**N/A**	**N/A**
Northbound Left	360	50.5	D	49	44	36.0	D	91	78
Northbound Through	360	8.3	A	31	15	4.6	A	72	44
Northbound Right	360	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Approach	**360**	**10.2**	**B**	**N/A**	**N/A**	**11.8**	**B**	**N/A**	**N/A**
Southbound Left	325	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Through	325	10.7	B	75	92	11.7	B	240	211
Southbound Right	325	15.3	B	175	169	11.2	B	74	69
Southbound Approach	**325**	**13.4**	**B**	**N/A**	**N/A**	**11.6**	**B**	**N/A**	**N/A**
Entire Intersection	**N/A**	**15.4**	**B**	**N/A**	**N/A**	**15.0**	**B**	**N/A**	**N/A**
Diamond Interchange - 67th Avenue and State Route 303 NB Ramp - Year 2040 Operations									
67th Avenue and State Route 303 NB Ramp - Year 2040 Operations	**Storage Length (feet)**	**AM Peak Hour**				**PM Peak Hour**			
		Delay (s/vehicle)	**LOS**	**Max Queue Length (feet)**	**95th Queue Length (feet)**	**Delay (s/vehicle)**	**LOS**	**Max Queue Length (feet)**	**95th Queue Length (feet)**
Eastbound Left	450	29.9	C	232	213	24.6	C	113	103
Eastbound Through	450	29.9	C	222	176	24.6	C	30	34
Eastbound Right	450	20.1	C	N/A	N/A	22.4	C	N/A	N/A
Eastbound Approach	**450**	**28.3**	**C**	**N/A**	**N/A**	**23.9**	**C**	**N/A**	**N/A**
Northbound Left	325	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Through	325	26.2	C	202	184	14.5	B	102	96
Northbound Right	325	24.7	C	92	71	14.5	B	110	83
Northbound Approach	**325**	**25.7**	**C**	**N/A**	**N/A**	**14.5**	**B**	**N/A**	**N/A**
Southbound Left	360	19.8	B	115	95	13.7	B	116	105
Southbound Through	360	0.7	A	113	91	0.2	A	97	66
Southbound Right	360	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Approach	**360**	**7.2**	**A**	**N/A**	**N/A**	**4.5**	**A**	**N/A**	**N/A**
Entire Intersection	**N/A**	**21.7**	**C**	**N/A**	**N/A**	**10.7**	**B**	**N/A**	**N/A**

Table 21: 67th Avenue Single-Point Urban Interchange Synchro Results

Single-Point Urban Interchange - 67th Avenue and State Route 303 Ramps - Year 2040 Operations									
67th Avenue and State Route 303 Ramps - Year 2040 Operations	Storage Length (feet)	AM Peak Hour				PM Peak Hour			
		Delay (s/vehicle)	LOS	Max Queue Length (feet)	95th Queue Length (feet)	Delay (s/vehicle)	LOS	Max Queue Length (feet)	95th Queue Length (feet)
Eastbound Left	550	33.4	C	228	197	35.7	D	96	88
Eastbound Through	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Eastbound Right	500	34.4	C	N/A	N/A	38.6	D	N/A	N/A
Eastbound Approach	**N/A**	**34.4**	**C**	**N/A**	**N/A**	**38.6**	**D**	**N/A**	**N/A**
Westbound Left	580	24.3	C	53	46	35.2	D	122	79
Westbound Through	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Westbound Right	500	25.8	C	N/A	N/A	36.2	D	N/A	N/A
Westbound Approach	**N/A**	**25.8**	**C**	**N/A**	**N/A**	**36.2**	**D**	**N/A**	**N/A**
Northbound Left	330	34.5	C	74	70	41.3	D	96	78
Northbound Through	N/A	22.0	C	161	129	15.0	B	97	81
Northbound Right	300	0.2	A	N/A	N/A	0.3	A	N/A	N/A
Northbound Approach	**N/A**	**16.7**	**B**	**N/A**	**N/A**	**14.1**	**B**	**N/A**	**N/A**
Southbound Left	330	38.3	D	99	89	38.1	D	201	147
Southbound Through	N/A	23.8	C	183	141	12.5	B	158	126
Southbound Right	300	1.3	A	N/A		0.2	A	N/A	N/A
Southbound Approach	**N/A**	**14.0**	**B**	**N/A**	**N/A**	**15.9**	**B**	**N/A**	**N/A**
Entire Intersection	**N/A**	**20.5**	**C**	**N/A**	**N/A**	**21.5**	**C**	**N/A**	**N/A**

Table 22: 67th Avenue Diverging Diamond Interchange Synchro Results

Diverging Diamond Interchange - 67th Avenue and State Route 303 SB Ramp - Year 2040 Operations									
67th Avenue and State Route 303 SB Ramp - Year 2040 Operations	Storage Length (feet)	AM Peak Hour				PM Peak Hour			
		Delay (s/vehicle)	LOS	Max Queue Length (feet)	95th Queue Length (feet)	Delay (s/vehicle)	LOS	Max Queue Length (feet)	95th Queue Length (feet)
Westbound Left	500	17.6	B	104	88	14.0	B	105	108
Westbound Through	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Westbound Right	500	N/A	N/A	259	218	N/A	N/A	168	149
Westbound Approach	**500**	**17.6**	**B**	**N/A**	**N/A**	**14.0**	**B**	**N/A**	**N/A**
Northbound Left	320	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Through	320	20.3	C	315	305	8.1	A	124	102
Northbound Right	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Approach	**360**	**20.3**	**C**	**N/A**	**N/A**	**8.1**	**A**	**N/A**	**N/A**
Southbound Left	320	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Through	320	11.9	B	351	224	16.3	B	292	262
Southbound Right	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Approach	**325**	**11.9**	**B**	**N/A**	**N/A**	**16.3**	**B**	**N/A**	**N/A**
Entire Intersection	**N/A**	**17.4**	**B**	**N/A**	**N/A**	**11.0**	**B**	**N/A**	**N/A**
Diverging Diamond Interchange - 67th Avenue and State Route 303 NB Ramp - Year 2040 Operations									
67th Avenue and State Route 303 NB Ramp - Year 2040 Operations	**Storage Length (feet)**	**AM Peak Hour**				**PM Peak Hour**			
		Delay (s/vehicle)	**LOS**	**Max Queue Length (feet)**	**95th Queue Length (feet)**	**Delay (s/vehicle)**	**LOS**	**Max Queue Length (feet)**	**95th Queue Length (feet)**
Eastbound Left	500	18.0	B	518	412	14.5	B	194	142
Eastbound Through	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Eastbound Right	500	N/A	N/A	72	59	N/A	N/A	74	75
Eastbound Approach	**450**	**18.0**	**B**	**N/A**	**N/A**	**14.5**	**B**	**N/A**	**N/A**
Northbound Left	320	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Through	320	19.3	B	236	200	14.7	B	223	198
Northbound Right	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Northbound Approach	**325**	**19.3**	**B**	**N/A**	**N/A**	**14.7**	**B**	**N/A**	**N/A**
Southbound Left	320	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Through	320	5.8	A	108	88	8.2	A	142	133
Southbound Right	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Southbound Approach	**360**	**5.8**	**A**	**N/A**	**N/A**	**8.2**	**A**	**N/A**	**N/A**
Entire Intersection	**N/A**	**15.4**	**B**	**N/A**	**N/A**	**11.2**	**B**	**N/A**	**N/A**

2.4.3 2040 No-Build Conditions Traffic Operations

The traffic operations analysis for the 2040 no-build conditions is based on the existing roadway network plus the interchanges at SR 303L / 51st Avenue and SR 303L / 43rd Avenue and the future 2040 no-build traffic volumes as described in the previous sections. The no-build roadway network and no-build traffic volumes are shown in Figure 15 through Figure 17 and Figure 18 through Figure 20. Figures 15 through Figure 20 also depict the operations of the freeway segments, merge/diverge areas, weaving areas (if any) and the ramp segments and the intersection LOS within the study area.

Table 23 depicts the approach LOS for the signalized and unsignalized intersections within the study area for 2040 No-Build condition.

(Continued on Page 30)

Figure 15. 2040 AM No-Build LOS, Volumes and Lane Configuration (Sheet 1 of 3)

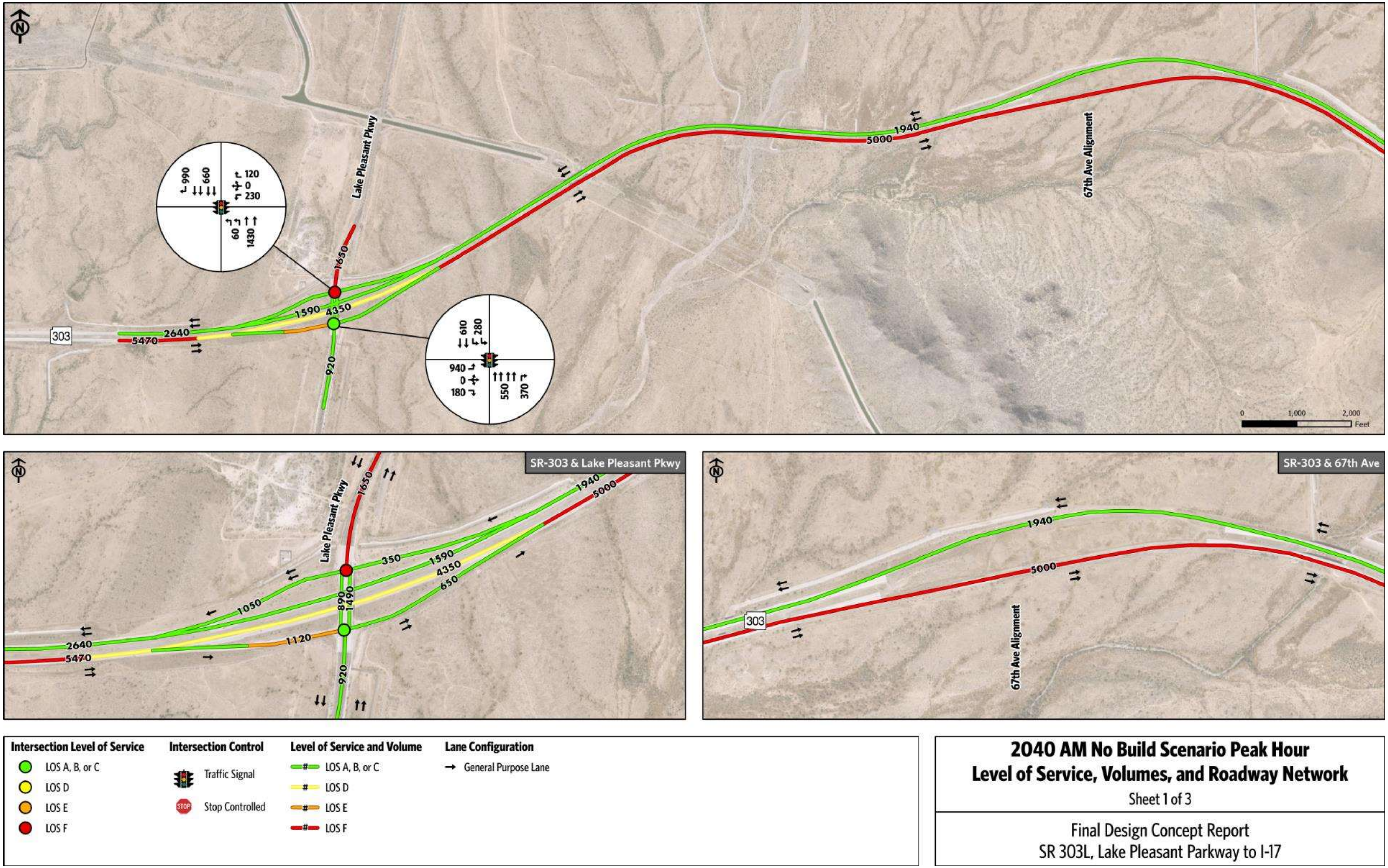


Figure 16. 2040 AM No-Build LOS, Volumes and Lane Configuration (Sheet 2 of 3)

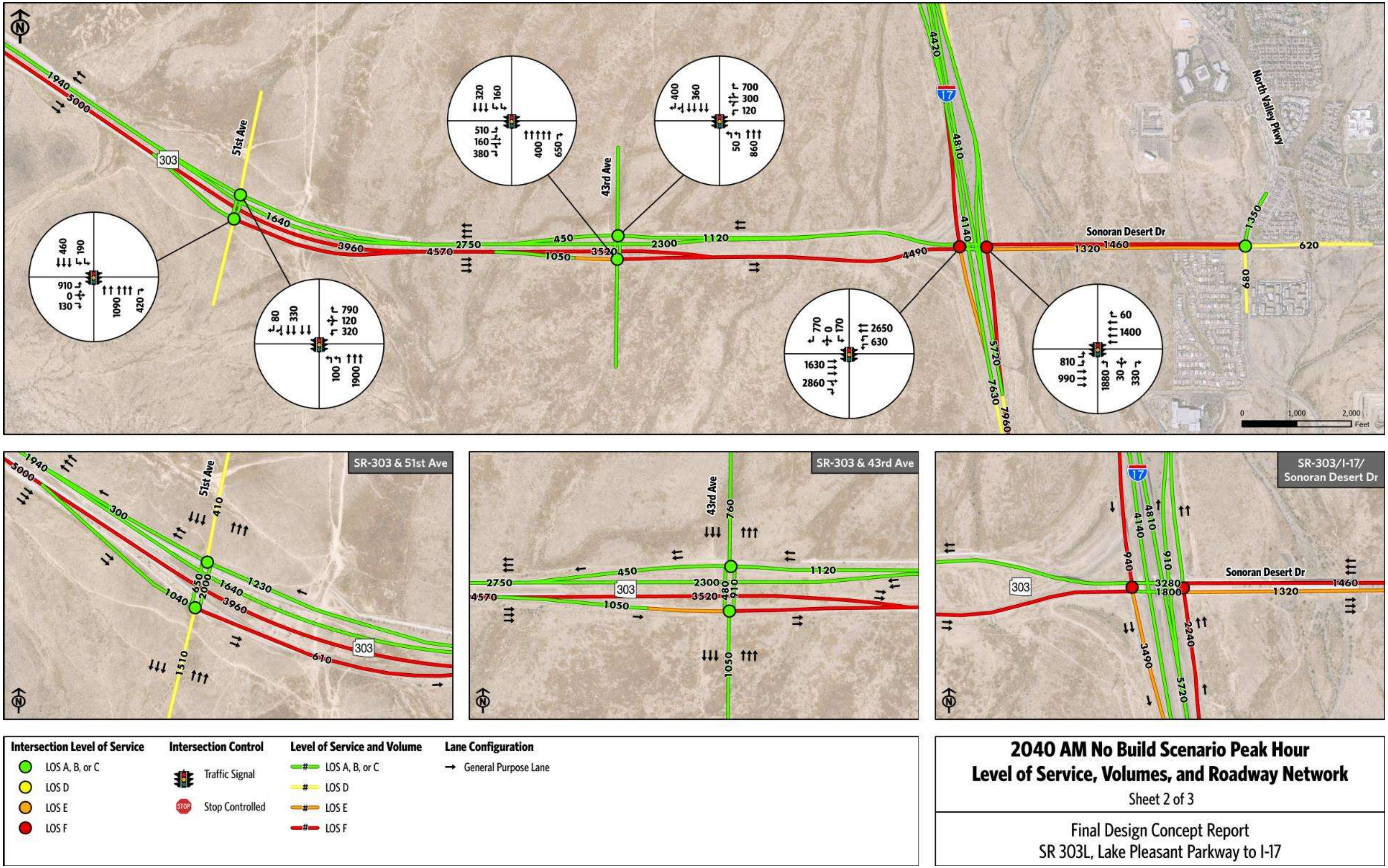


Figure 17. 2040 AM No-Build LOS, Volumes and Lane Configuration (Sheet 3 of 3)

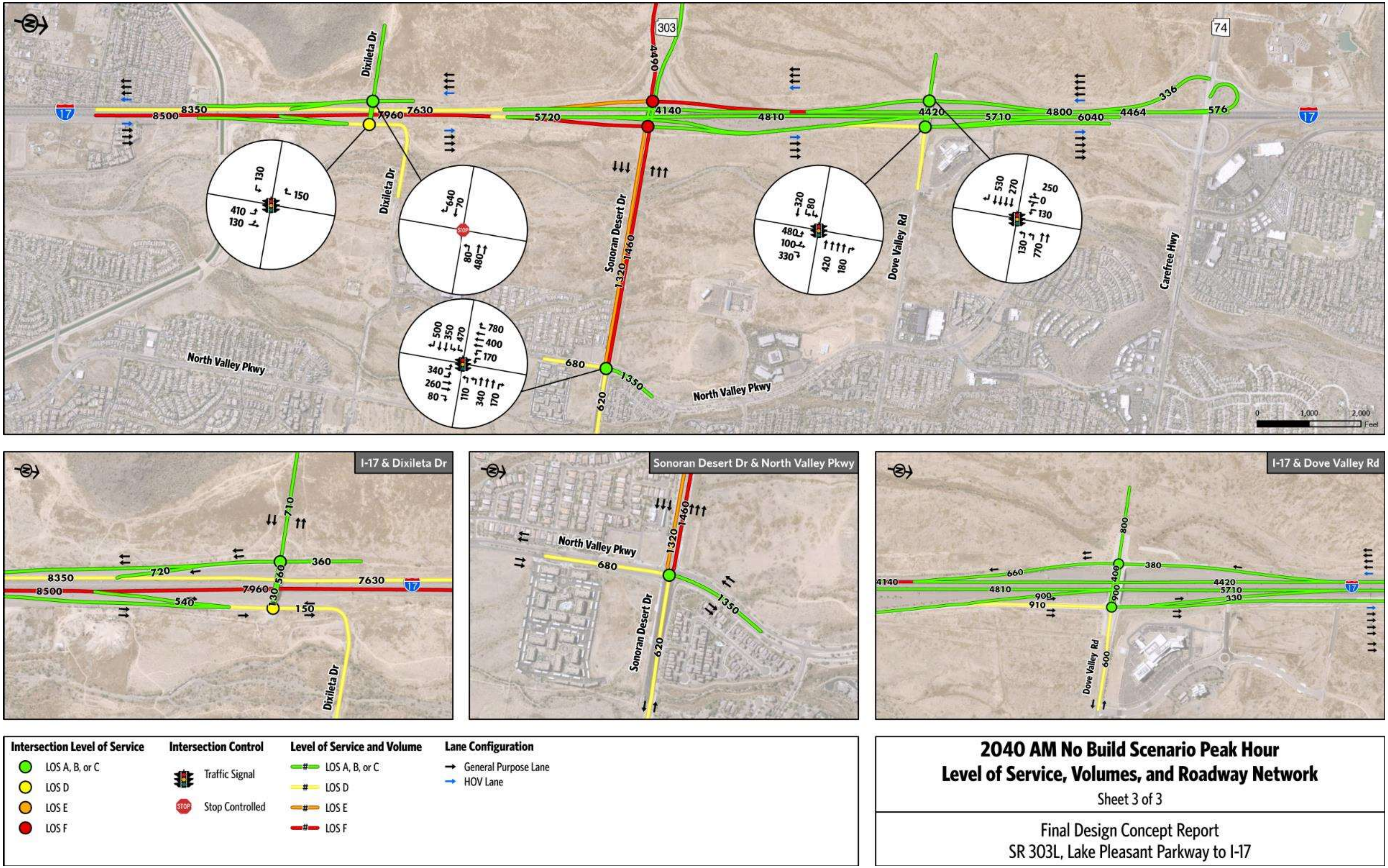


Figure 18. 2040 PM No-Build LOS, Volumes and Lane Configuration (Sheet 1 of 3)

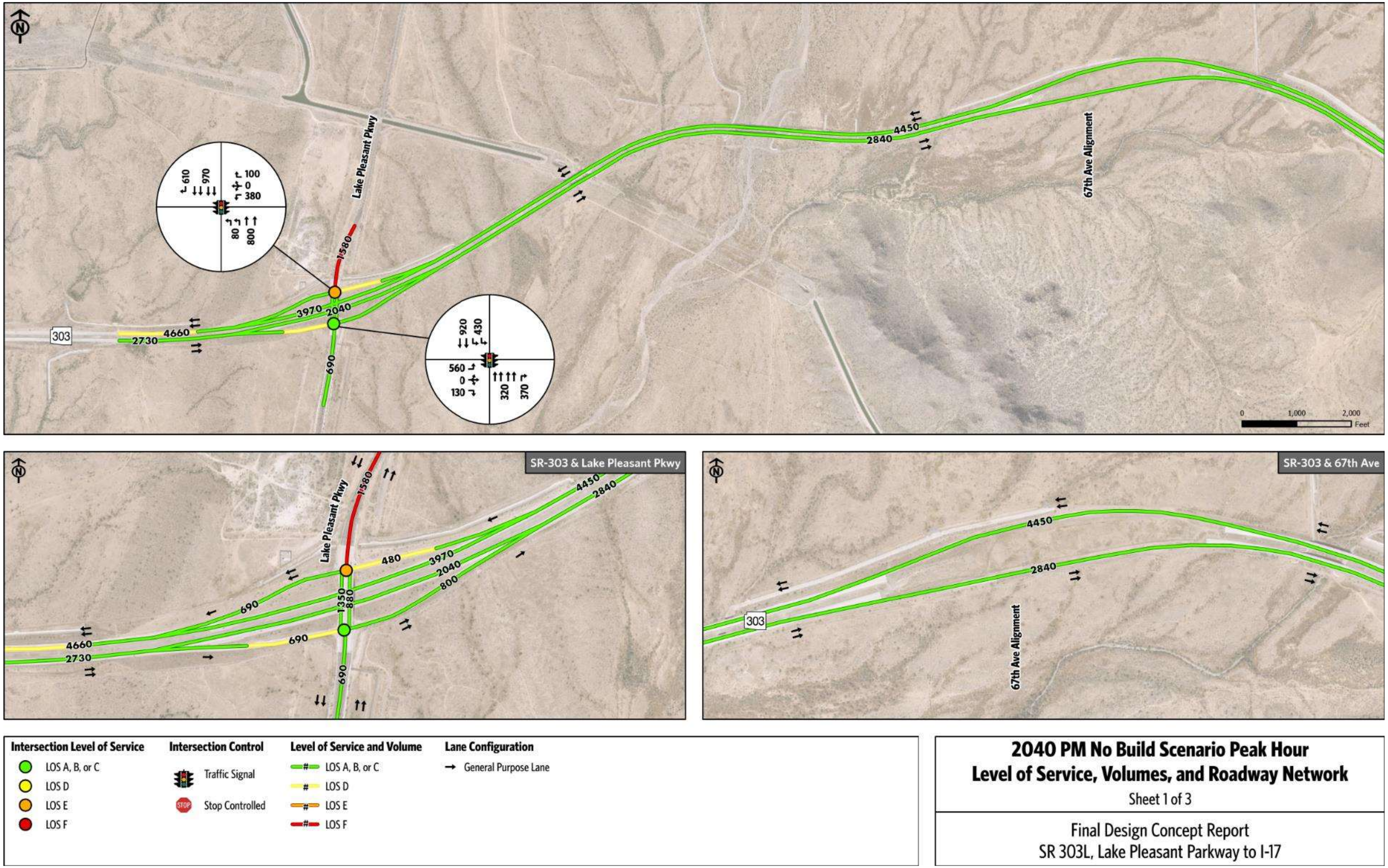


Figure 19. 2040 PM No-Build LOS, Volumes and Lane Configuration (Sheet 2 of 3)

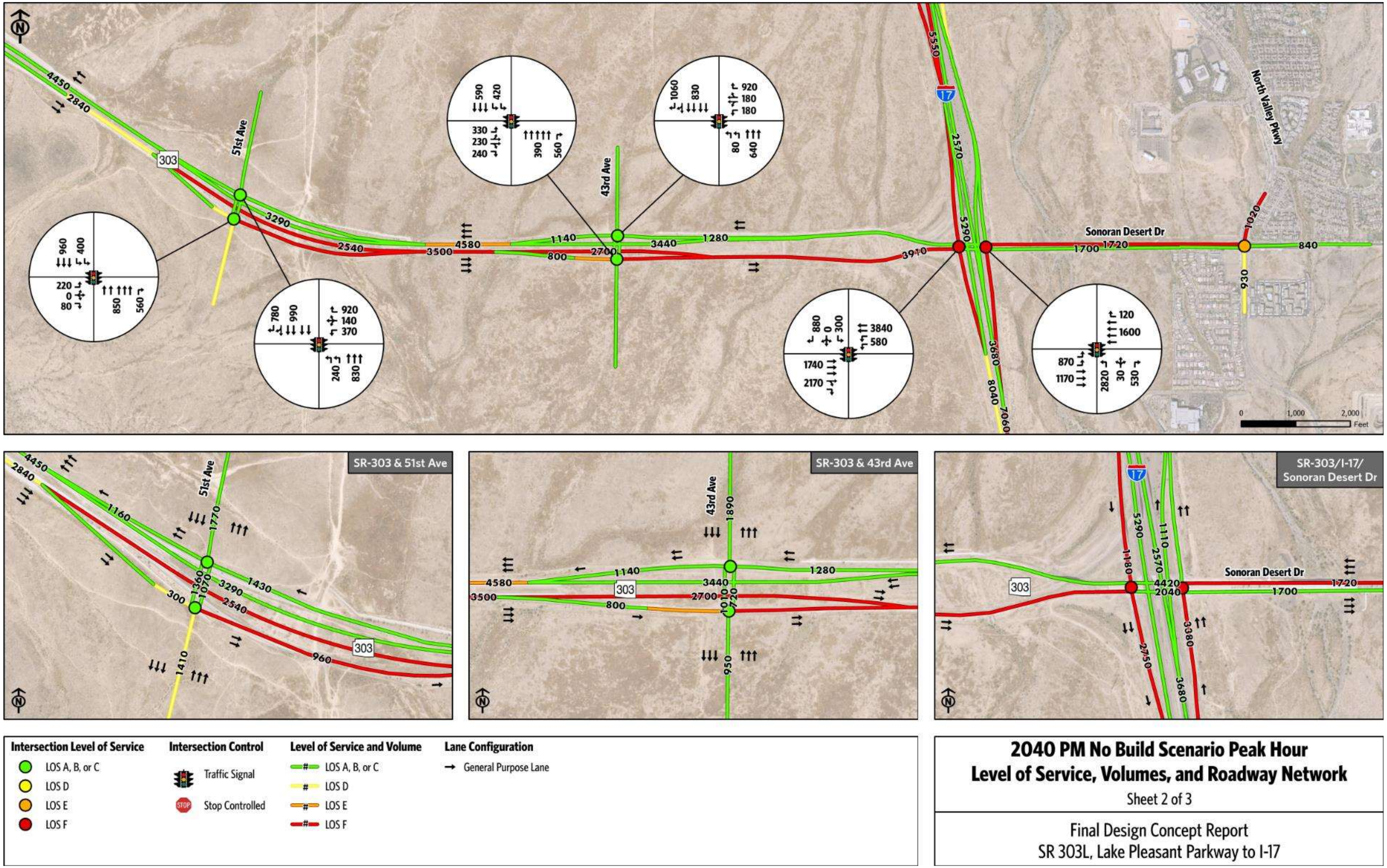


Figure 20. 2040 PM No-Build LOS, Volumes and Lane Configuration (Sheet 3 of 3)

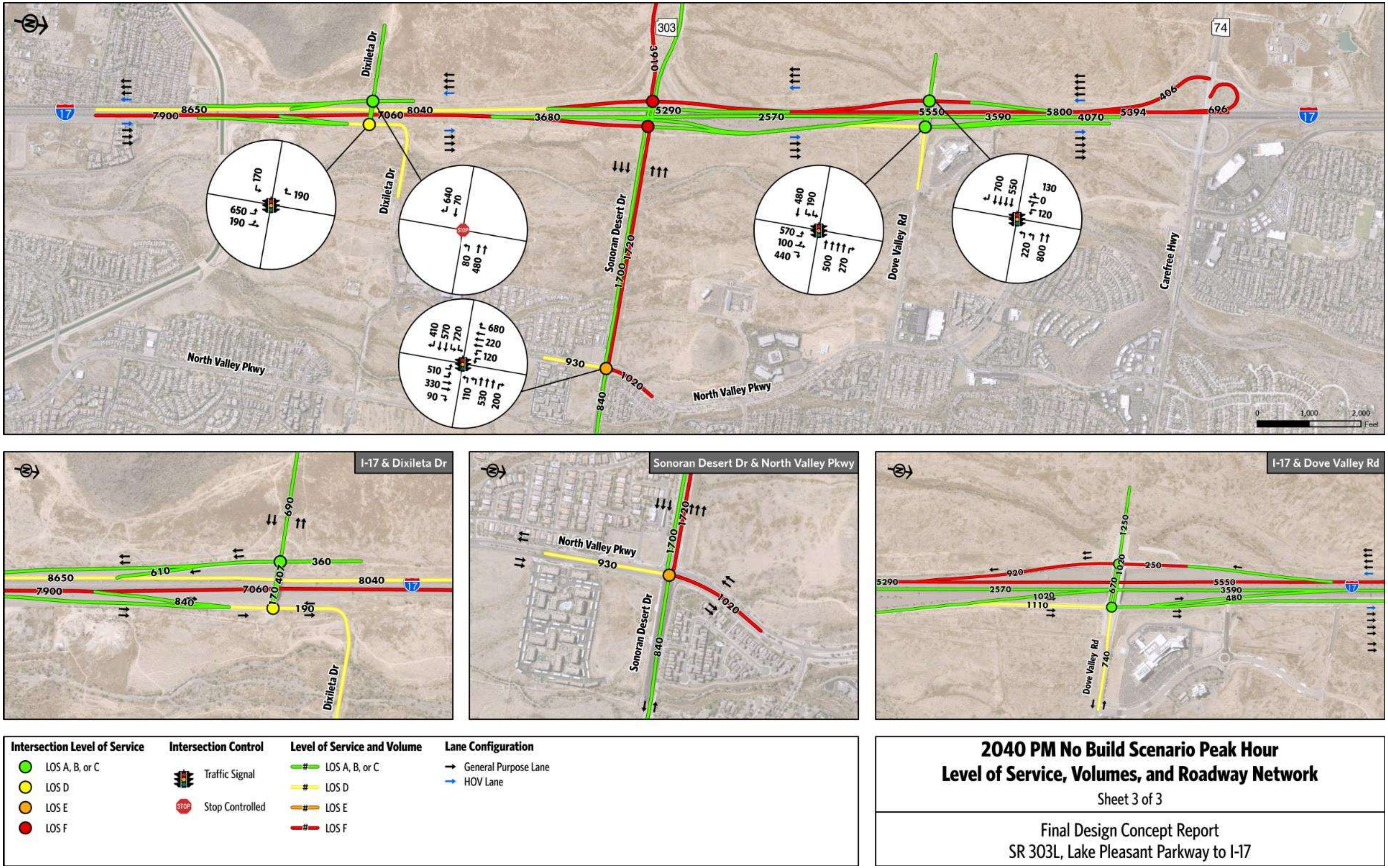


Table 23: 2040 No-Build Peak Hours LOS for Signalized and Unsignalized Intersections

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		Approach Delay	Approach LOS	Intersection Delay	Intersection LOS	Approach Delay	Approach LOS	Intersection Delay	Intersection LOS
I-17 SBFR and SR 303/Sonoran Desert Dr	SB	116.6	F	94.7	F	273.6	F	111.0	F
	WB	1.4	A			1.4	A		
	NB	-	-			-	-		
	EB	182.2	F			166.9	F		
I-17 NBFR and SR 303/Sonoran Desert Dr	SB	-	-	140.1	F	-	-	125.1	F
	WB	36.0	D			127.4	F		
	NB	482.4	F			255.4	F		
	EB	1.0	A			1.0	A		
SR 303 SBFR and Lake Pleasant Pkwy	SB	186.8	F	80.5	F	93.6	F	57.9	E
	WB	32.1	C			45.1	D		
	NB	2.7	A			0.8	A		
	EB	-	-			-	-		
SR 303 NBFR and Lake Pleasant Pkwy	SB	1.5	A	33.9	C	2.5	A	18.1	B
	WB	-	-			-	-		
	NB	16.2	B			16.5	B		
	EB	80.7	F			46.6	D		
Sonoran Desert Dr and North Valley Pkwy	SB	30.0	C	34.0	C	119.5	F	61.4	E
	WB	36.2	D			29.4	C		
	NB	36.7	D			52.8	D		
	EB	37.2	D			35.1	D		
I-17 SBFR and Dove Valley Rd	SB	22.8	C	10.1	B	96.6	F	21.8	C
	WB	1.5	A			1.8	A		
	NB	-	-			-	-		
	EB	10.7	B			22.7	C		
I-17 NBFR and Dove Valley Rd	SB	-	-	28.4	C	-	-	25.9	C
	WB	40.9	D			40.4	D		
	NB	38.9	D			38.2	D		
	EB	1.1	A			1.3	A		
SR 303 NBFR and 51st St	SB	0.9	A	29.4	C	2.8	A	23.4	C
	WB	-	-			-	-		

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		Approach Delay	Approach LOS	Intersection Delay	Intersection LOS	Approach Delay	Approach LOS	Intersection Delay	Intersection LOS
	NB	42.2	D			39.6	D		
	EB	22.2	C			40.1	D		
SR 303 SBFR and 51st St	SB	42.0	D	15.2	B	30.1	C	20.9	C
	WB	23.2	C			23.1	C		
	NB	3.8	A			2.5	A		
	EB	-	-			-	-		
SR 303 NBFR and 43rd St	SB	0.9	A	16.7	B	1.2	A	27.6	C
	WB	-	-			-	-		
	NB	17.8	B			23.4	C		
	EB	26.5	C			68.2	E		
SR 303 SBFR and 43rd St	SB	31.3	C	19.0	B	33.3	C	23.8	C
	WB	21.1	C			18.0	B		
	NB	3.4	A			3.7	A		
	EB	-	-			-	-		
I-17 NBFR and Dixileta Dr/FR Rd	SB	48.9	D	40.9	D	45.7	D	33.3	C
	WB	-	-			-	-		
	NB	49.0	D			44.4	D		
	EB	1.6	A			1.9	A		

As shown in Table 23, the no-build LOS for all the study intersections is ‘D’ or better during both the AM and PM peak hours, except for the following intersections:

- I-17 Southbound Ramps and Sonoran Desert Drive intersection (AM/PM peak hours)
- I-17 Northbound Ramps and Sonoran Desert Drive intersection (AM/PM peak hours)
- SR 303L Southbound Ramps and Lake Pleasant Parkway intersection (AM/PM peak hours)
- Sonoran Desert Drive and North Valley Parkway intersection (PM peak hour)

Figures 15 through 20 indicate the SR 303L and Sonoran Desert Drive TI intersection experience significant turning movement volumes resulting in traffic excessive slowdowns and queueing for miles during the peak hours. This results in poor operational conditions along many freeway segments along I-17 and SR 303 L in the project area. The poor operational condition along the freeways results in low throughput during the peak hours; the observed throughput is as low as 70% of the forecasted travel demand. This may result in some segments of the freeway corridor and some study intersections operating at an LOS ‘C’ or better during the peak hours in the no-build conditions. This is misleading as the total volumes processed by the simulation model during the analysis peak hour is much less than the forecasted demand, and hence the better LOS.

The adverse operational performance of SR 303L and I-17 during the peak hours clearly shows the need for this project. A sensitivity analysis (see Section 4.7 of the Traffic Report) was conducted to evaluate the performance of the I-17 and Sonoran Desert Drive service interchange. This analysis showed that the I-17 NW ramps and ES ramps are required as early as year 2030 to provide a facility with acceptable LOS and delays. Otherwise, capacity and signal timing/phasings improvements would be required by the year 2030 to obtain an acceptable LOS at this location. The analysis indicates that the temporary ramps east of 43rd Avenue will operate at an acceptable LOS until the year 2030. Beyond 2030 the temporary ramps will not perform at an acceptable LOS without the implementation of the system interchange.

2.4.4 2040 Build Conditions Traffic Operations

The traffic operations analysis for the 2040 build conditions is based on the proposed roadway network for the build alternative and the future 2040 build traffic volumes as described in the previous sections. The roadway network and traffic volumes for the build alternative are shown in Figures 21 to 23: 2040 AM Build LOS, Volumes and Lane Configuration and Figures 24 to Figure 26. Figure 21 to Figure 26 also depict the operations of the freeway segments, merge/diverge areas, weaving areas (if any) and the ramp segments and the intersection LOS within the study area. Table 24 depicts the approach LOS for the signalized and unsignalized intersections within the study area for 2040 build conditions.

Figure 21. 2040 AM Build LOS, Volumes and Lane Configuration (Sheet 1 of 3)

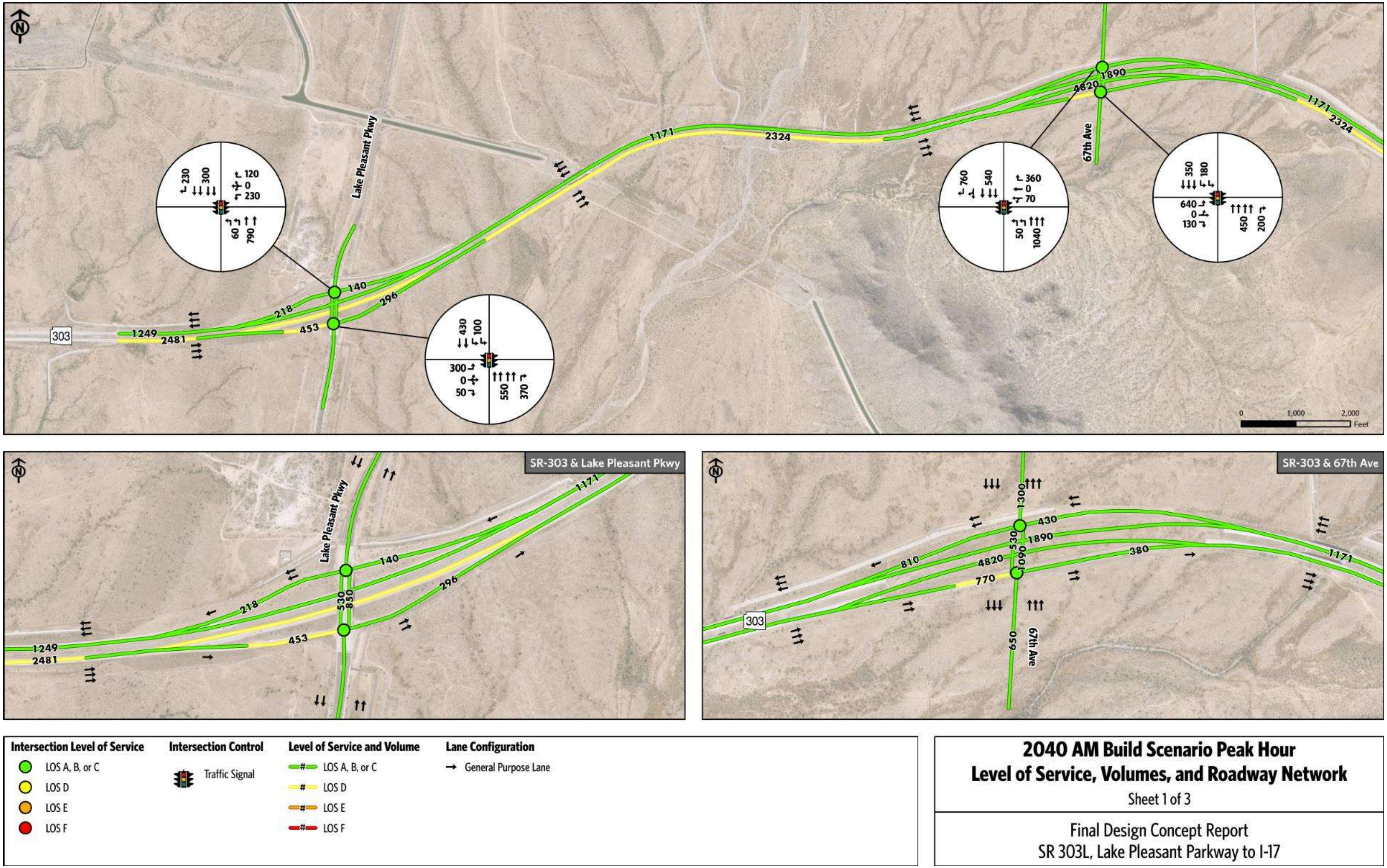


Figure 22. 2040 AM Build LOS, Volumes and Lane Configuration (Sheet 2 of 3)

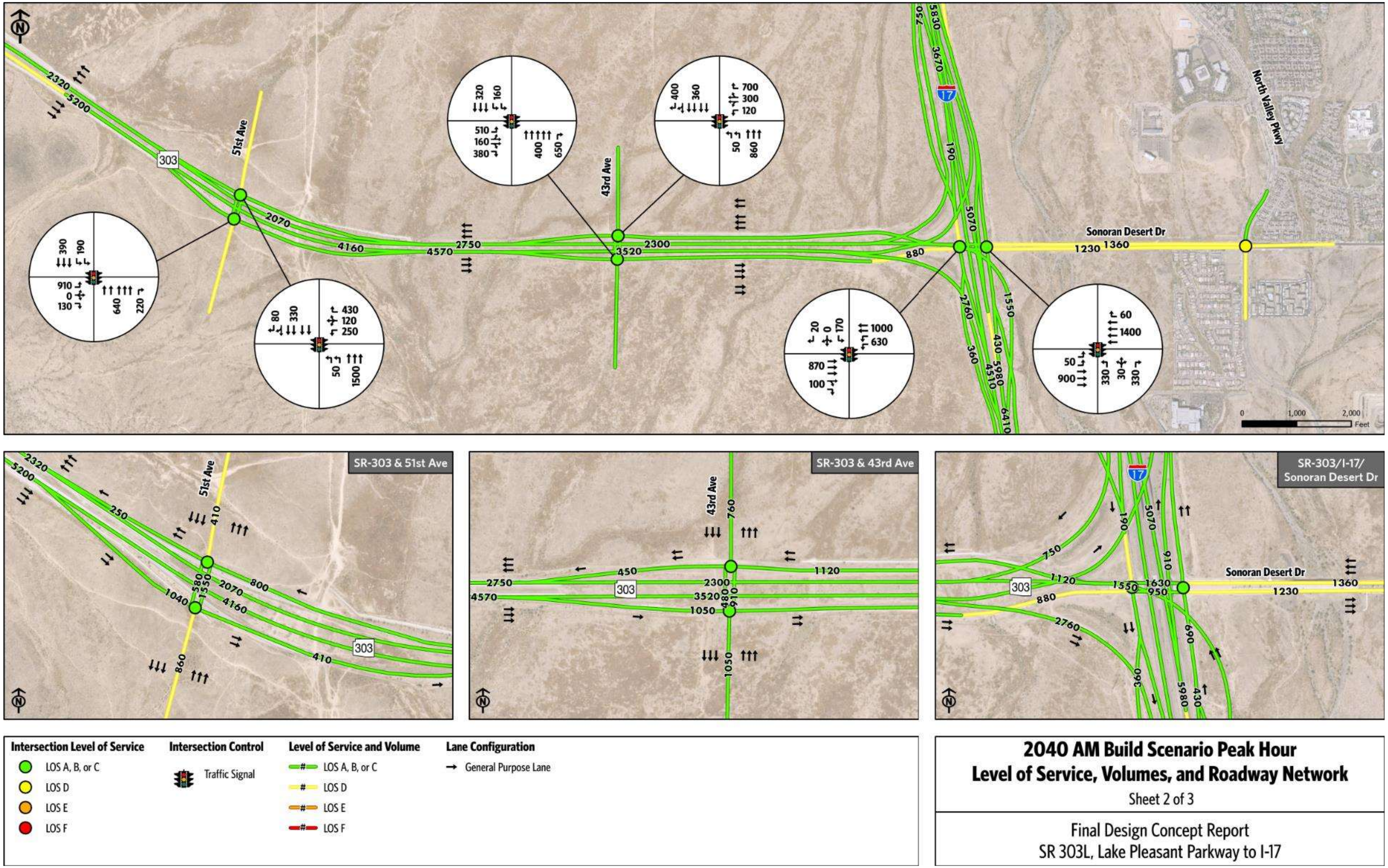


Figure 23. 2040 AM Build LOS, Volumes and Lane Configuration (Sheet 3 of 3)

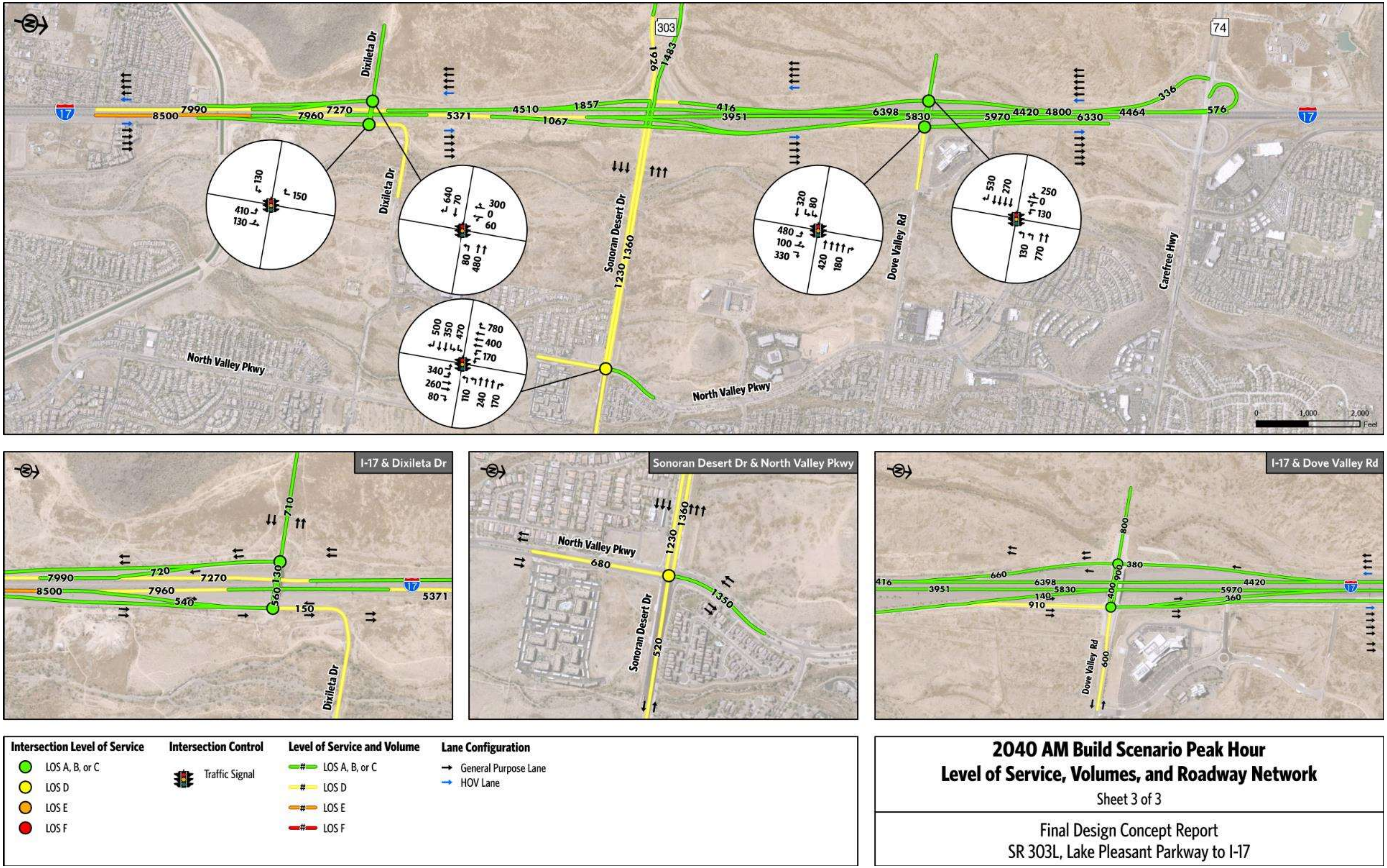


Figure 24. 2040 PM Build LOS, Volumes and Lane Configuration (Sheet 1 of 3)

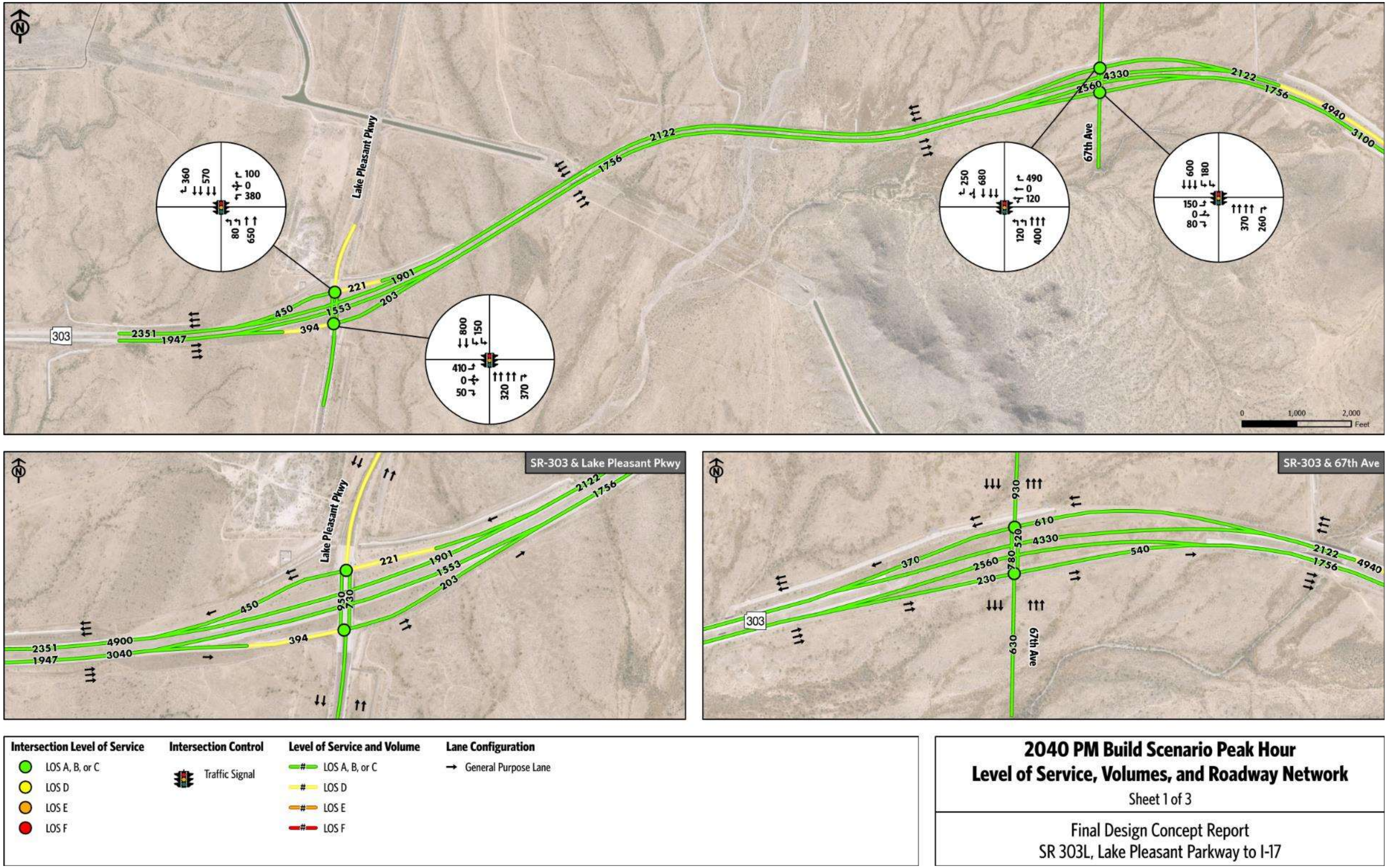


Figure 25. 2040 PM Build LOS, Volumes and Lane Configuration (Sheet 2 of 3)

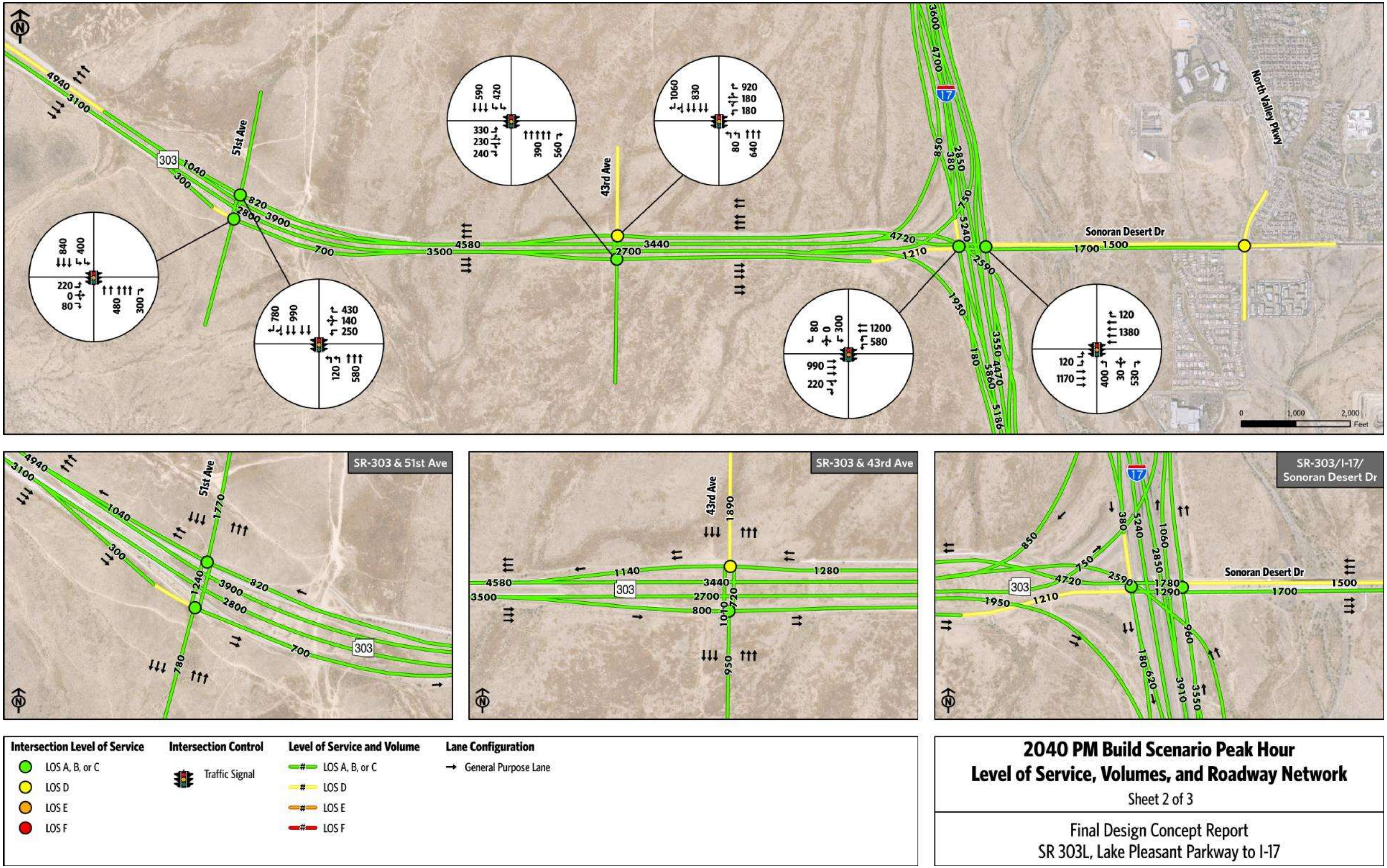


Figure 26. 2040 PM Build LOS, Volumes and Lane Configuration (Sheet 3 of 3)

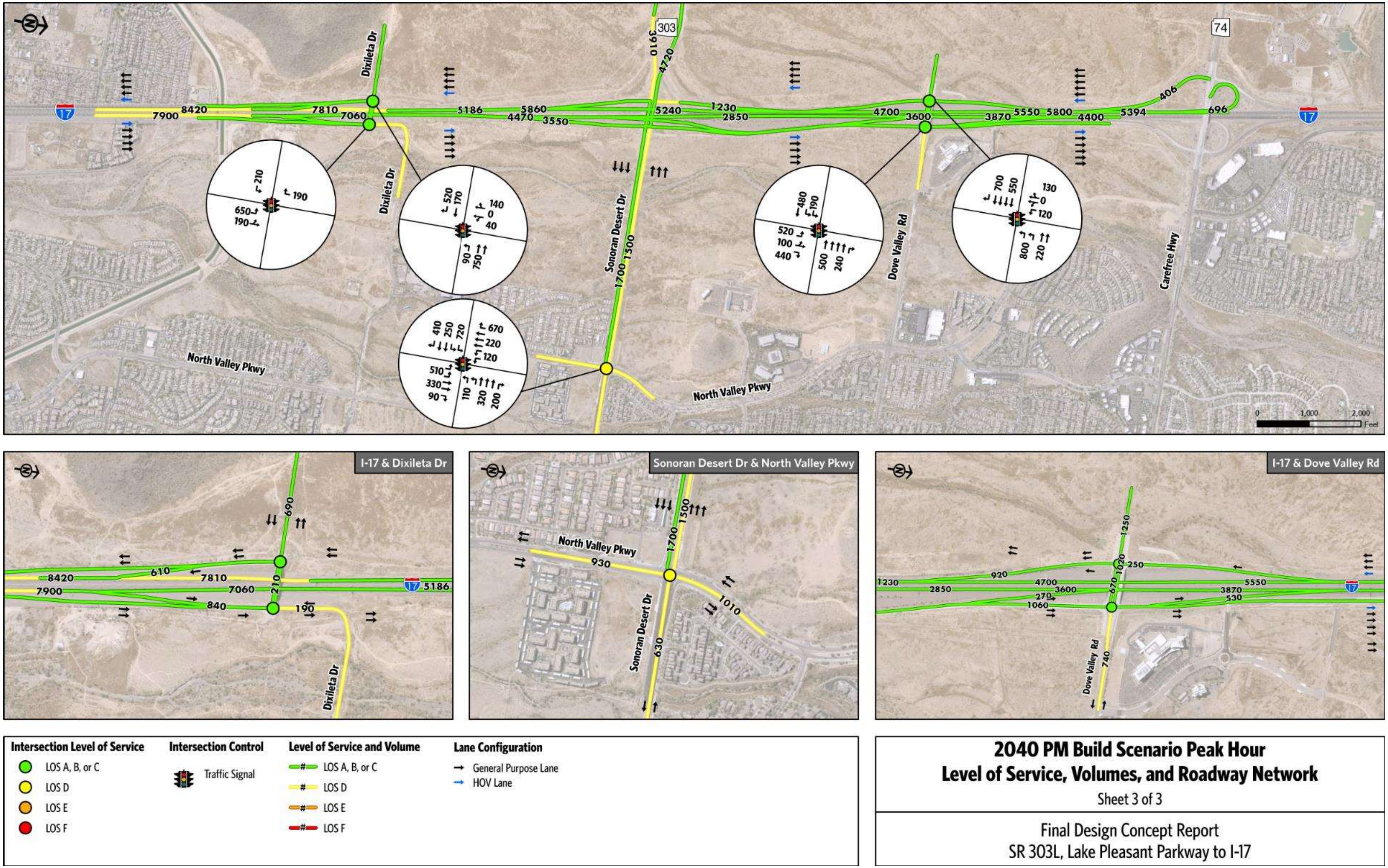


Table 24: 2040 Build Peak Hours LOS for Signalized and Unsignalized Intersections

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		Approach Delay	Approach LOS	Intersection Delay	Intersection LOS	Approach Delay	Approach LOS	Intersection Delay	Intersection LOS
I-17 SBFR and SR 303/Sonoran Desert Dr	SB	51.9	D	19.0	B	54.8	D	21.4	C
	WB	1.3	A			1.2	A		
	NB	-	-			-	-		
	EB	44.0	D			40.9	D		
I-17 NBFR and SR 303/Sonoran Desert Dr	SB	-	-	23.0	C	-	-	23.9	C
	WB	35.2	D			37.5	D		
	NB	30.8	C			33.3	C		
	EB	1.0	A			1.0	A		
SR 303 SBFR and Lake Pleasant Pkwy	SB	33.7	C	17.9	B	41.8	D	28.6	C
	WB	33.4	C			45.6	D		
	NB	1.6	A			1.0	A		
	EB	-	-			-	-		
SR 303 NBFR and Lake Pleasant Pkwy	SB	1.2	A	17.9	B	1.7	A	16.2	B
	WB	-	-			-	-		
	NB	16.3	B			16.1	B		
	EB	47.7	D			46.2	D		
Sonoran Desert Dr and North Valley Pkwy	SB	27.2	C	36.9	D	40.6	D	40.5	D
	WB	41.7	D			37.2	D		
	NB	36.9	D			53.4	D		
	EB	44.5	D			34.6	C		
I-17 SBFR and Dove Valley Rd	SB	23.1	C	9.9	A	32.5	C	11.9	B
	WB	1.7	A			1.7	A		
	NB	-	-			-	-		
	EB	13.3	B			16.6	B		
I-17 NBFR and Dove Valley Rd	SB	-	-	30.4	C	-	-	27.4	C
	WB	42.2	D			40.3	D		
	NB	35.3	D			34.4	C		
	EB	1.6	A			2.0	A		
SR 303 NBFR and 67th St	SB	16.3	B	28.0	C	18.1	B	17.7	B
	WB	-	-			-	-		

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		Approach Delay	Approach LOS	Intersection Delay	Intersection LOS	Approach Delay	Approach LOS	Intersection Delay	Intersection LOS
	NB	13.4	B			13.3	B		
	EB	49.6	D			28.0	C		
SR 303 SBFR and 67th St	SB	5.8	A	5.4	A	2.2	A	4.6	A
	WB	10.4	B			10.7	B		
	NB	2.9	A			1.8	A		
	EB	-	-			-	-		
SR 303 NBFR and 51st St	SB	0.8	A	23.2	C	1.0	A	13.6	B
	WB	-	-			-	-		
	NB	35.8	D			24.3	C		
	EB	25.0	C			38.4	D		
SR 303 SBFR and 51st St	SB	42.5	D	14.6	B	29.9	C	22.3	C
	WB	24.0	C			23.0	C		
	NB	2.2	A			1.8	A		
	EB	-	-			-	-		
SR 303 NBFR and 43rd St	SB	0.9	A	15.9	B	1.1	A	14.9	B
	WB	-	-			-	-		
	NB	21.9	C			25.9	C		
	EB	16.5	B			19.0	B		
SR 303 SBFR and 43rd St	SB	31.2	C	21.9	C	35.2	D	27.8	C
	WB	29.1	C			30.3	C		
	NB	5.6	A			3.8	A		
	EB	-	-			-	-		
I-17 SBFR and Dixileta Dr/FR Rd	SB	21.0	C	17.1	B	16.4	B	12.5	B
	WB	0.4	A			0.4	A		
	NB	-	-			-	-		
	EB	28.1	C			26.2	C		
I-17 NBFR and Dixileta Dr/FR Rd	SB	48.0	D	34.4	C	44.8	D	29.9	C
	WB	-	-			-	-		
	NB	34.8	C			30.6	C		
	EB	17.8	B			13.7	B		

As shown in Table 24, the build LOS for all the study intersections is 'D' or better during both the AM and PM peak hours, including the approaches for all the study intersections.

It should be noted that the operations analysis assumes the roadway configuration for I-17 to have a "4+1" scenario with four general purpose lanes and one HOV lane in both NB and SB directions (minus any added exit or auxiliary lanes) between SR 303L system interchange ramps and the I-17/Dixileta Drive TI. The current roadway configuration for I-17 is "3+1" scenario with three general purpose lanes and one HOV lane. ADOT currently does not have a project in the current RTP to upgrade the number of general-purpose lanes on I-17 in this project's vicinity. It is assumed that the "4+1" is the ultimate footprint for I-17 at or beyond year 2040, and the Vissim model has included this assumption in the build analysis to evaluate the operations of this system interchange at I-17 and SR 303L.

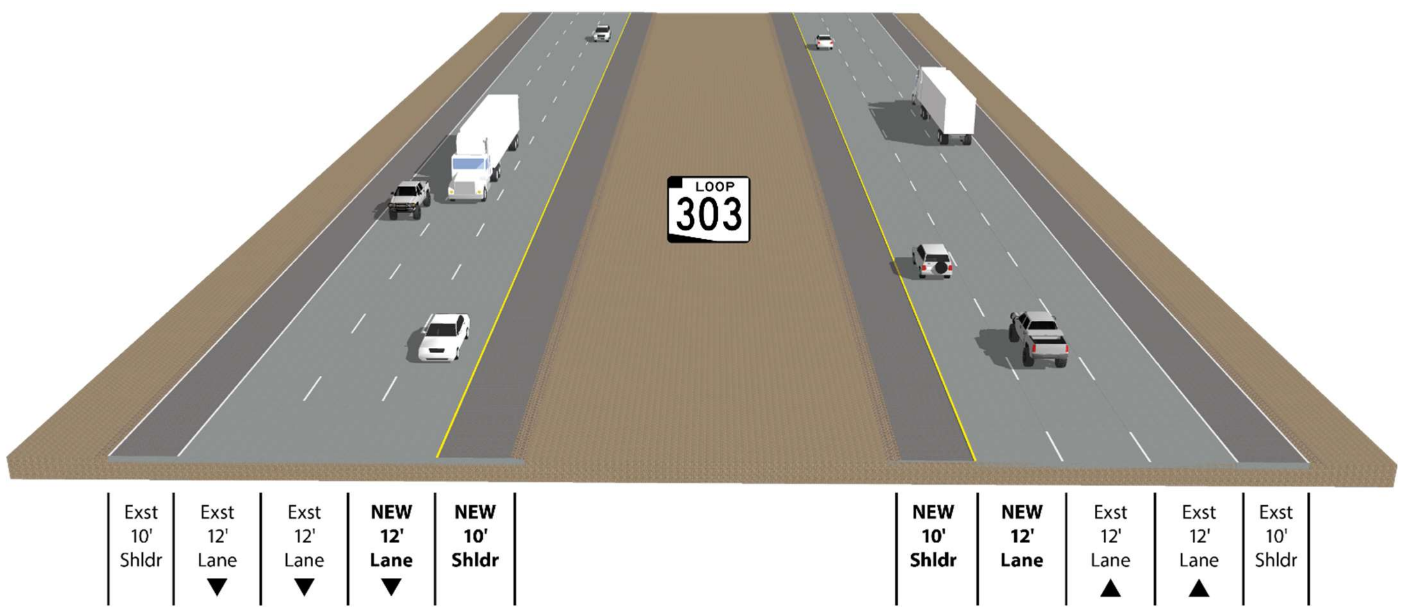
A future study is needed to analyze traffic operations along I-17 in both directions from Carefree Highway to Happy Valley Road to ascertain the ultimate footprint of the I-17 corridor.

3.0 DESIGN CONCEPT ALTERNATIVES

3.1 Introduction

For SR 303L mainline, the only alternative considered includes providing one additional general-purpose lane in each direction of travel. This would be achieved by converting the existing 12-foot inside PCCP shoulder into a third general-purpose lane, adding four feet asphaltic concrete and six feet of aggregate base course to complete a 10-foot inside shoulder. This is consistent with the adjacent project between Happy Valley Parkway and Lake Pleasant Parkway which is currently using the same typical section to widen from two to three general-purpose lanes in each direction of travel. This concept provides the needed additional general-purpose lane capacity. In the future when the ultimate fourth general-purpose lane and HOV lane are added, the asphalt section would be removed, and the new lanes would be constructed using PCCP and concrete median barrier.

Figure 27. SR 303L Typical Section



3.2 67th Avenue TI Design Concept Alternatives Studied in Detail

Three alternatives for interchange types were considered for the TI at 67th Avenue: a diamond TI, a single-point urban interchange (SPUI) and a diverging diamond interchange (DDI). These alternatives were screened based on qualitative and quantitative screening criteria and performance measures.

SR 303L currently has two general purpose lanes in each direction. At 67th Avenue, the existing mainline was constructed along the future ramp alignments. Depending on the type of traffic interchange (TI) selected, most or all of the existing Portland cement concrete pavement (PCCP) will be reused to construct the entrance and exit ramps at 67th Avenue. The proposed configuration for SR 303L is three general purpose lanes and an auxiliary lane in each direction of travel with 12-foot outside shoulders. A future project will add a fourth general-purpose lane and an HOV lane toward the median in each direction of travel.

The proposed configuration for 67th Avenue is a major arterial with three travel lanes, a bike lane, and a sidewalk in each direction of travel. The 67th Avenue width and lane configuration is consistent with Cross Section B from the City of Phoenix Street Planning and Design Guidelines (December 1, 2009). SR 303L would cross over 67th Avenue which would be constructed at or close to existing grade. Options for constructing SR 303L underneath the future 67th Avenue was considered but eliminated since the existing SR 303L mainline approaching the 67th Avenue alignment was constructed on embankment fills, essentially setting up SR 303L to go over 67th. Lowering SR 303L would require needless removal of existing SR 303L mainline pavement.

The 2006 DCR showed a tight diamond TI with 67th Avenue crossing over SR 303L, and the report included a caveat that the type of interchange and stacking order could change as the design progressed. After publication of the 2006 DCR, the stacking order was changed to have SR 303L crossing over 67th Avenue. The 2006 DCR included a prototype overpass bridge for a freeway crossing over a street at a diamond TI. The prototype bridge had two equal spans of 108 feet. Frontage roads are not planned for this segment of Sr 303L and, therefore, were not included in the development of alternatives for the 67th Avenue TI. If during future phases of development along the SR 303L corridor frontage roads are determined to be necessary, analysis of the TI geometrics will need to be completed to accommodate their implementation.

Three types of interchanges were selected for consideration at 67th Avenue: A diamond TI, a single-point urban interchange (SPUI) and a diverging diamond interchange (DDI).

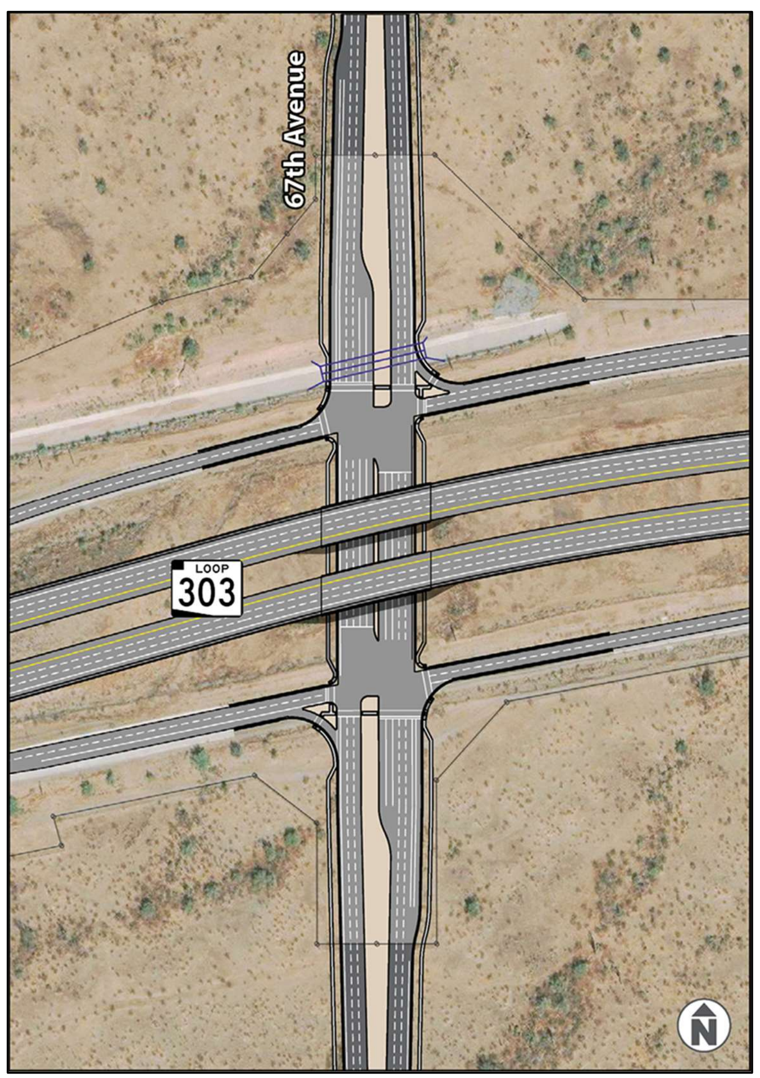
(Continued on Page 48)

3.2.1 Diamond Interchange

The diamond TI includes one-lane parallel type entrance ramps and two-lane parallel type exit ramps. All existing PCCP is expected to remain. The vertical alignments of the ramps and 67th Avenue would closely follow the existing condition. The exit ramps widen to three lanes at the intersections with 67th Avenue, and a refuge island would be constructed at each exit ramp right turn lane to shorten the pedestrian clearance interval. On 67th Avenue, single left turn lanes are warranted by the traffic demand analysis, but dual left-turn lanes would be provided for consistency with the previous DCR. Due to the taper length required to widen 67th Avenue at the ramp intersections, the street width would not match City of Phoenix Cross Section B at the previously secured right-of-way limit. This is true regardless of whether single or dual left-turn lanes are provided.

A minimum 175-foot double-barrel reinforced concrete box culvert (RCBC) would be required at the drainage channel to the north. The overpass structure span length is consistent with the 2006 DCR. The construction cost estimate for the diamond TI is approximately $29.1 million. The cost estimate includes work along 67th Avenue within ADOT right-of-way and work along SR 303L in the immediate vicinity of the TI. A detailed estimate is included in Appendix B.

Figure 28. Diamond Interchange Alternative

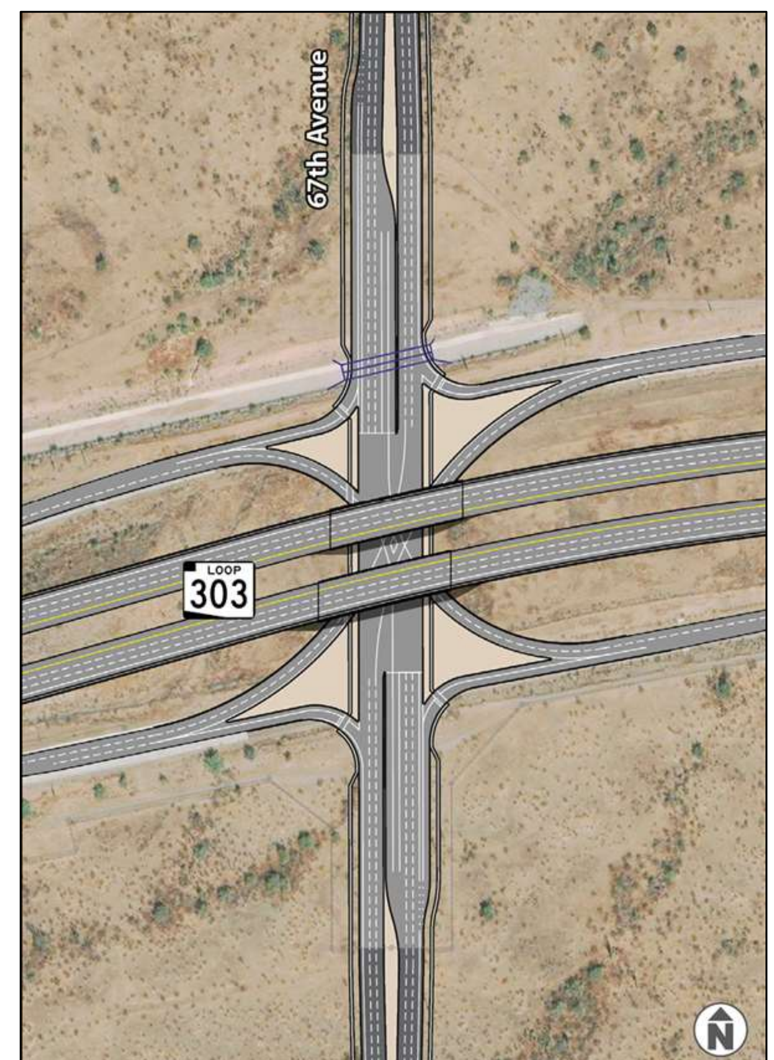


3.2.2 Single-Point Urban Interchange

The SPUI includes one-lane parallel type entrance ramps and two-lane parallel type exit ramps. Along the southbound entrance ramp, 270 square yards of PCCP would be removed, and 200 feet of concrete barrier and a guardrail end terminal would be replaced. Along each of the exit ramps, 110 square yards of PCCP would need to be removed. The vertical alignments of the ramps and 67th Avenue would closely follow the existing condition. The entrance and exit ramps widen to three lanes at the intersection with 67th Avenue. The center diamond at the intersection would be a minimum of 10 feet by 10 feet. On 67th Avenue, single left-turn lanes are warranted by the traffic demand analysis, but dual left-turn lanes will be provided for consistency with the 2006 DCR and to provide for future capacity needs. Proposed improvements are within the existing ADOT right-of-way.

A minimum 150-foot double-barrel RCBC would be required at the drainage channel. Along the northbound entrance ramp, four catch basins would need to be replaced and the overpass would be a 200-foot single span bridge. The construction cost estimate for the SPUI is approximately $32.1 million. The cost estimate includes work along 67th Avenue within ADOT right-of-way and work along SR 303L in the immediate vicinity of the TI. A detailed estimate is included in Appendix B.

Figure 29. Single-Point Urban Interchange Alternative

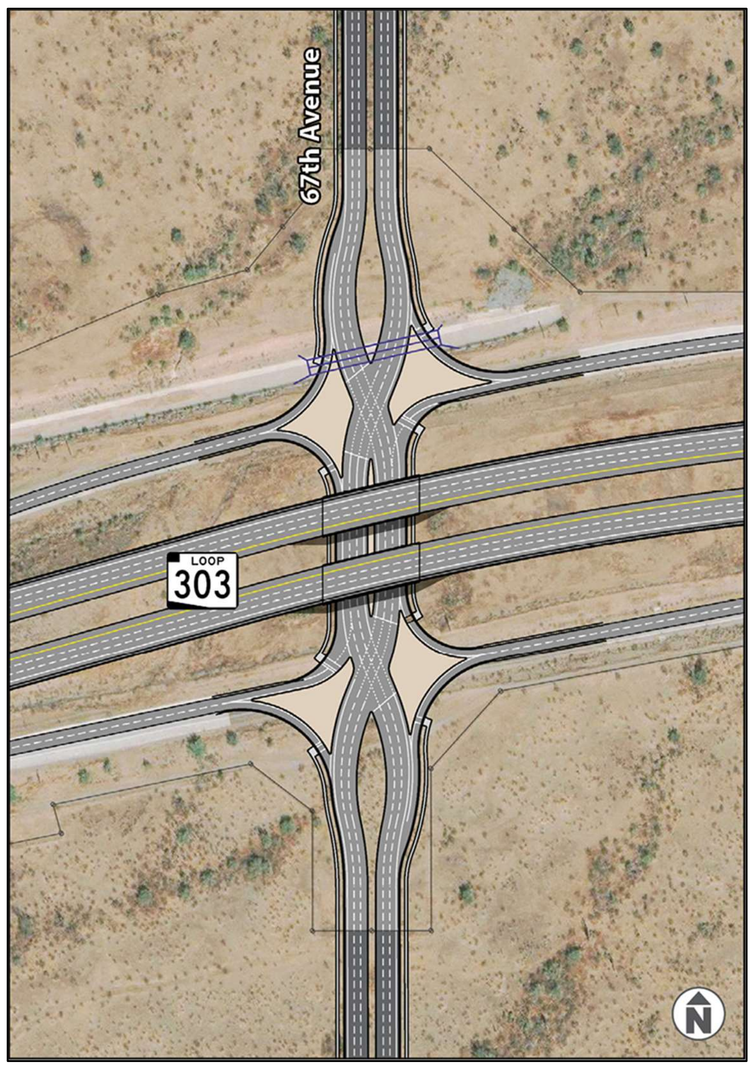


3.2.3 Diverging Diamond Interchange

The diverging diamond interchange includes one-lane parallel type entrance ramps and two-lane parallel type exit ramps. All existing PCCP is expected to remain. The vertical alignments of the ramps and 67th Avenue would closely follow the existing condition. Pedestrian access would be limited to outside walkways, and pedestrians would not be allowed to cross 67th Avenue. During the crossover, bikes lanes will remain on the righthand side of the vehicle lanes and shift to the middle of 67th Avenue. Proposed improvements are within the future ADOT right-of-way.

A minimum 225-foot double-barrel RCBC would be required at the drainage channel. The overpass structure span length is consistent with the 2006 DCR. The construction cost estimate for the DDI is approximately $28.9 million. The cost estimate includes work along 67th Avenue within ADOT right-of-way and work along SR 303L in the immediate vicinity of the TI. A detailed estimate is included in Appendix B.

Figure 30. Diverging Diamond Interchange Alternative



3.3 Evaluation of Alternatives

The three alternatives that were recommended for further consideration were evaluated based upon criteria grouped into the following categories:

- Total project cost
- Structures
- Drainage and floodplain impacts
- Traffic operational performance
- Multimodal opportunities
- ROW impacts
- Acceptance by the public and agencies
- Incident management
- Interchange type

Performance measures were used to compare the alternatives. Thirty performance measures were identified to determine the extent each alternative met each criterion. Qualitative and quantitative metrics were used to compare the alignments. The degree to which an alternative met each criterion was measured using a high-medium-low scale. The scale is graphically represented using the following symbols.

- Highest Performing/Lowest Impact – ●
- Medium Performing/Moderate Impact – ◉
- Lowest Performing/Highest Impact - ○

The screening criteria and performance measures may be found in Table 25. The alternatives screening matrix that documents the screening of each alternative and documents the final determination for the selection of the preferred alternative is found in Table 26.

3.4 Recommendations

All of the alternatives operate at an acceptable level of service; however, the diamond and DDI configurations operate slightly better than the SPUI, and the total construction costs is relatively similar with the diamond and DDI, while the SPUI is the highest cost alternative. Although frontage roads are not planned in this area, the diamond TI configuration would best accommodate their implementation in the future should the need arise. The diamond configuration ranked highest or equal to the SPUI and DDI in every other category with the exception of the number of potential vehicle conflicts, but this is offset by an improvement in driver expectancy with the diamond configuration. Based on the results of the comparative analysis, the Diamond TI is the recommended alternative.

(Continued on Page 50)

Table 25. Screening Criteria and Performance Measures

Category	Criteria	Performance Measure	Scale		
			●	◉	○
Total Project Cost	Construction cost	Planning level construction cost estimate	Lowest cost	Moderate cost	Highest cost
	Right-of-way cost	Planning level right-of-way 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, 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	Area of impact to existing floodplains	Permitting processing time and potential ROW costs	Lowest impact to floodplain	Moderate impact to floodplain	Highest impact to floodplain
	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
	Intersection 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 (sensitivity analysis)	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 or other infrastructure improvements	Capacity can be added with signing and marking improvements, as well as significant roadway widening and infrastructure improvements
		Level of Service with additional 30% traffic for all movements	LOS A or B	LOS C or D	LOS E or F
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
	Bicycle accommodations	Locations of bike lanes	Highest level of bicycle access	Moderate level of bicycle access	Lowest level of bicycle access
		Familiarity with navigating intersection type	Bicyclists familiar with navigating intersection type	Bicyclists somewhat familiar with navigating intersection type	Bicyclists unfamiliar with navigating intersection type
		Number of conflict points	Few conflict points	Moderate conflict points	Most conflict points
Right-of-Way Impacts	Area of impact	Area required outside of existing right-of-way	No impacts outside of existing right-of-way	Moderate impacts outside of existing right-of-way	Large impacts outside of existing right-of-way
	Access control requirements	Length required for future limited access easement	Lowest impacts outside of existing right-of-way	Moderate impacts outside of existing right-of-way	Largest impacts outside of existing right-of-way
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 303L corridor.	Interchange type is most common in SR 303L corridor	Interchange type is somewhat common in SR 303L corridor	Interchange type is least common in SR 303L 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
	Future TI expansion	Ability to accommodate future TI expansion	Highest potential to expand TI capacity or accommodate frontage road	Moderate potential to expand TI capacity or accommodate frontage road	Lowest potential to expand TI capacity or accommodate frontage road

Table 26. Alternatives Screening Matrix

Category	Criteria	Performance Measure	Interchange Type					
			Diamond TI		SPUI		DDI	
Total Project Cost	Construction cost	Planning level construction cost estimate	◉	$29.1 million	○	$32.1 million	●	$28.9 million
	Right-of-way cost	Planning level right-of-way cost estimate	●	$0	●	$0	●	$0
	Long-term maintenance cost	Long-term maintenance cost	●	Lowest long-term maintenance cost	○	Highest long-term maintenance cost due to bridge span length	◉	Moderate long-term maintenance cost due to RCBC length
Structures	Total square footage of bridge (consistently assuming full-height abutments)	Structure size and cost	●	20,959 SF	◉	24,849 SF	●	19,955 SF
	Depth of structure	Structure depth and impact to roadway profile/ embankment / wall quantity	●	3'-6" low roadway profile and roadway embankment/retaining wall quantity	○	8'-3" (SB/WB) & 9'-6" (NB/EB) high roadway profile and roadway embankment/retaining wall quantity	●	3'-5" low roadway profile and roadway embankment/retaining wall quantity
	Ease and cost of widening	Ability to widen in-kind and impact to crossroad traffic when widen in-kind	●	Minimal impact on ability to widen in-kind, crossroad traffic, or complexity of widening	○	• In-kind widening with CIP/PT required to span SPUI • Complicated traffic control with potential falsework in SPUI footprint	●	Minimal impact on ability to widen in-kind, crossroad traffic, or complexity of widening
Drainage and Floodplain Impacts	Area of impact to existing floodplains	Permitting processing time and potential ROW costs	●	Lowest impact to Zone A floodplain limits	◉	Moderate impact to Zone A floodplain limits	○	Highest impact to Zone A floodplain limits with fill and box culvert lengths
	Impacts to existing drainage facilities	Removal of existing drainage structures	●	Lowest impact to existing concrete channel infrastructure	◉	Moderate impact to existing concrete channel infrastructure	○	Highest impact to existing concrete channel infrastructure with largest amount of removal
	Long-term maintenance impacts	Long-term maintenance cost/effort	●	Lowest long-term maintenance cost/effort due to shortest box culvert lengths	◉	Moderate long-term maintenance cost/effort from box culvert lengths and channel maintenance	○	Highest long-term maintenance cost/effort due to box culvert length
Traffic Operational Performance	TI operations	Level of Service	●	AM: LOS [B] PM: LOS [B]	◉	AM: LOS [C] PM: LOS [C]	●	AM: LOS [B] PM: LOS [B]
	Intersection operations	Level of Service	●	WB/SB Ramps AM: LOS [B] PM: LOS [B] EB/NB Ramps AM: LOS [C] PM: LOS [B]	◉	AM: LOS [C] PM: LOS [C]	●	WB/SB Ramps AM: LOS [B] PM: LOS [B] EB/NB Ramps AM: LOS [B] PM: LOS [B]
	Individual movement operations	Level of Service	●	AM: LOS [B] or better (5 of 13 movements)	◉	AM: LOS [B] or better (2 of 10 movements)	●	AM: LOS [B] or better (5 of 6 movements)

				PM: LOS [B] or better (8 of 13) movements)		PM: LOS [B] or better (4 of 10 movements)		PM: LOS [B] or better (6 of 6 movements)
	Potential ability to accommodate greater than anticipated traffic demand based (sensitivity analysis)	Ability to add capacity with minimal future improvements.	●	Single left turn lanes are warranted by traffic demand analysis, but dual left turn lanes are provided for consistency with previous DCR.	●	Single left turn lanes are warranted by traffic demand analysis, but dual left turn lanes are provided for consistency with previous DCR.	◎	Future widening for dual left turn lanes along 67th Ave would require ramp widening and realignment at intersections and bridge replacement or cut-back walls.
Multimodal Opportunities	Pedestrian accommodations	Locations of sidewalk/crossings	●	• Sidewalks in both directions. • Pedestrians can move across 67th Ave	◎	• Sidewalks in both directions • Pedestrians cannot move across 67th Ave at the TI and must travel to the next intersection	◎	• Sidewalks in both directions • Pedestrians cannot move across 67th Ave at the TI and must travel to the next intersection • Keeps pedestrians to the exterior along 67th Ave
		Familiarity with navigating intersection type	●	Pedestrians highly familiar with navigating diamond TIs	◎	Pedestrians somewhat familiar with navigating SPUIs	○	Pedestrians unfamiliar with navigating DDIs
		Number of conflict points	◎	10 conflict points	●	8 conflict points	●	8 conflict points
	Bicycle accommodations	Locations of bike lanes	●	Bike lanes in both directions	●	Bike lanes in both directions	◎	• Bike lanes in both directions • Bike lanes shift to the middle of the 67th Ave during the crossover. In the event of an emergency or mechanical failure, bicyclists must wait for an opening in traffic if they need to access the sidewalk.
		Familiarity with navigating intersection type	●	Bicyclists highly familiar with navigating diamond TIs	◎	Bicyclists somewhat familiar with navigating SPUIs	○	Bicyclists unfamiliar with navigating DDIs
		Number of conflict points	●	8 conflict points	●	8 conflict points	●	8 conflict points
Right-of-Way Impacts	Area of impact	Area required outside of existing right-of-way	●	67th Ave matches city of Phoenix typical section 180' north and south of future ADOT limited access easement	●	• Improvements are within ADOT right-of-way • 67th Ave matches city of Phoenix typical section within future ADOT limited access easement	●	• Improvements are within ADOT right-of-way • 67th Ave matches city of Phoenix typical section within future ADOT limited access easement
	Access control requirements	Additional length required for meet current (2021) access control requirements	●	Lowest additional length required	◎	Moderate additional length required	○	Highest additional length required
Acceptance	Local agency acceptance	Ability to gain local agency support	TBD	TBD	TBD	TBD	TBD	TBD
	Public acceptance	Ability to gain public support	TBD	Public support is anticipated due to regional familiarity with diamond TIs	TBD	Public support is anticipated due to regional familiarity with SPUIs	TBD	DDIs are relatively new to the region, and public outreach may be required gain public support
	Nonstandard design features	Number of design exceptions or variances	●	• 2 design exceptions (4' outside shoulder on each exit ramp) • Design exceptions could be eliminated with additional pavement	●	• 2 design exceptions (4' outside shoulder on each exit ramp) • Design exceptions could be eliminated with additional pavement	●	• 2 design exceptions (4' outside shoulder on each exit ramp) • Design exceptions could be eliminated with additional pavement
Incident Management	Emergency services access	Ability to provide access for emergency services personnel	●	Permits through movement from ramp	◎	Through movement from ramp would negatively affect traffic operations	◎	Does not permit through movement from ramp
	Incident traffic management	Level of flexibility for clearing incidents	●	Permits through movement from ramp	◎	Through movement from ramp would negatively affect traffic operations	◎	Does not permit through movement from ramp
Interchange Type	Corridor consistency	Interchange type is consistent with other interchanges along SR 303L corridor.	●	Interchange type is most common in SR 303L corridor (10 existing diamond TIs along corridor)	◎	Interchange type is somewhat common in SR 303L corridor (5 existing SPUIs along corridor)	○	Interchange type is least common in SR 303L corridor (no existing DDIs along corridor)

	Driver expectation	Ability to meet driver expectation	●	High ability to meet driver expectation due to prevalence of diamond TIs on SR 303L and within the region	◎	Moderate ability to meet driver expectation due to prevalence of SPUIs on SR 303L and within the region	○	DDIs are relatively new to the region, and public outreach may be required to educate drivers
	Potential vehicle conflicts	Number of conflict points	○	26 conflict points	◎	24 conflict points	●	18 conflict points
	Existing transportation infrastructure	Impact to existing transportation infrastructure	●	All existing PCCP is expected to remain	◎	• WB/SB entrance ramp: 270 SY of PCCP is removed • WB/SB entrance ramp: guardrail end terminal and 200 LF of barrier is replaced • Both entrance ramps: widened 1 lane • Both exit ramps: 110 SY of PCCP is removed	●	All existing PCCP is expected to remain
	Constructability	Complexity and duration of construction	●	• Bridge can be constructed without traffic underneath • Lowest complexity and shortest duration to construct 67th Ave	◎	• Bridge can be constructed without traffic underneath • Moderate complexity and duration to construct 67th Ave • Some PCCP, guardrail and barrier to be replaced along ramps	○	• Bridge can be constructed without traffic underneath • Highest complexity and longest duration to construct 67th Ave • Longest RCBC
	Future TI expansion	Ability to accommodate future TI expansion	●	High potential to accommodate frontage road to Lake Pleasant Pkwy or future 51st Ave	○	Frontage road would negatively affect traffic operations	○	Does not accommodate frontage road

4.0 MAJOR DESIGN FEATURES OF THE PREFERRED ALTERNATIVE

4.1 Introduction

This chapter outlines the criteria used in developing the Recommended Alternative and to describe its key design features.

4.2 Design Controls

4.2.1 Design Speed

The design speed for the SR 303L mainline roadway is 65 miles per hour (mph) in accordance with ADOT Table 101.3 for an urban controlled access highway.

The design speed for the directional ramps at I-17 is 55 mph in accordance with ADOT RDG 503.3, with the initial ramp curve designed for 65 mph to match the mainline design speed.

The design speed for the interchange ramps is 50 mph in accordance with ADOT RDG 503.3 with the initial curve on exit ramps designed for 60 mph. The minimum design speed for the ramps near the crossroad terminus is 35 mph.

Crossroad design speed is 45 mph.

4.2.2 Lane and Shoulder Width

The preferred roadway section is three (3) twelve-foot (12') paved travel lanes, a ten foot (10') outside paved shoulder, and a ten foot (10') inside shoulder which is comprised of four feet (4') of asphaltic concrete (AC) paving matching the SR 303L mainline cross slope and six feet (6') of compacted aggregate base (AB) graded at 20:1 (h:v) towards the median in each direction.

In the area near 67th Avenue the entire SR 303L mainline roadway section described above will be constructed.

The existing SR 303L mainline pavement is 46 feet wide which allows for three travel lanes and outside shoulder, with the 10-foot inside shoulder widening required to obtain the three travel lanes.

Interchange ramps will have 12-foot travel lanes. Interchange ramps may be one or two lanes as shown in the traffic report. Shoulder widths should be in accordance with Table 302.4 and as shown in Figures 504.7, 504.8A, or 504.8B of the ADOT RDG.

Directional ramps will be designed as two-lane ramps with shoulders as detailed in the Design Memorandum entitled *2 Foot Offset Distance to Roadside Barriers*.

Crossroad lane and shoulder widths will match City of Phoenix standard Cross Section "B" – Major Arterial section. Near the intersection, the crossroad roadway configuration will widen as needed to allow for turn lanes and for bridge piers in the median.

4.2.3 Superelevation Rate

The maximum superelevation rate is 6% in accordance with ADOT Table 202.3B for urban controlled access highways including ramps.

Crossroads will be designed as low speed urban streets in accordance with the AASHTO 2018 Green Book.

4.2.4 Horizontal Curve Radius

The minimum horizontal curve radius for the various design speeds shall be in accordance with ADOT Table 202.3B for the SR 303L mainline, directional ramps, and interchange ramps.

Crossroads will be designed as low speed urban streets in accordance with the AASHTO 2018 Green Book.

4.2.5 Stopping Sight Distance

The design stopping sight distance for the SR 303L mainline roadway, directional ramps, interchange ramps and crossroads inside the ADOT access control shall be based on the controlling design speed with adjustment made for the effective grade in accordance with ADOT Figure 201.2.

4.2.6 Maximum Grade

The maximum profile grade for the SR 303L mainline roadway is 3% in accordance with ADOT Table 204.3.

For interchange and directional ramps, the desirable maximum upgrade is 4% and desirable maximum downgrade is 5% in accordance with ADOT RDG 504.1.

4.2.7 Cross Slopes

The standard cross slope for the paved roadway is 0.02 ft/ft in accordance with ADOT Section 301.2.

4.2.8 Vertical Clearance

Vertical clearance for bridges shall be in accordance with ADOT Bridge Practice Guidelines, Section 2.

4.2.9 Design Loading Structural Capacity

Design loads for structures shall be in accordance with ADOT Bridge Practice Guidelines, Section 3.

4.3 Horizontal and Vertical Alignment

The horizontal and vertical alignment should work together to provide a roadway that exceeds the minimum standard, reduces impacts to the environment, remains within the right of way easement shown, and reduces the long-term maintenance cost.

The horizontal alignments for the SR 303L mainline, the interchange ramps, the crossroads, and the system interchange ramps were set in the record drawings for the Lake Pleasant Parkway – I-17 project (H715701C) or in the 51st Avenue and 43rd Avenue Traffic Interchanges Project Assessment (F042401D).

Minor profile adjustments may be made for connections into existing facilities for the mainline and the interchange ramps.

Profile adjustments have been made to the system interchange ramps to obtain necessary vertical clearance based on phased construction.

4.4 Access

SR 303L is a full access-controlled facility and no additional access points are anticipated.

4.5 Right-of-Way

No new ROW is anticipated for the project. Construction of 67th Avenue will be limited to the existing ADOT right of way easement.

Additional access control along 67th Avenue is anticipated. ADOT has obtained full access control within the existing right of way approximately 330 feet from the future radius return. The ADOT access control guidelines were updated in 2021 and are represented in Exhibit 506.A of the ADOT *Roadway Design Guidelines*, February 2022 Revision (RDG). To meet current RDG requirements, departing the TI ramp intersection (exit ramp intersection), an additional 330 feet of full access control is anticipated to be acquired, for a total full access control of 660 feet from the ramp intersection radius return. An additional 660 feet of limited access control would allow for only one right-in / right-out only access, and full access would be permitted a minimum 1,320 feet from the radius return. Approaching the TI ramp intersection (entrance ramp intersection), there is 330 feet of full access control from the radius return, and then an additional 990 feet of limited access control that would allow for one right-in / right-out only access, and full access would be permitted a minimum 1,320 feet from the radius return.

ADOT would need to acquire the recommended access control requirements from ASLD, and further coordination will need to continue throughout the development process. Temporary construction easements are not anticipated but should be evaluated during final design stages.

4.6 Drainage

The drainage evaluation was based on the requirements of Chapter 600 of ADOT's Roadway Design Guidelines. The minimum catch basin spacing was based on the allowable spread requirements for each roadway classification. The delineation of the onsite drainage basins was conducted based on the location of inlets and roadway geometry for the Preferred Build Alternative. Rational method calculations were conducted using a minimum 10-minute time of concentration for the calculation of design peak flows. The drainage areas are delineated based on proposed SR 303 alignment data. Considering crests, sag points, and superelevation locations, onsite drainage items and storm drain catch basins are proposed and designed based on spread calculations and drainage areas. To calculate the spread, the spread calculation calculates every 5 ft pavement runoff, using rational method per drainage ADOT design manual. The flow directions are determined from SR 303 alignment longitudinal and cross slopes. The catch basins drainage items with assumed capture ratio were inserted in the calculation to calculate the capture volume and carry over volume to next 5 ft sections.

Preliminary gutter and inlet hydrologic and hydraulic calculations follow guidelines and procedures in the ADOT Hydraulic Manual and HEC-22 publications.

Almost all of the offsite drainage improvements along the SR303L corridor from Lake Pleasant Parkway to I-17 have already been constructed by the interim roadway projects, excluding the final design near term traffic interchange for the 43rd Avenue and 51st Avenue interchanges (F0424) which has identified additional offsite drainage improvements relevant to that project and the Taiwan Semiconductor Manufacturing Company plant. Based on SR 303 offsite drainage system existing condition, SR 303L inside widening and improvements would not significantly impact existing offsite drainage system. All existing offsite channels and culverts were designed and constructed for the flood-carrying capacity. From existing SR 303 STA 1935+00 to existing SR 303 STA 1945+00, the 67th Avenue interchange crosses a tributary wash to Deadman Wash and a mapped floodplain with multiple shallow wash channels. Two new box culverts north of SR303L under 67th Avenue have been identified and will cross at the location of Existing Concrete Channel N1 draining east to west and a natural wash channel further north. Three interchanges design alternatives for a Single-Point Urban Interchange (SPUI), Diverging Diamond Interchange (DDI) and Standard Diamond Interchange (SDI) were analyzed for the offsite drainage crossings.

The existing concrete channel N1 will need to be reconstructed with transition wingwalls and maintenance access at the new crossing. A new 2 barrel – 8' Span x 6' Rise Reinforced Concrete Box Culvert is identified for the crossing at 67th Avenue. Another 2 – 8' x 6' RCBC is designed for the crossing at the north of interchange for the Deadman Wash Tributary crossing the 67th Avenue. Based on the N1 channel design flow (50-year), the 2 crossing culverts design Q will be 489.5 cfs, each. The design Q is obtained from the Estrella Freeway, SR303L Happy Valley Road to I-17 Final Design Concept Report and interim roadway project final design report (H7157). For the Deadman Wash Tributary crossing culverts, which is north of the interchange, the length of the culverts will be 343 ft (DDI alternative), or 382 ft (SDI alternative). For the Channel culvert. The length of the culvert will be 282 ft (DDI alternative), or 187 ft (SDI alternative), and requires the removal of 187 ft N1 channel. The new 67th Avenue box culverts, roadway embankments, and channel lie in an existing Deadman Wash tributary floodplain. A floodplain mapping revision should be performed in accordance with local floodplain management requirements and FEMA requirements for any impacts to the floodplain or floodway.

In SR303/I-17 projects drainage design, there are 197 proposed storm drain catch basins, 15 manholes, and 16,303 linear feet of pipe. For 197 storm drain catch basins, 168 storm drain catch basins are ADOT Standard C-15.92/C-15.91 freeway catch basins and 29 are ADOT Standard C-15.80 median drop catch basins/area inlets. Based on SR303 mainline spread calculations, new inlets are placed as needed and existing storm drain catch basins are replaced where the new freeway widening overlaps the existing inlets. Based on the new SR303 alignment, the sag/flanking inlets are placed at the sag points with calculated offsets. The ramp inlets are designed along the ramps' curb considering superelevation and sag/low points, out falling to adjacent storm drain systems. The new sag inlets are placed at the new SR303 STA 2128+90.00 and new SR303 STA 2057+10.00. New sag inlets will replace the existing sag inlets at the new SR303 STA 1996+80.00. To minimize construction costs, the existing storm drainage system are kept, utilized, and improved as much as possible. However, catch basins and pipes removal are still needed and replaced by new storm drainage systems based on the new freeway improvements and spread calculations.

Special detail catch basins or manholes are proposed to retain or improve maintenance access to all existing lateral and trunk lines. These drainage structures are referred to with the word "Mod" before the structure name callout in the plans. The modifications to these structures may include reshaping existing catch basins when the proposed catch basin is located close to the existing inlet. Other cases include modification of existing manholes into catch basins or capping existing manholes and catch basins. The intent is to eliminate the presence of manhole rims located in the roadway pavement while meeting the maximum spacing criteria required for the trunk line's diameter. The design of special detail maintenance access structures will be coordinated with ADOT Drainage Design Section and Phoenix District representatives during final design.

When laterals are used to connect new catch basins with existing catch basins or manholes, the laterals are angled in the upstream direction at 45 degrees from perpendicular to the trunk line. In this way, the maintenance equipment used to clean out the storm drains could more easily make the turn from the lateral into the trunk line. These angled laterals would be needed a minimum of every 330 feet (as measured along the trunk line) to provide adequate access to the trunk line. Alternatively, if the 45-degree lateral was not possible, ADOT Phoenix Maintenance District (ADOT Maintenance) stated that a 48-inch perpendicular lateral could be used, as long as the lateral length was less than 15 feet. For all lateral treatments, ADOT Maintenance stated that it would be preferable to have the bottoms of capped catch basins or manholes to be rounded, or for prefabricated tees to be used at the junctions. Furthermore, they stated that it would be best if the prefab tees could be made with matching inverts. Standard prefab tees are made with matching pipe centerlines.

4.7 Section 401 and 404 of the Clean Water Act

The Corps approved ADOT's preliminary jurisdictional delineation (PJD) for the SR303L 51st and 43rd Ave TIs project, which identified potential Waters of the U.S. (WOUS) within the project area between MP 135.7 and MP 139.1 (Corps File No. SPL-2021-00585). ADOT also received a CWA Section 404 permit from the Corps for the proposed SR303L 51st and 43rd Ave TIs project. The Section 401 certification was conditionally certified through use of Regional General Permit No. 96. ADOT will coordinate with the Corps to identify other potential WOUS within the other portions of the broader SR303L, Lake Pleasant Parkway to I-17 project area that were not included in the SR303L 51st and 43rd Ave TIs PJD and receive a CWA Section 404 permit and Section 401 certification for any proposed work within any WOUS prior to construction.

4.8 Floodplain Considerations

There are multiple mapped floodplains along the DCR corridor from Lake Pleasant Parkway to I-17. The floodplains drain the areas north of the freeway to regional waterways. The regulatory floodplains relevant to the SR303 corridor for the DCR are summarized in Table 27 below. Refer to the local floodplain manager and FEMA data sources for effective GIS mapping data and hydraulic models. The below effective FIRM panel maps have since been revised by LOMR that are in the FEMA GIS system, but no mapping panel update has been made yet. For example, flood zone areas reduced by levee certification at Agua Fria River bridge and New River bridge are not mapped on the FEMA effective map panels but are shown in the LOMR in the effective FEMA GIS database as LOMR 20-09-1553P effective 7/29/2020.

Table 27. Floodplains in the Project Area

River / Wash Name	FEMA PANEL #	MAP #	Floodplain Jurisdiction	Map Panel Effective Date	Flood Hazard Area Designation
New River West Tributary 5	0840	04013C0840L	CITY OF PEORIA	10/16/2013	AE
New River & New River West Tributary 5, 10, 15,	0840	04013C0840L	CITY OF PEORIA/ CITY OF PHOENIX	10/16/2013	AE
Deadman Wash Tributary 1	0840	04013C0840L	CITY OF PEORIA	10/16/2013	A
Deadman Wash	0840/ 0845	04013C0840L/ 04013C0845L	CITY OF PEORIA CITY OF PHOENIX	10/16/2013	AE
Deadman Wash Tributary 2	0845	04013C0845L	CITY OF PHOENIX	10/16/2013	A
Deadman Wash Tributary 2a	0845	04013C0845L	CITY OF PHOENIX	10/16/2013	A
Upper Buchanan Wash	0845	04013C0845L	CITY OF PHOENIX	10/16/2013	A
CAP Wash West	0845	04013C0845L	CITY OF PHOENIX	10/16/2013	A
CAP Wash East	0845	04013C0845L	CITY OF PHOENIX	10/16/2013	A
Skunk Creek	0845	04013C0845L	CITY OF PHOENIX	10/16/2013	AE

The existing and proposed drainage crossings at these locations were designed to minimize floodplain and floodway encroachment, and to ensure that each crossing is adequately sized for the flood-carrying capacity. FEMA criteria allow water surface elevation increases of one foot or less in regulated floodplains where no floodways have been designated.

The new 67th Avenue box culverts, roadway embankments, and channel lie in an existing Deadman Wash tributary floodplain. A floodplain mapping revision should be performed in accordance with local floodplain management requirements and FEMA requirements for any impacts to the floodplain or floodway.

Changes to the Dead Man Wash Tributary 2 and Tributary 2A floodplains and floodways north of the ADOT ROW near the future 51st Avenue Interchange are proposed due to offsite private development for the TSMC site construction. A Conditional Letter of Mapping Revision was approved by FEMA for the proposed changes to Dead Man Wash Tributary 2 and Tributary 2A for the TSMC construction project on August 20, 2021.

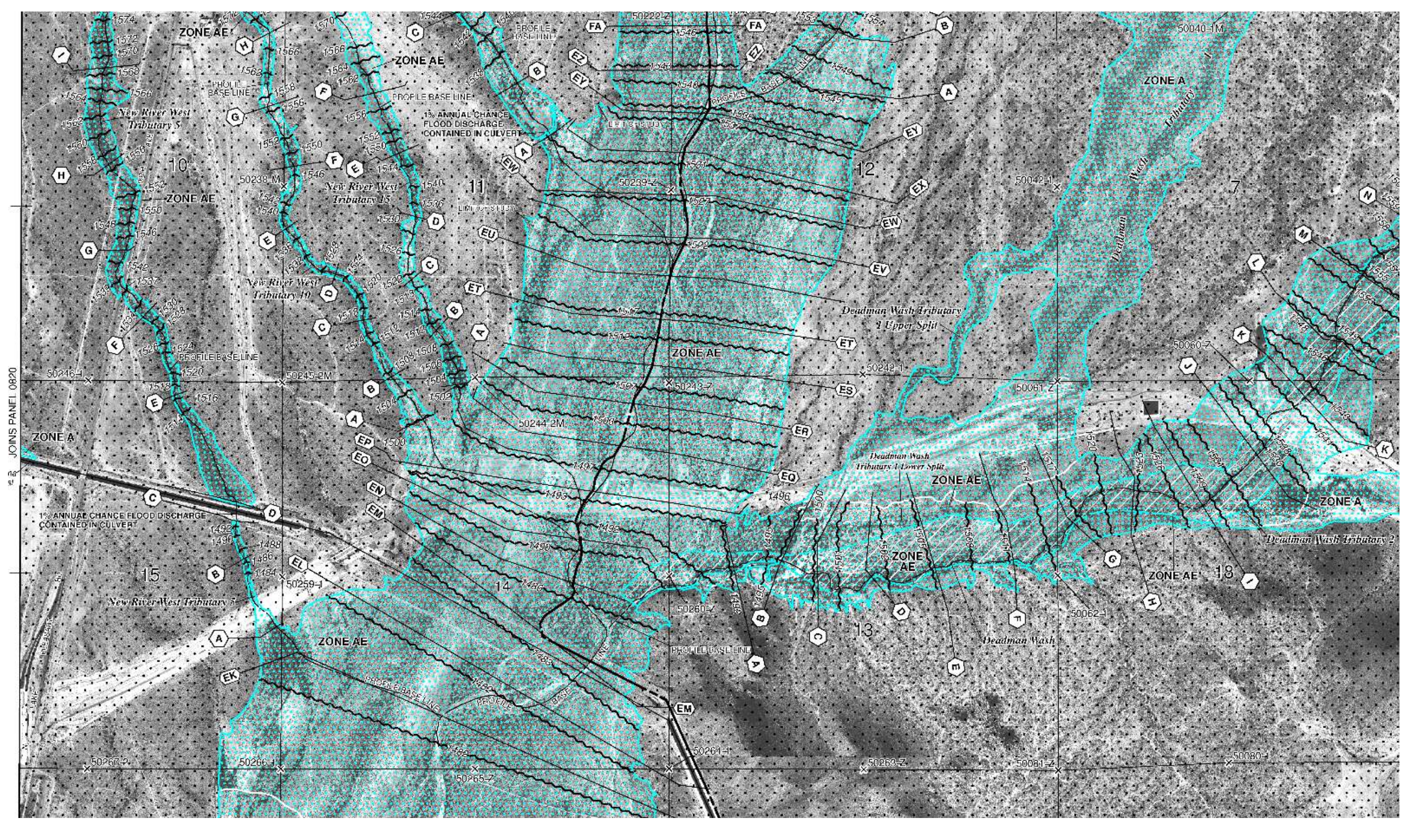


Figure 31. FEMA Floodplain Map Panel 04013C08040L Effective 10/15/13

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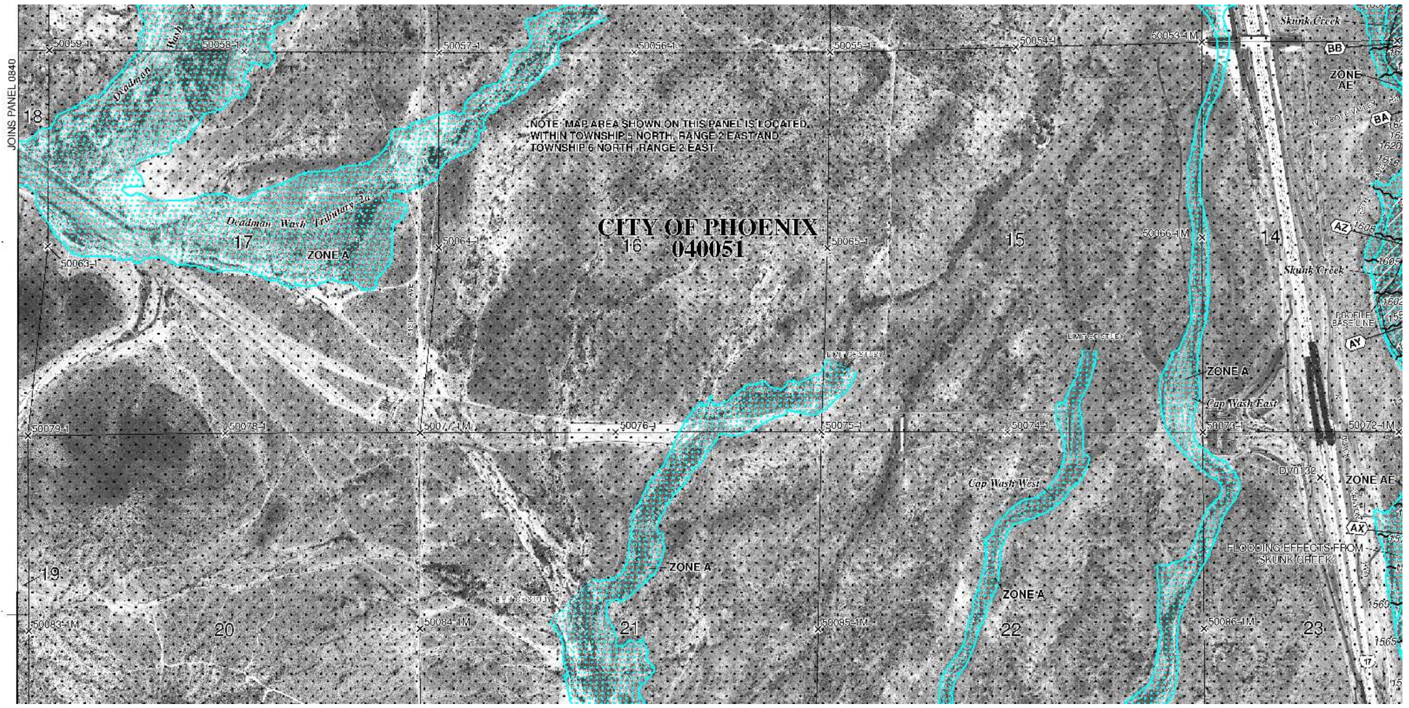


Figure 32. FEMA Floodplain Map Panel 04013C08045L Effective 10/15/13

There are a number of existing FEMA and local jurisdiction floodplains along the Loop 303 corridor from Lake Pleasant Parkway to I-17. Many of the major wash and river crossings were design and constructed to the ultimate freeway width in the original freeway roadway construction project in 2013. The proposed SR303 mainline widening and proposed traffic interchanges would encroach into some of the local floodplains and floodways. Below is a summary of the impacts and final design recommendations. The final design phases of the freeway improvements should meet with local floodplain administrators to determine what mitigations are required and if mapping revisions will be required.

Table 28. Floodplain Impact Summary Table

Stationing	River / Wash Name	Floodplain Jurisdiction	Flood Hazard Area Designation	Description of Impact	Final Design Recommendation
SR303L Med 1824+82, 0' LT	New River West Tributary 5	CITY OF PEORIA	AE	Median inside widening into mapped Zone A floodplain	Wash crosses Loop 303 mainline roadway through an existing cross culvert constructed with H7157 Interim Roadway Project. There will be no impacts to floodplain / floodway from inside widening. There are no FEMA mapping revisions recommended at this floodplain location. No mapping revisions were performed for this culvert crossing in the H7157 Interim Roadway improvement project when the existing culvert was constructed.
SR303L Med 1824+82 1839+15	New River	CITY OF PEORIA/ CITY OF PHOENIX	AE	No Impacts	No Recommendations

Table 28. Floodplain Impact Summary Table

Stationing	River / Wash Name	Floodplain Jurisdiction	Flood Hazard Area Designation	Description of Impact	Final Design Recommendation
1856+37 1839+15, 0' LT	New River West Tributary 5, 10, 15,		A AE AE		
SR303L Med 1909+35, 0' LT	Deadman Wash Tributary 1 / Tributary 1 Upper Split	CITY OF PHOENIX	A	No Impacts	No Recommendations
SR303L Med 1939+96, 306.0' LT & 1941+01, 848.0' LT	Deadman Wash Tributary 1	CITY OF PHOENIX	A	Roadway Embankment Channelization Hydraulic Structure	Recommend coordination with City of Phoenix Floodplain Manager on need for FEMA Mapping Revision due to earthwork from proposed 67th Avenue Roadway, channelization of Deadman Wash Tributary 1, and new roadway cross culverts.
SR303L Med 1937+00, 820.0' RT	Dead Man Wash Tributary	CITY OF PHOENIX	AE	Roadway Embankment	Recommend coordinate with City of Phoenix Floodplain Manager on need for FEMA Mapping revision due to roadway fill material in north bank of Dead Man Wash Tributary 1 Zone AE floodplain and floodway.
SR303L Med 1968+60, 0.0' LT	Deadman Wash	CITY OF PHOENIX	AE	No Impacts	No Recommendations
SR303L Med 1987+30, 207.0' LT	Deadman Wash Tributary 2	CITY OF PHOENIX	A	No Impacts	No Recommendations
SR303L Med 2008+02, 156.0' LT	Deadman Wash Tributary 2a	CITY OF PHOENIX	A	No Impacts	No Recommendations. Offsite development for Taiwan Semiconductor Corporation processing CLOMR / LOMR for offsite impacts to Deadman Wash Tributary 2a. CLOMR approved by FEMA 8/20/21.
SR303L Med 2091+50, 0.0' LT to 2109+46, 472' LT	Upper Buchanan Wash	CITY OF PHOENIX	A	Roadway Embankment Channelization Hydraulic Structures	Floodplain mapping revisions to be processed in F0424 01D SR303, 51st Avenue to 43rd Avenue Final Design project. CLOMR approved by FEMA 5/9/22.
SR303L Med 2142+70, 0.0' LT	CAP Wash West	CITY OF PHOENIX	A	No Impacts	No Recommendations
SR303L Med 2160+35, 0.0' LT	CAP Wash East	CITY OF PHOENIX	A	Roadway Embankment	Recommend coordinate with City of Phoenix Floodplain Manager on need for FEMA Mapping Revision due to

Table 28. Floodplain Impact Summary Table

Stationing	River / Wash Name	Floodplain Jurisdiction	Flood Hazard Area Designation	Description of Impact	Final Design Recommendation
					SR303 mainline embankment fill in Zone A floodplain.
I-17 Med 1000+00, 000.0' RT	Skunk Creek	CITY OF PHOENIX	AE	Roadway Embankment	Recommend coordinate with City of Phoenix Floodplain Manager on need for FEMA Mapping Revision due to potential SR303/I-17 System Interchange ramp embankment fill in Zone AE floodplain.

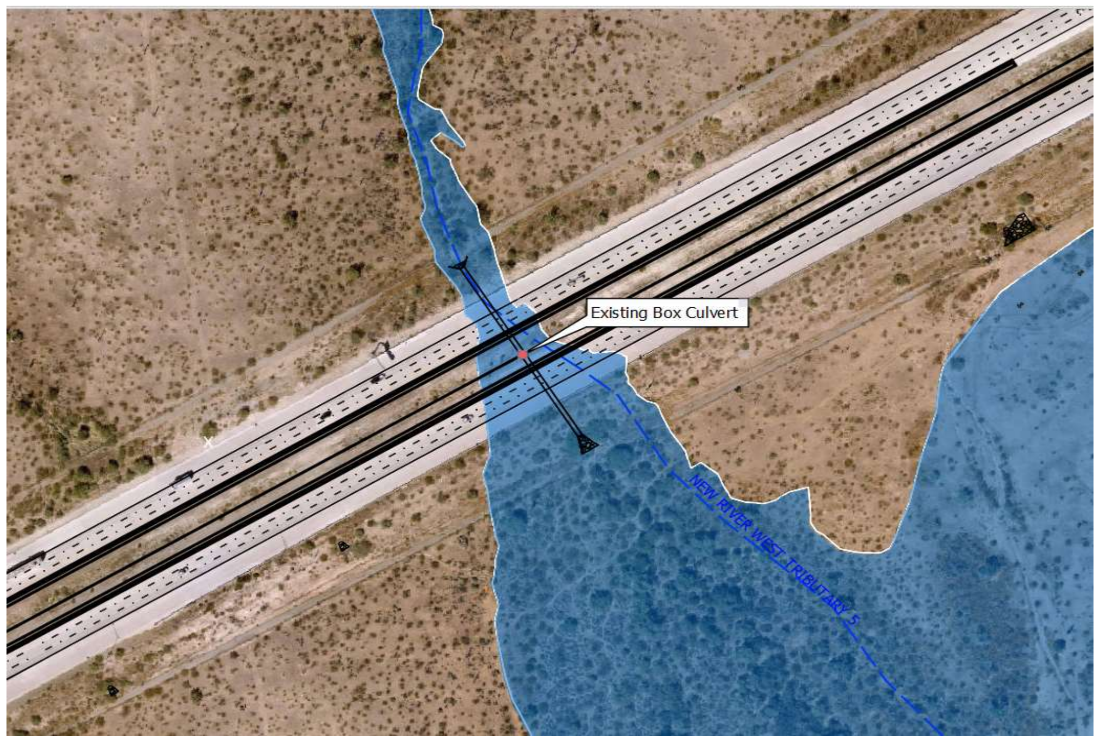


Figure 33. Station 1824+82, 0.0' LT – New River West Tributary 5 FEMA Map View

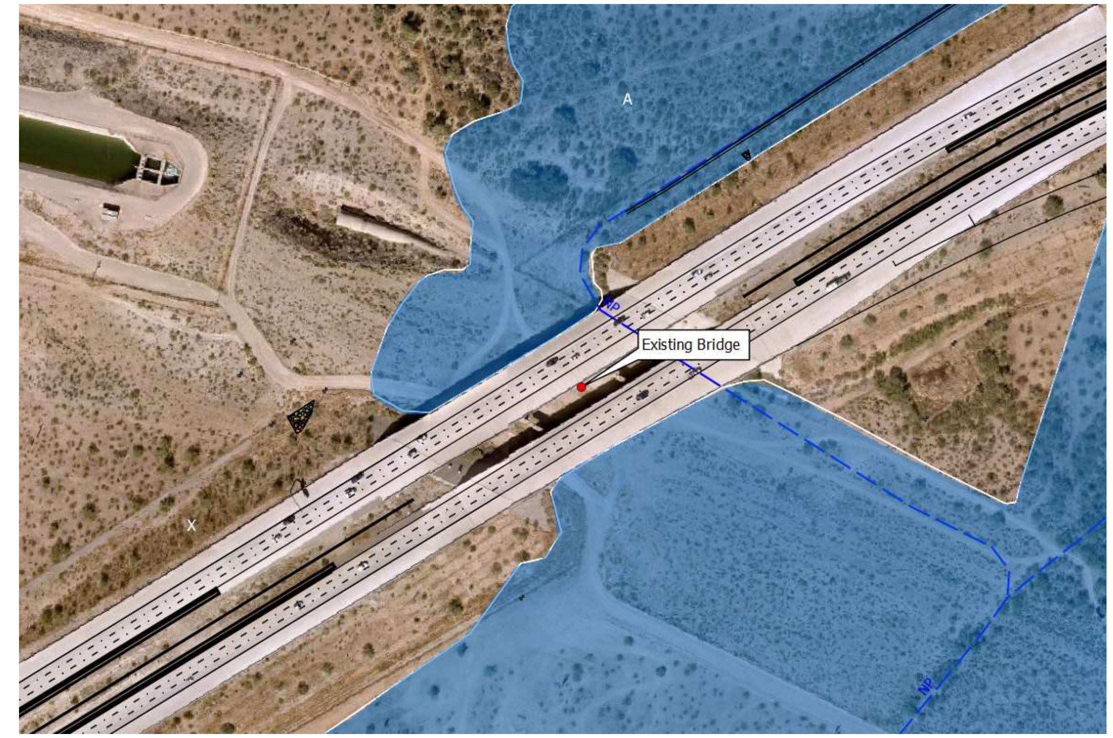


Figure 34. Station 1869+15, 0.0' LT – New River West Tributary 10 FEMA Map View

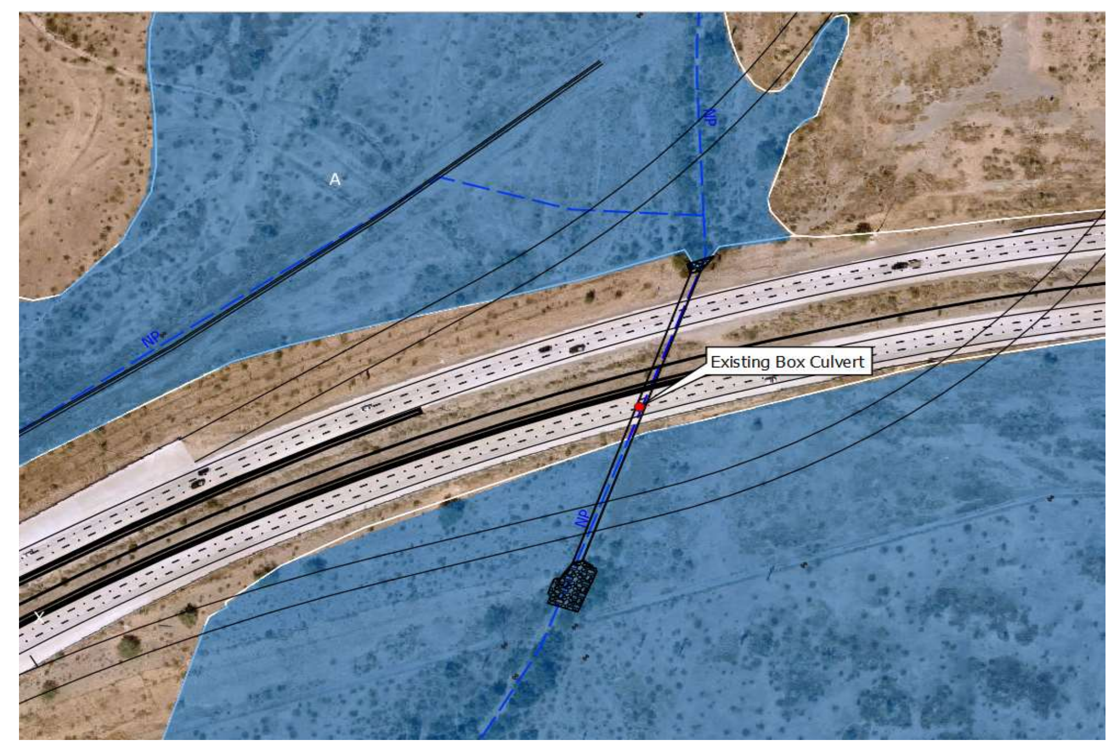


Figure 35. Station 1856+37, 0.0' LT – New River West Tributary 15 FEMA Map View

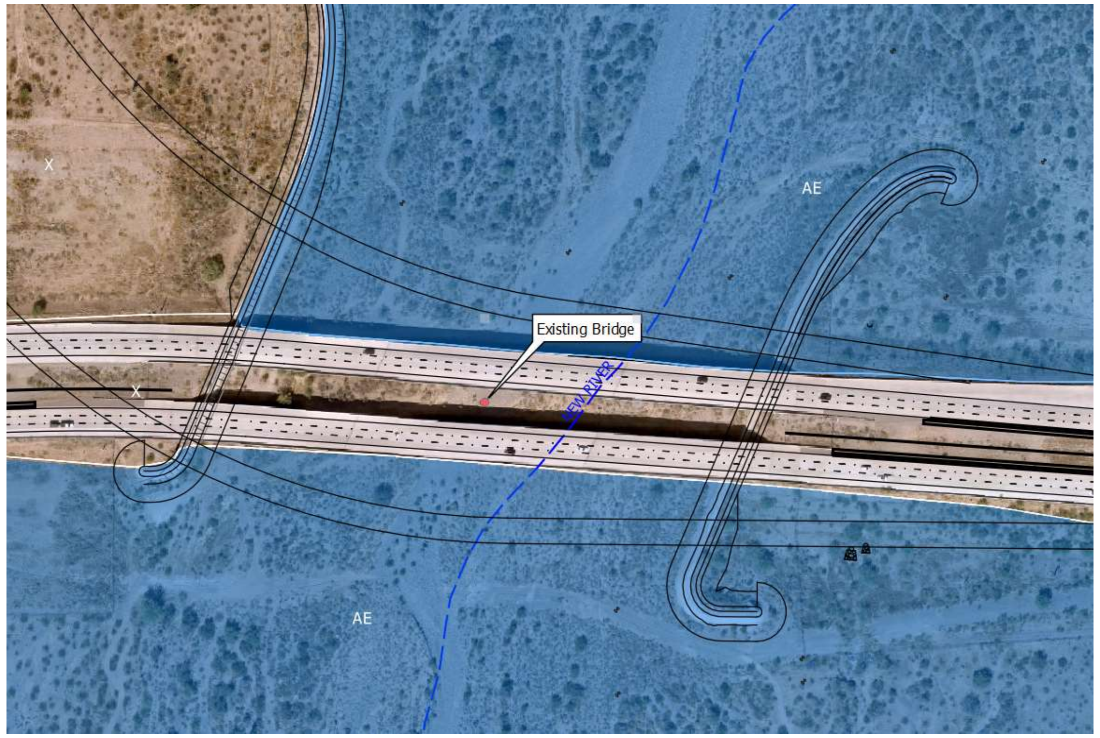


Figure 36. Station 1839+15, 0.0' LT – New River FEMA Map View

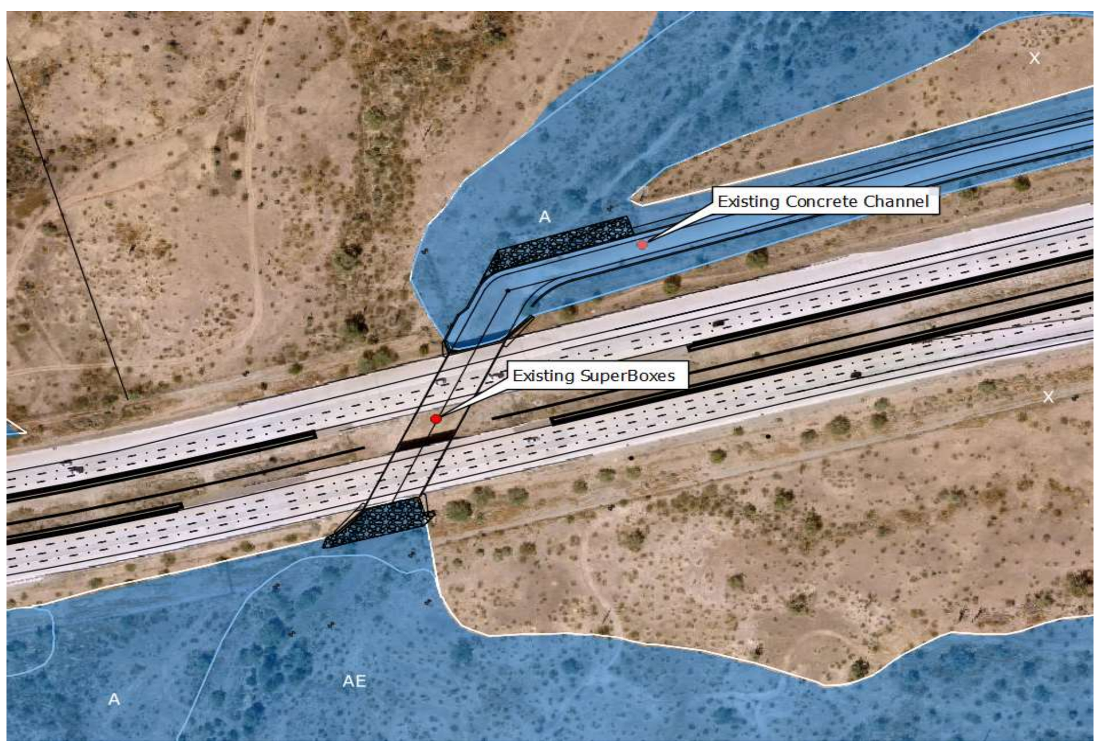


Figure 37. Station 1909+35, 0.0' LT – Deadman Wash Tributary 1 FEMA Map View

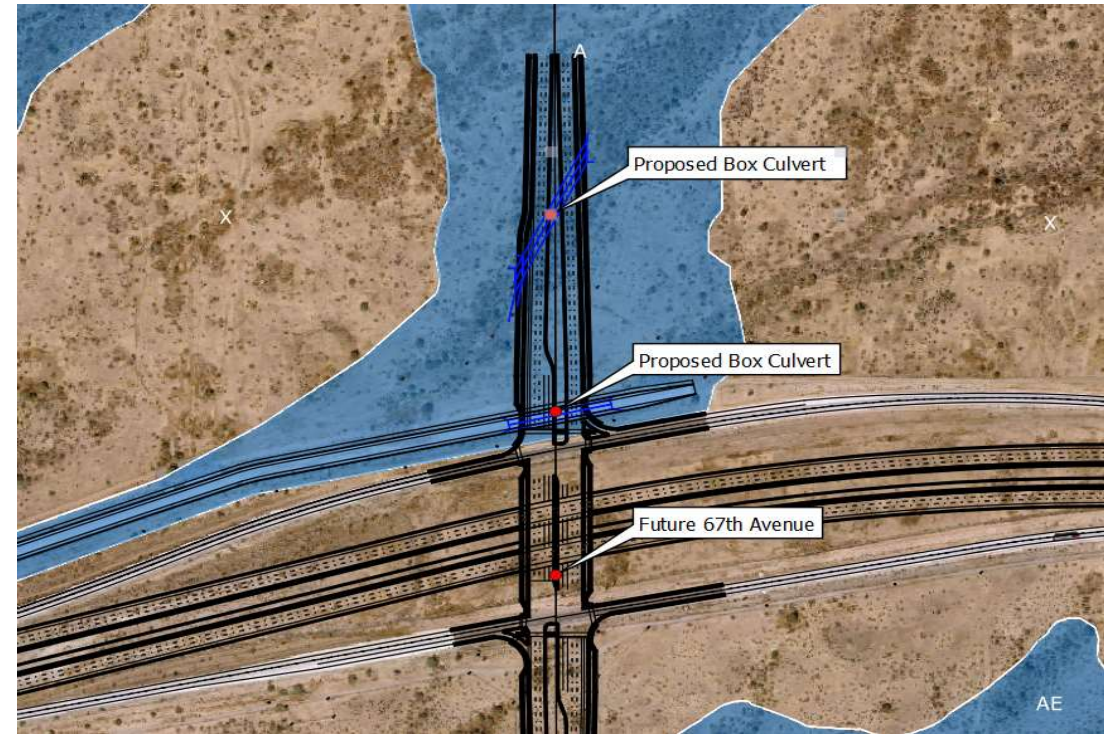


Figure 38. Station 1939+96, 306.0' LT & 1941+01, 848.0' LT – Deadman Wash Tributary 1 FEMA Map View

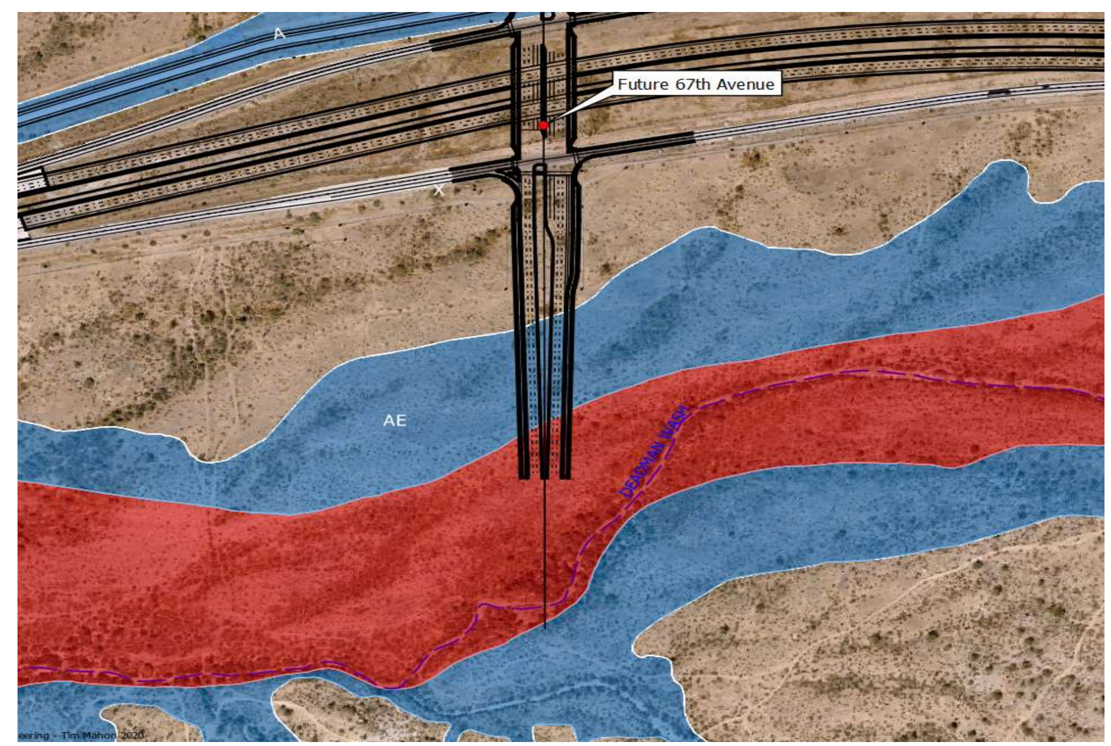


Figure 39. Station 1937+00, 820.0' RT – Deadman Wash Tributary 1 FEMA Map View

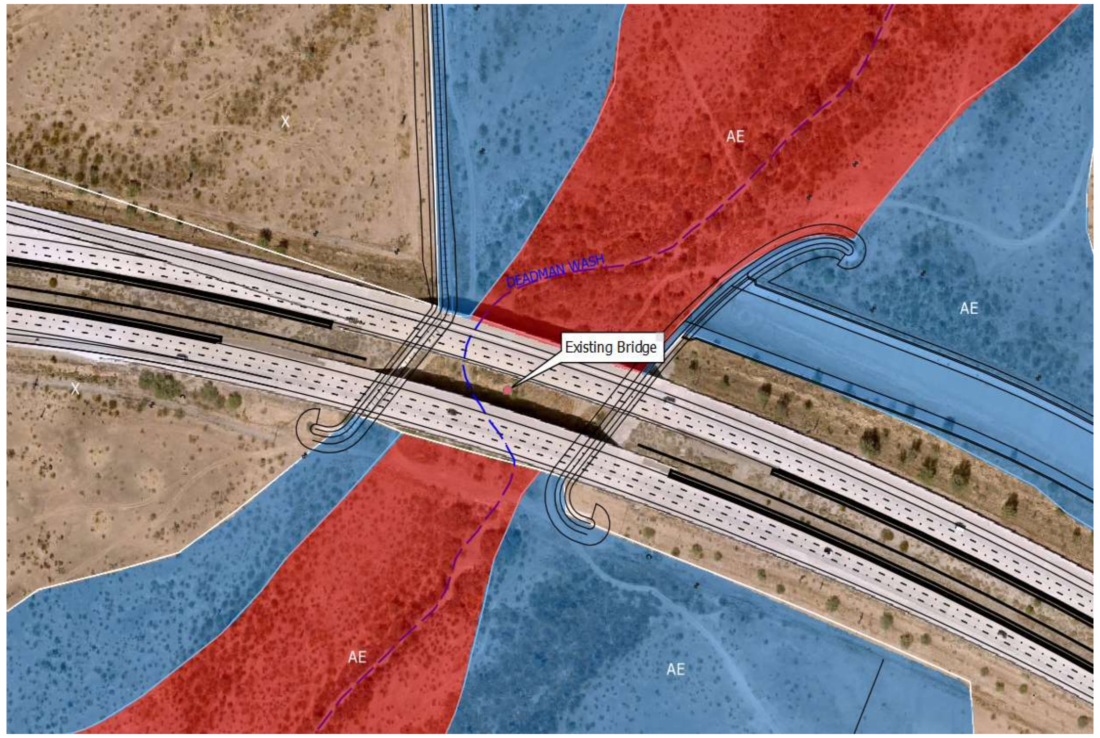


Figure 40. Station 1968+60, 0.0' LT – Deadman Wash FEMA Map View

Figure 41. Station 1987+30, 207.0' LT – Deadman Wash Tributary 2 FEMA Map View

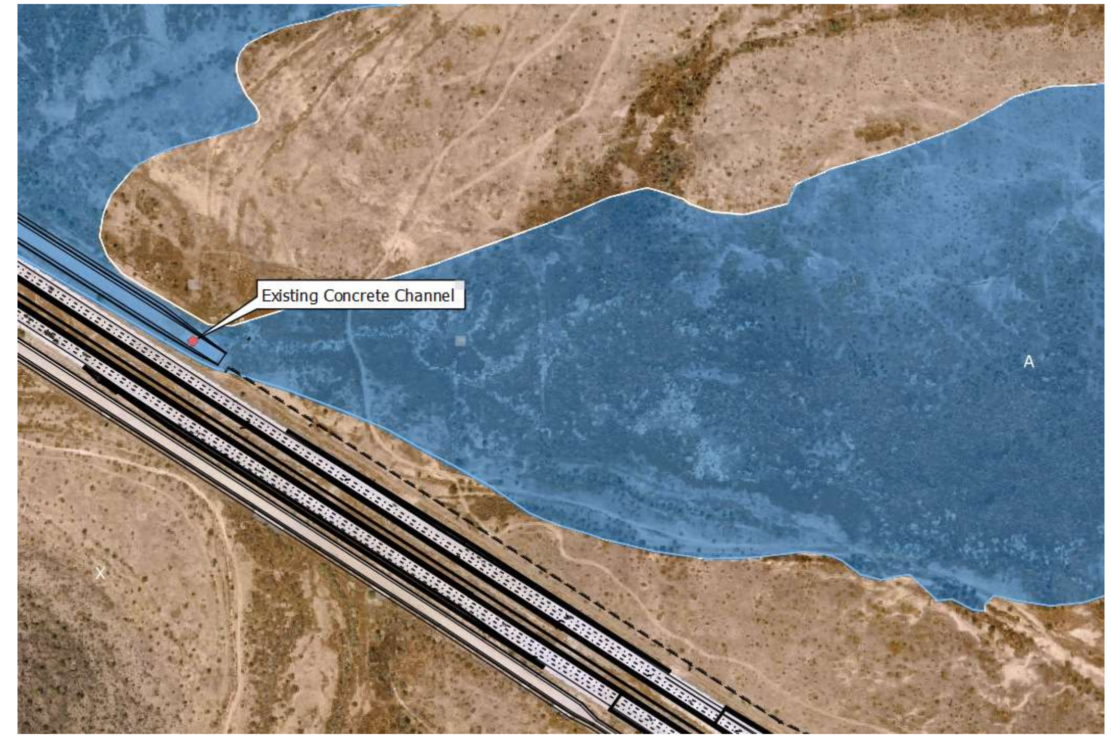


Figure 42. Station 2008+02, 156.0' LT – Deadman Wash Tributary 2a FEMA Map View

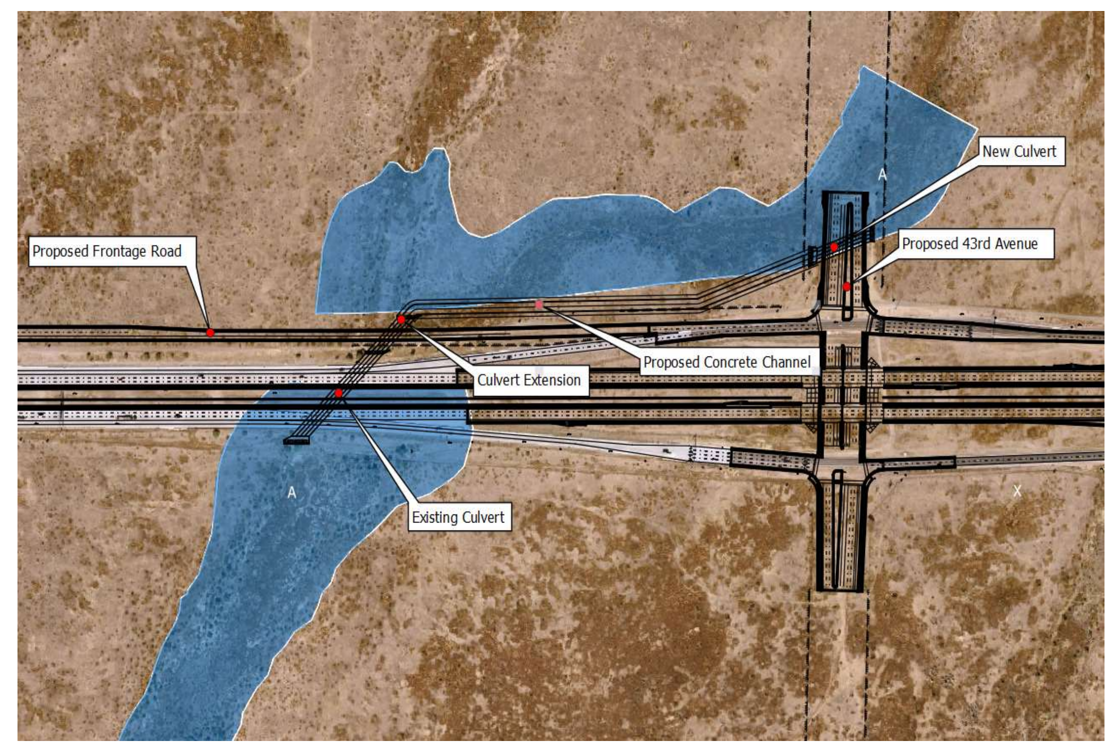


Figure 43. Station 2091+50, 0.0' LT to Station 2109+46, 472' LT – Upper Buchanan Wash FEMA Map View

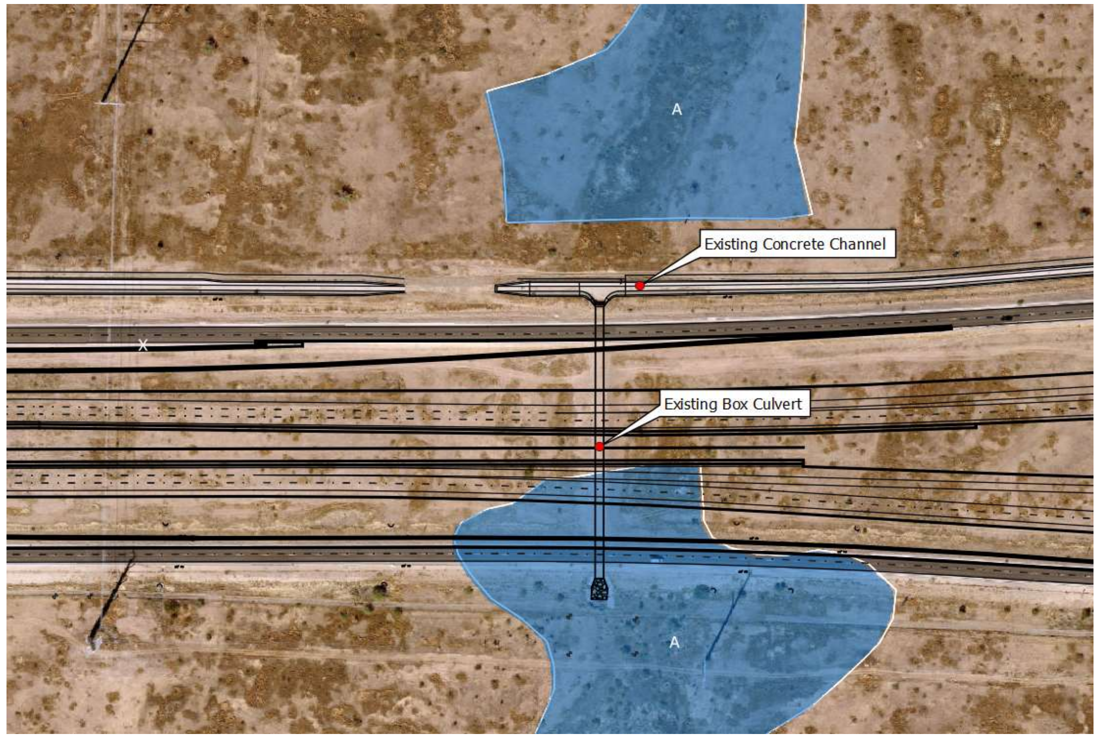


Figure 44. Station 2142+70, 0.0' LT – CAP Wash West FEMA Map View

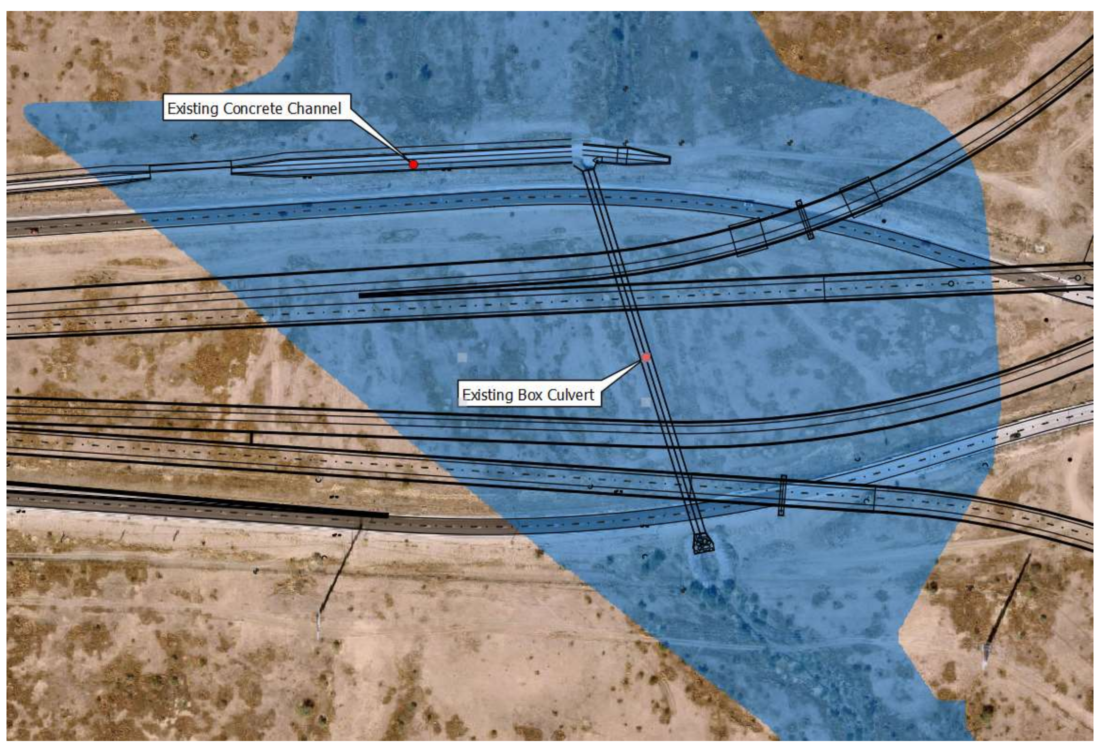


Figure 45. Station 2160+35, 0.0' LT – CAP Wash East FEMA Map View

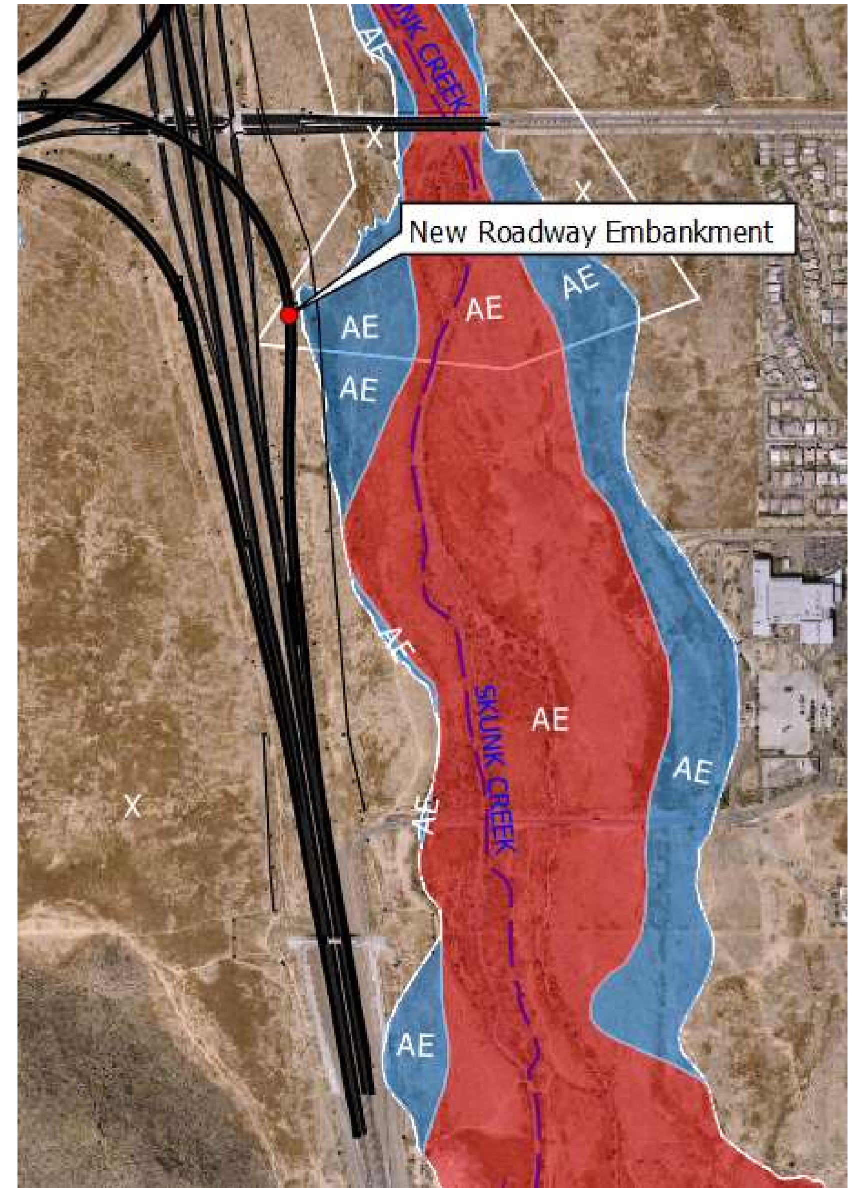


Figure 46. I-17 Med Station 1102+45, 570.0' RT – Skunk Creek FEMA Map View

4.9 Earthwork

The project area has numerous hills and valleys that would require either the removal or addition of material, or fill, to construct the proposed road to the specified design. It would be the responsibility of the contractor to identify any waste disposal sites and to provide the environmental documentation regarding the potential use of these sites, as specified in the ADOT Standard Specifications for Road and Bridge Construction (2021). All waste materials will be removed from the project area and disposed of at an approved facility. Compensation for the materials removed will be made to the appropriate landowner, particularly ASLD.

4.10 Construction Phasing and Traffic Control

The SR 303L mainline section at 67th Avenue and the bridge for 67th Avenue can be constructed with traffic in the existing configuration. The existing temporary ramp connectors on the 67th Avenue ramps can be removed once traffic is switched to the newly constructed mainline pavement.

The proposed SR 303L inside shoulder widening can be constructed with two lanes of mainline traffic utilizing the outside two lanes of mainline and temporarily reducing the existing 12' inside shoulder to 6' and placing temporary concrete barrier for the work zone.

The I-17/SR303L system TI ramps would require shoulder closures in several locations for the construction of bridge foundations, piers, and other structural elements, as well as ramp tie-ins on I-17. Short-term weekend and/or overnight closures may be required. A preliminary construction sequencing plan is provided in Appendix D.

4.11 Traffic Design

The traffic design elements for the SR 303L will consist of signing and pavement marking design, lighting design, traffic signal design and Intelligent Transportation Systems (ITS) design between Lake Pleasant Parkway and I-17.

SR 303L Lane Configuration

The project will construct three (3) mainline lanes along SR 303L in each direction between Lake Pleasant Parkway and I-17. The project will also construct the 67th Avenue interchanges in its ultimate configuration along with upgrades to 51st Avenue and 43rd Avenue interchanges to the ultimate configurations. The system interchange at SR 303L and I-17 will be constructed with two (2) lanes on the NW and SE ramps and one (1) lane on EN and SW ramps.

Signing and Pavement Markings

A design plan will be prepared for the preferred alternative for the SR 303L corridor within the project limits and the project approaches on both directions of I-17 which documents the new sign structures along SR 303L and the impacts to existing sign structures along I-17. The objective of the guide sign concept is to provide a clear and consistent advanced guide signing and exit signage for the service and system interchanges.

The design is currently under development and will be included in the Initial Design Concept Report. The guide sign concept will be developed in accordance with FHWA's *Manual of Uniform Traffic Control Devices (MUTCD)*, 2009 Edition and *the Arizona Supplement to MUTCD, 2009 Edition*, and ADOT's *Traffic Guidelines and Policies, TGP 300, Signs*. All the signs included in the guide sign concept shall conform to ADOT's retro-reflectivity standards and will not require any sign lighting for installation. The final location and the size of sign panels and sign structures will be determined during the final design of the project and the final designer must consider the conflicts associated with the installation of other infrastructure such as bridges, drainage features, noise/retaining walls, utilities, and other appurtenances.

Due to the addition of the system interchange at SR 303L and I-17 as well as addition of new service interchanges along SR 303L, existing sign panels and sign structures are no longer applicable and hence will be removed and salvaged. All proposed sign panels, and sign structures will be new equipment within the project limits.

The pavement marking design correspond with the new lane configurations for the mainline, auxiliary lanes, cross streets, and the service/system interchange ramps and ramp terminal intersections. The pavement marking plans have been developed to comply with FHWA's *MUTCD, 2009 Edition* and ADOT's *Signing and Pavement Marking Standard Drawings*, Latest Edition.

Traffic Signals

The project improvements will require modifications to existing traffic signals and/or construction of new traffic signals at service interchanges. The impacts of the project improvements on the traffic signals will need to be evaluated further during the final design for the individual projects for implementation.

Lighting

High mast lighting exists along I-17 to about half mile north of Dixileta Drive overpass and the existing lighting along SR 303L is limited to merge/diverge areas for Lake Pleasant Parkway TI, and the ramp terminal intersections of Sonoran Desert Drive and I-17 TI and Lake Pleasant Parkway and SR 303L TI.

SR 303L south of Lake Pleasant Parkway does not have any high mast lighting consistent with rural highway criteria, except at the merge/diverge areas of a service TI and at the ramp terminal intersections. This design will be carried on this section of SR 303L between Lake Pleasant Parkway and I-17. Along I-17, the high mast lighting will be added at the system interchange with SR 303L per the criteria identified below:

- Light Emitting Diode (LED) luminaire fixtures will be used throughout the project corridor.
- Lighting pole foundations, light poles, mast arms, and junction boxes will comply with ADOT *Signing and Lighting Standard Drawings*, Latest Edition.
- Light loss factor (LLF): 0.8
- RP-8-00 luminaire standard for freeway Class B
    - Minimum average maintained horizontal illuminance: 0.6 footcandles
    - Minimum illuminance value: 0.2 footcandles
    - Average to minimum uniformity ratio: 4:1 or better

The lighting design shall consider impacts to any residential land uses (if any) in the project vicinity adjacent to ADOT ROW. The light spill and glare outside the ADOT ROW will be addressed during the final design of the project improvements. During final design, the lighting designer shall consider luminaire options such as horizontal mount luminaire with a pole adapter or high mast lighting (along I-17) with a forward throw optics at locations where the glare could be an issue.

Intelligent Transportation Systems (ITS)

Trunkline ITS conduits (3-count, 3-inch) and 144-count single mode fiber optic (SMFO) cable exists along the southern ROW limits between Lake Pleasant Parkway. On the northern ROW limits of SR 303L, the existing SMFO transitions from 3-count 3-inch conduits 144-count SMFO to direct-buried armored 144-count SMFO just east of Lake Pleasant Parkway interchange to the point of termination at I-17. The direct-buried SMFO will be upgraded to a 3-cell, 3-inch conduits from Lake Pleasant Parkway to 51st Avenue as per ADOT's *ITS Design Guide* requirements. At 67th Avenue, the ITS design includes mainline loops, advanced detection loops on the on-ramps, ramp meter cabinets, CCTV camera and wrong-way detection equipment.

At the Sonoran Desert Drive and I-17 TI, there is existing 144-count SMFO on both sides located within 3-count 3-inch conduits within the project limits. The ITS design will maintain the existing ITS splices between the SR 303L and I-17 trunkline communication system. New ITS devices will be added and/or upgraded at SR 303L and I-17 System Interchange to meet ADOT's *ITS Design Guide* requirements.

4.12 Utilities

There are some major utilities that have been relocated within these project limits, along with others that will remain in place. APS has an overhead 69kV transmission line crossing the SR 303L approximately 6,650 feet west of the proposed 51st Avenue TI that was relocated as of February 2022. This overhead crossing was originally located at Station 2052+91 and now resides near Station 1956+52. APS has another overhead transmission crossing located at Station 2135+08 that will remain in place. No conflicts are anticipated with either of these overhead crossings.

The majority of the remaining utilities that will require relocation run along the I-17 Right-of-Way. These utilities will most likely be impacted by the proposed I-17 System Interchange. Relocation of the utilities relating to the planned system interchange should be coordinated such that further repositioning will not be necessary at the time of construction.

The City of Phoenix has constructed water and sewer facilities at the upcoming 51st Avenue and 43rd Avenue TI projects, which are currently in the final design phase. These facilities run along the north side of the SR303L, beneath the future frontage road between the two TI's.

Additional sleeves will be included for private utility owners that have expressed interest in future crossings at these locations. Table 29 identifies the that sleeves are currently being finalized as a part of the utility clearance for this project.

Table 29. Utilities in Project Area

Utility Owner	51st Avenue Crossroad (Station 2042+67)	43rd Avenue Crossroad (Station 2109+33)
City of Phoenix	1-72" Steel Water Sleeve, 2-48" Steel Sanitary Sewer Sleeves, 1-36" Steel Water Sleeve	1-36" Steel Water Sleeve
COX Communications	3-2" Conduits	3-2" Conduits
Lumen (CenturyLink)	2-4" Conduits	2-4" Conduits
Verizon (MCI)	2-4" Conduits	2-4" Conduits
APS	8-5" Conduits	8-5" Conduits

ASLD has also shown interest in having utility sleeves provided along the SR303L for future utilities. The number and size of these sleeves are unknown and will be coordinated further during final design. The location of these sleeves would be at approximate at Stations 1914+00 and 2000+00.

As development within the Cities of Peoria and Phoenix continues, particularly along the freeway corridor, new utilities may be required. Future utilities may include fiber optic, water, sewer, gas, and power lines. Main trunk lines and distribution lines would be necessary to service the developing communities. Coordination with the City of Peoria, City of Phoenix, private utility companies, and developers of the communities will be necessary to avoid future utility conflicts.

During final design, the City of Phoenix, City of Peoria, and each utility company will receive and review the preliminary design plans for this project. Utility conflicts will be resolved with cooperation from the affected companies. Construction plans for the relocations and/or adjustments to the utilities will be developed by the responsible parties.

All ADOT utilities that are in conflict will be included in the freeway design and utility relocation efforts. This will include the conversion of any existing unmetered freeway lighting, traffic signals or any other electrical facilities into metered services.

4.13 Structures

The SR 303L from Lake Pleasant Parkway to the I-17/SR303L system TI includes six (6) traffic interchange bridges at major crossroads and six (6) ramp structures at the SR 303L/I-17 TI. The structures are listed in Table 28 along with preliminary evaluation recommendations of bridge and girder type, span configuration, abutment type, and estimated cost. Recommendations should be further evaluated during final design stages and associated Bridge Structure Selection Reports. This DCR reflects updates from the Final Bridges Selection Reports and 95% for the 43rd and 51st Ave TIs. Cost estimates are based on unit cost recommendations provided by ADOT Contracts & Specifications for the February 25, 2022, Stage IV submittal of the 43rd and 51st TIs final design.

Table 30. Summary of New Structures

ID	Structure Location	Girder Type	Spans	Abut ment	Width	Length	Max Span	Skew	Cost
1	67th Ave TI SB	UBT42	2	Partial	62.83'	205.83'	100.0'	13°06'	$4,109,074
2	67th Ave TI NB	UBT42	2	Partial	62.79'	205.83'	100.0'	13°06'	$4,106,458
3	51st Ave TI SB	UBT42	2	Partial	62.83'	205.83'	100.0''	13°39'	$4,071,985
4	51st Ave TI NB	UBT42	2	Partial	62.79'	205.83'	100.0'	13°39'	$4,087,610
5	43rd Ave TI SB	UBT42	2	Partial	62.83'	205.5'	100.0'	1°34'	$3,877,737
6	43rd Ave TI NB	UBT42	2	Partial	62.79'	205.5''	100.0'	1°34'	$3,870,587
7	Ramp SW over I-17 SB FR	CIP/PT	3	Stub	43.17'	406.0'	184.0'	0°	$5,768,646
8	Ramp SW over 303 SB FR	CIP/PT	2	Stub	43.17'	238.4'	117.0'	0°	$3,373,353
9	Ramp ES over 303 NB FR	UBT66	3	Stub	43.17'	404.2'	135.0'	0°	$5,713,311
10	Ramp ES under I-17 SB FR	UBT66	2	Full	35.17'	279.2'	137.0'	0°	$3,588,068
11	Ramp NW over I-17	CIP/PT	12	Stub	43.17'	2182.0'	205.0'	0°	$30,223,021
12	Ramp NW over I-17 NB FR	CIP/PT	3	Stub	43.17'	402.0	167.0'	0°	$5,614,317

Bridge evaluation was based on the ADOT Bridge Guidelines and AASHTO LRFD Bridge Design Specifications. The criteria reflected in this Design Concept Report and required in final design include:

- 16'-6" Vertical Clearance
- 16'-0" Temporary Construction Vertical Clearance
- TL-4 single-slope (38-inch) barriers, except
- TL-5 single-slope 42-inch barriers on directional ramps for freeway-to freeway interchanges where ramps cross traffic lanes
- Crossroad lane configurations conform to City of Phoenix standard, Cross Section "B" – Major Arterial modified to allow for dual left turns in each direction of travel and clearance to the center pier

Segments of the SR303L mainline and the SR303L/I-17 system interchange bridges are already constructed and will to be incorporated into the ultimate construction. At the traffic interchange locations where the existing SR 303L mainline traffic uses future ramps, the segments of existing PCCP will be connected to create the complete freeway section. At the I-17/SR303L system interchange, the system ramps will be incorporated without modification into the existing system. Table 30 provides the proposed structure depths and minimum distance between top of roadway (TOR) profiles for use in deriving vertical clearances .

Bridge width recommendations consider that all lanes of traffic on existing roadways must remain open during construction. Where exception is required, the closure is described in the specific bridge section. Where cast-in-place, post-tensioned (CIP/PT) recommendations are made, falsework depth and required lane opening width during construction is considered in required selecting structure depth and verifying minimum vertical clearances.

The structure types and dimensions provided in this DCR are recommendations for estimation, constructability, and setting of roadway profiles. Cost estimates are based on historical ADOT bids. The final structure selections will occur during the final design stage and refined selection made through a Bridge Selection Report.

Aesthetic treatments at anticipated on exposed structural concrete and conforming to the existing aesthetics of the corridor including the 2007 *SR 303L Aesthetic Guidelines* and the 2021 *Arizona's State Highway System Standard Aesthetics – Roadside Landscape Architecture Guidelines.* Standard vertical rustication on abutments and wingwalls, large icons on bridge piers, paint, barrier rustication, and other structural elements is anticipated. Exposed structural concrete will be painted. All aesthetic treatments will be reviewed and approved by ADOT Roadside Development and ADOT Central District.

Table 31. Structure Depth and Vertical Clearances

ID	Structure Location	Structure Depth (A)	Vertical Clearance (B)	Minimum TOR-to-TOR (A+B)
1	67th Ave TI SB	4.50'	21.4'	25.89'
2	67th Ave TI NB	4.50'	21.0'	25.51'
3	51st Ave TI SB	4.50'	16.7'	21.17'
4	51st Ave TI NB	4.50'	16.6'	21.11'
5	43rd Ave TI SB	4.50'	18.0'	22.45'
6	43rd Ave TI NB	4.50'	18.8'	23.32'
7	Ramp SW over I-17 SB FR	7.91'	17.0'	24.96'
8	Ramp SW over 303 SB FR	5.85'	20.3'	26.19'
9	Ramp ES over 303 NB FR	7.00'	16.5'	23.50'
10	Ramp ES under I-17 SB FR	7.00'	17.8'	24.80'
11	Ramp NW over I-17	8.82'	24.2'	33.01'
12	Ramp NW over I-17 NB FR	7.18'	20.8'	28.02'

4.13.1 43rd, 51st, and 67th Avenue TIs

The 43rd and 51st Avenue TIs are considered in place and functional for the purposes of this DCR. An additional traffic interchange is planned at 67th Avenue, and . following the design approach at the 51st and 43rd Avenues, the traffic interchange bridges would be constructed in an interim condition with three (3) lanes and full shoulders, with future widening (after 2025) occurring to the inside to achieve the ultimate roadway configuration.

Roadway profiles have been evaluated for overpass (SR 303L over the cross streets) and underpass options, and an overpass is recommended for constructability, traffic control considerations, and to enable connecting with existing ultimate ramp and mainline infrastructure. Underpass options would require removal of segments of constructed ramps, mainline, and unnecessary waste of usable infrastructure.

Bridge span configuration and structure type evaluations prioritize limiting structure depth to minimize roadway profile, borrow for embankment, and overall costs. A pre-cast, prestressed (PC/PS) girder bridge is recommended at these locations to enable opening up of crossroad traffic as early as possible during construction by eliminating falsework. A UBT42 PC/PS is recommended as it provides low structure depth, less girders as compared to AASHTO girder and box beams due alternatives and is shown in Figure 47 for each traffic interchange.

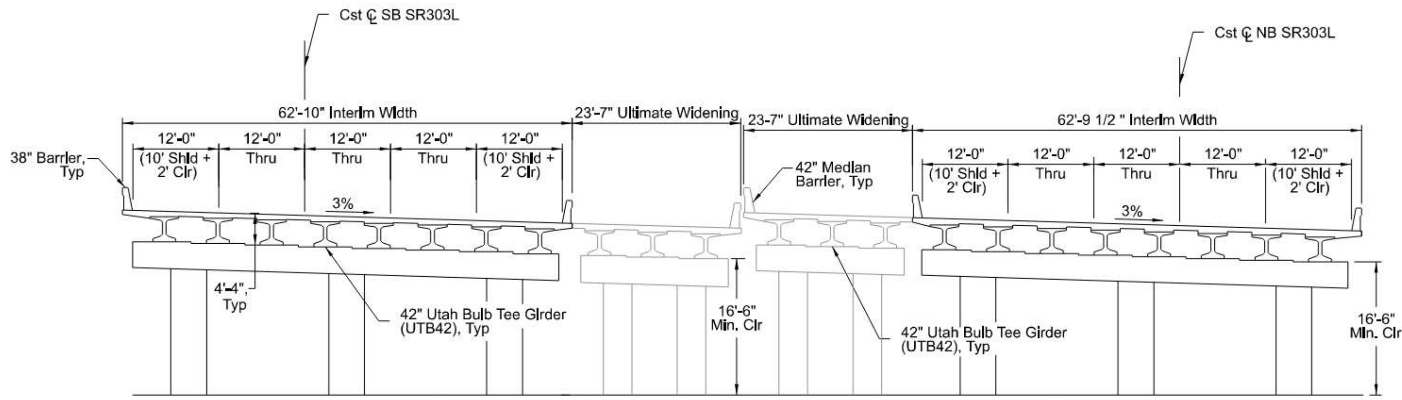
The continuous, two-span, precast, prestressed UBT 42 girder bridge, similar to those used at the 51st and 43rd Avenues TIs, is recommended to minimize girder depth and lines. Final design of the interchanges may use traditional-strength girders on full abutments to shorten spans and further reduce structure depth. Use of higher concrete strength of 8.5 ksi and use of partial-height abutments at 3:1 slope can further increase spans, with higher costs offset by elimination of more-costly full-height abutment and walls. The abutment face shall be offset from curb sufficiently to provide an offset sidewalk and sufficient sight distance for turning crossroad traffic.

If early access is not required at 67th Avenue TI, a continuous, two-span, cast-in-place, post-tensioned (CIP/PT) concrete girder bridge constructed on soffit fill can be built for comparable cost and similar low structure depths. The proposed roadway profile allows the bridges to be widened either in-kind considering falsework depth, or with PC/PS girders, while meeting temporary and permanent vertical clearance requirements. The savings of CIP/PT on soffit fill are found through elimination of falsework, girder transport and crane operations, reduced earthwork costs through compact superstructure depth and lowered roadway profiles and leveraging of borrow already required for the mainline embankment.

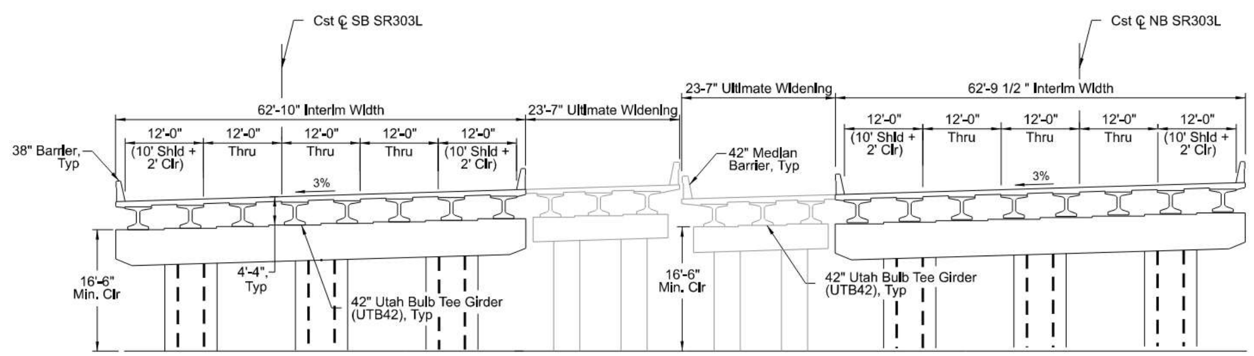
The proposed SR 303L mainline has adequate vertical clearance to account for future widening with pre-cast, pre-stressed (PC/PS) 42-inch Utah Bulb Tee girders. A minimum 16'-6" vertical clearance is required, however a 6-inch rise in roadway would enable widening with CIP/PT including 3'-0" falsework. The proposed 43rd , 51st , and 67th Avenue crossroad lane configurations represent ultimate conditions as provided by the City of Phoenix and ADOT. Bridge span configurations do not need to consider future widening of the crossroad.

Flanking retaining walls with stepped footings are assumed for the proposed full and partial height abutments. These may be left in place during future widening for the ultimate condition but should incorporate details which facilitate tying in with the new structure.

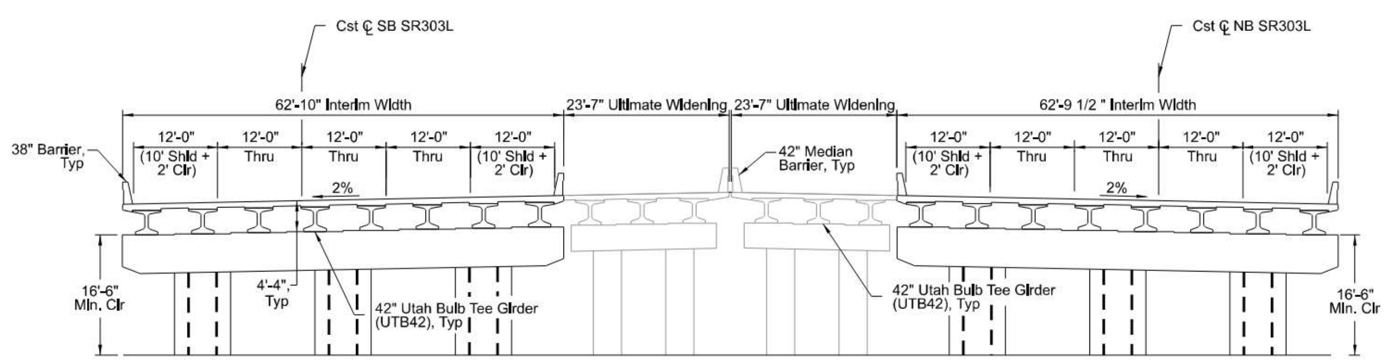
Twin structures are proposed to limit transverse thermal structural loads experienced by wide bridges. Additionally, separation of structures by flow direction facilitates future programming of bridge and pavement maintenance, as pavement preservation projects are often funded by direction, and deck and pavement often receive higher wear in one direction (e.g., eastbound, loaded trucks from California).



TYPICAL SECTION
1: 67th Ave OP SB
2: 67th Ave OP NB



TYPICAL SECTION
3: 51st Ave OP SB
4: 51st Ave OP NB



TYPICAL SECTION
5: 43rd Ave OP SB
6: 43rd Ave OP NB

Figure 47. Typical Sections of 43rd, 51st, and 67th Avenue TIs

4.13.2 I-17 SR 303L System TI

The proposed I-17/SR303L system TI is a directional "T" with the SR 303L mainline extending to the west. Six (6) ramp structures are required to obtain the proposed system TI as listed in Table 28, including five (5) ramp structures over/under frontage roads and one (1) flyover ramp over I-17. The Directional High Occupancy Vehicle (DHOV) ramp over I-17 is not evaluated as part of this Design Concept Report. The proposed structures and their locations within the interchange are shown in Figure 48.

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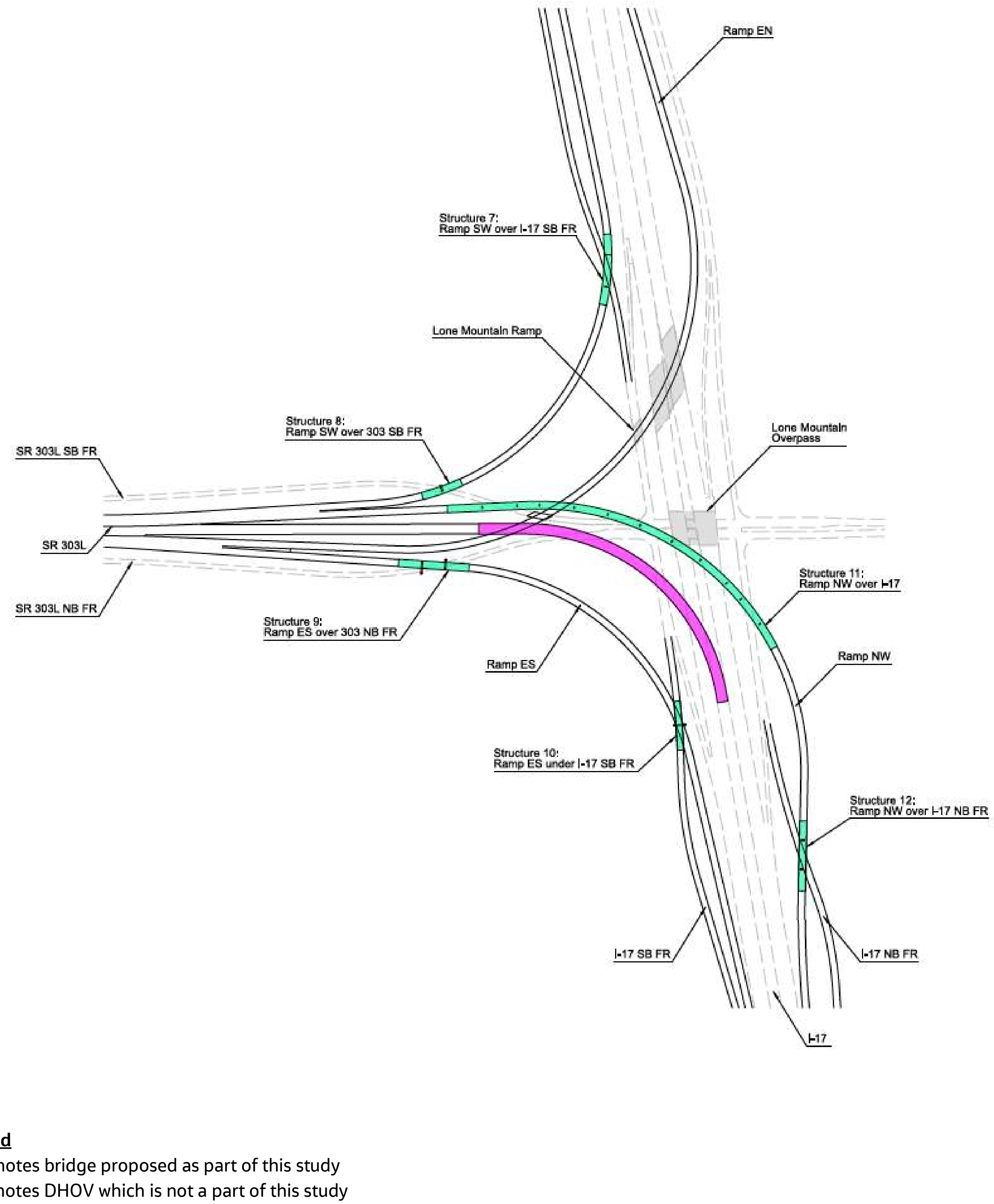

Figure 48. SR 303L / I-17 System TI layout

4.13.3 Ramp SW over I-17 SB FR (Structure 7)

A three-span CIP/PT concrete girder bridge on stub abutments supported by drilled shafts set at a 3:1 slope from roadway is recommended for Ramp SW over the I-17 southbound frontage road as shown in Figure 49. The 184' center span fully crosses the proposed 140-inch diameter, 44-inch diameter and other utilities proposed to run perpendicular to I-17 and below this structure. Due to the presence of large-diameter utilities under the bridge and potential load to the pipe or maintenance access needs, a frame undercrossing is not recommended. The sufficient vertical clearance and lack of existing traffic to span with falsework allow a deeper girder as well as the potential to construct on soffit fill.

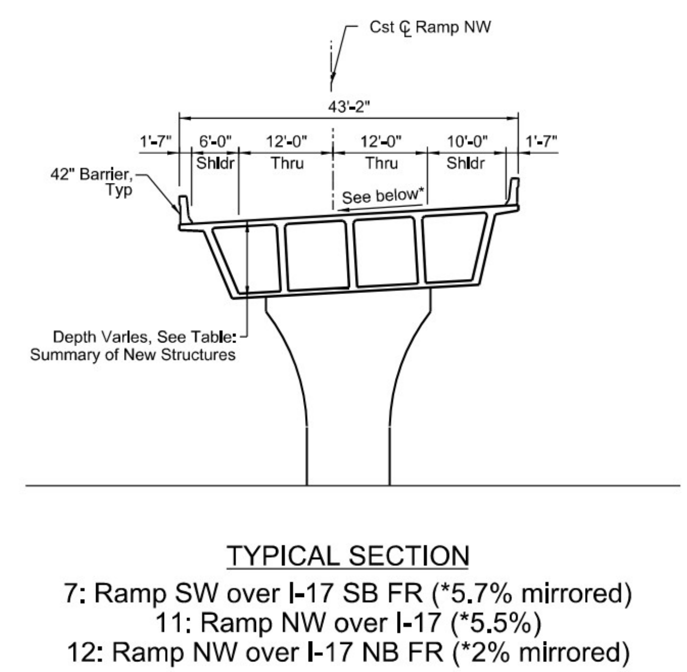

Figure 49. Typical Section CIP/PT on single columns (Structures 7, 11 and 12)

4.13.4 Ramp SW over 303 SB FR (Structure 8)

A two-span, CIP/PT, concrete girder bridge with straddle bent pier and stub abutments with 2:1 slope paving is recommended for Ramp SW over the SR 303 southbound frontage road as shown in Figure 50. The abutments may be founded on drilled shafts enabling use of cost-effective stub-type abutments. The proposed Ramp SW profile accommodates 4'-2" falsework depth and the proposed 5.85ft structure depth. Due to the presence of existing traffic on the frontage road, a frame structure is not recommended as their footings would have to be offset from the existing traveled lanes, increasing the span and consequently structure depth and cost. Post-tensioning of the straddle, as needed, will be determined in final design. A PC/PS concrete girder structure is a suitable alternative to CIP/PT concrete girder structure.

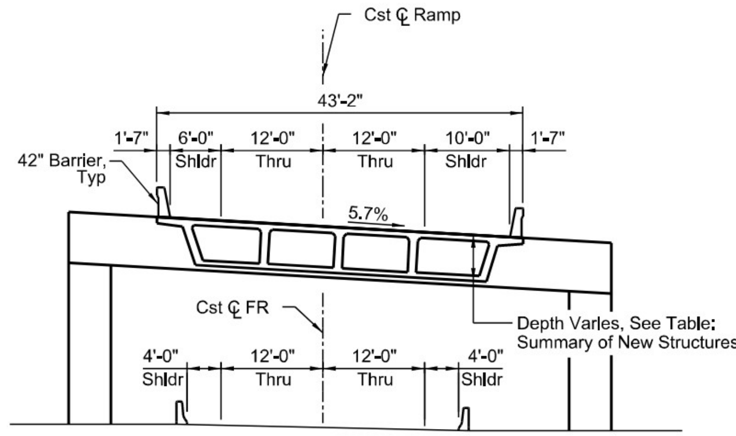

Figure 50. Bridge 8 Typical Section (Ramp SW over 303 SB FR)

4.13.5 Ramp ES over 303 NB FR (Structure 9)

A three-span, precast, prestressed, dapped-end 66" Utah Bulb Tee (UBT66) concrete girder bridge with straddle bent piers and stub abutments is recommended for Ramp ES over the SR 303 northbound frontage road as shown in Figure 51. High strength concrete is used to enable maximizing girder length to span 133'-0". A three-span is recommended in lieu of two-span to enable locating the abutment and slope paving beyond the double-barrel box culvert. Post-tensioning of the straddle, as needed, will be determined in final design. Due to low available vertical clearance and presence of existing roadway/traffic, a CIP/PT structure is not recommended due to additional clearance required for falsework. Due to the presence of existing traffic on the frontage road a frame structure is not recommended as their footings would have to be offset from the existing traveled lanes, increasing the span and consequently structure depth and cost.

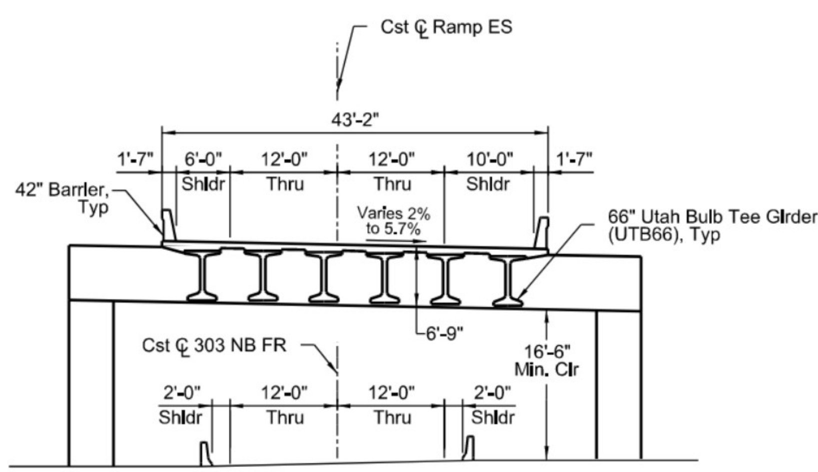

Figure 51. Bridge 9 Typical Section (Ramp ES over NB FR)

4.13.6 Ramp ES under I-17 SB FR (Structure 10)

A two-span, precast, prestressed, dapped-end 66-inch Utah Bulb Tee (UBT66) concrete girder bridge with straddle bent and full-height abutments is recommended for Ramp ES under the I-17 southbound frontage road as shown in Figure 52. High strength concrete is assumed to enable maximizing girder length to span 137'-0". The full-height abutments enable minimizing span length and consequently girder depth. Post-tensioning of the straddle, as needed, will be determined in final design. Due to the frontage road being over the ramp a girder bridge is recommended over a frame undercrossing structure.

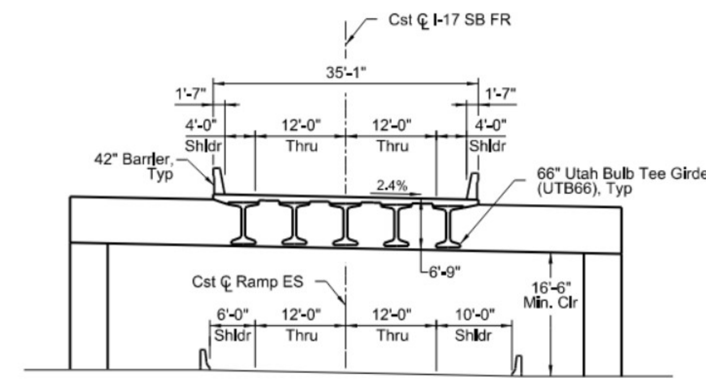

Figure 52. Bridge 10 Typical Section (Ramp ES under I-17 SB FR)

4.13.7 Ramp NW over I-17 Mainline (Structure 11)

A 12-span, CIP/PT concrete girder bridge on single-column piers shown in Figure 49 and stub abutment supported on drilled shaft as is recommended for the Ramp NW over the I-17 mainline. A maximum span of 205 feet and a structure depth of approximately 8'-10" are anticipated. Long-term closures of I-17 mainline will be not allowed during construction. Construction of the ramp can be accomplished with falsework shoring towers placed in the I-17 mainline shoulders and perpendicular to the ramp alignment. For the proposed ramp alignment, an 8'-0" falsework depth is estimated to enable spanning all lanes of I-17 traffic. A closure of the centner lane of the southbound exit ramp at the intersection I-17 and Sonoran Desert Drive is anticipated to construct the ramp over the intersection. Due to the long spans required over the I-17 mainline, an AASHTO girder superstructure alternative is not recommended.

4.13.8 Ramp NW over I-17 NB FR (Structure 12)

A three-span, CIP/PT, concrete girder bridge on single-column piers and stub abutments (as shown in Figure 48) supported by drilled shafts set at a 3:1 slope from roadway is recommended for Ramp NW over the I-17 northbound frontage road. The lack of existing traffic and ample vertical clearance enable a 7.18-foot structure depth and potential to construct on soffit fill. Due to the high profile of the NW ramp, a frame structure is not recommended as the structure would need to 1) support 8'-0" of fill, increasing loads, member sizes, and costs, or 2) increase frame height, and consequently depths of all members, reducing the cost-effective range for this structure type.

4.14 Preliminary Pavement Considerations

The existing SR 303L mainline pavement is comprised of Portland cement concrete pavement (PCCP) and aggregate base course (AB) with a pavement structural section of 11-inch PCCP on 4-inch AB (Class 2).

Preliminary pavement design indicates a thicker pavement section is required due to the anticipated increased traffic volume. SR 303L mainline pavement and system interchange ramp pavement will be comprised of 14-inch PCCP on 4-inch AB (Class 2).

Mainline interchange ramps have a pavement structural section of 10-inch PCCP on 4-inch AB (Class 2) matching the existing pavement section for interchange ramps.

The existing temporary ramp connectors pavement section on the 67th Avenue ramps is 4-inch AC (3/4-inch) on 6-inch AB (Class 2). This will be removed and replaced with 10-inch PCCP on 4-inch AB (Class 2) to match the existing ramp section.

The proposed SR 303L inside shoulder widening is assumed to have a pavement section of 3-inch AC (3/4-inch) on 8-inch AB (Class 2) to match the adjacent project F011601C.

Final pavement sections will need to be developed with the geotechnical investigation and materials design report during final design.

There are various segments with the SR 303L mainline paving that are experiencing significant cracking. These areas should be further investigated during final design stages to determine the cause of the cracking and the appropriate mitigating repairs should be included with the project construction. Further information is included in Appendix G.

4.15 Habitat Connectivity

A natural biological community characterizes the project area. Vegetation is dominated by creosote bush and paloverde-mixed cacti plant associations. Riparian ecosystems in the project area have developed in response to patterns of flooding, groundwater fluctuation, and impoundment structures. Riparian corridors are ephemeral, flowing only in direct response to precipitation in the immediate area. The area generally does not support substantial wildlife habitat resources.

The riparian corridors and undeveloped desert habitat within the project limits provide an important wildlife connectivity zone as designated by the Arizona Game and Fish Department (AZGFD). Skunk Creek is considered a Maricopa County Wildlife Movement Area as it provides a riparian corridor for movement. Additional needs for culverts and drainages should be evaluated for wildlife connectivity. To lessen or avoid potential impacts to wildlife, removal or disturbance of vegetation would be minimized through project design as practicable.

4.16 Trails

There are several planned trails within the project corridor, including:

- The Maricopa Trail along the west side of North Lake Pleasant Parkway near MP 131.5
- A trail extending from the CAP Canal and intersecting the highway near MP 134
- A trail along New River intersecting the highway near MP 134
- Two trails along Deadman Wash intersecting the highway near MP 134
- A trail along the unpaved portion of 51st Avenue intersecting the highway near MP 136.7

The City of Peoria *Community Services Masterplan* (August 2014) identifies current and future trail systems within the project area, including the trails along New River, Deadman Wash and the CAP. Consideration of trail connectivity should be included during final design stages. Where possible, existing structures and large concrete box culverts could be used for trail crossings, and sidewalk should extend throughout the TI locations.

4.17 Landscape and Aesthetics

Landscaping and aesthetics shall follow the ADOT Roadside Development Landscape Architecture Guidelines for *State Highway System Standard Aesthetics*, July 2021. During final design, coordination with the Cities of Peoria and Phoenix, the Arizona State Land Department and the ADOT Central District will be required to determine the landscape and aesthetic requirements for the project.

5.0 ITEMIZED COST ESTIMATE

5.1 Project Cost Assumptions

The estimated unit costs are based on unit prices obtained from recent ADOT bid results for similar projects within the Phoenix Metro area, and consistent with prices utilized by ADOT's Regional Freeway Program Management Consultant.

The estimate has a base year of 2022.

Pavement structural sections used in this estimate are provided in Section 4.14 of this report.

Following is a list of assumptions reflected in the cost estimate:

- No new right of way is anticipated for the project.
- Additional access control along 67th Avenue will be required but is not included in the estimate.
- Freeway lighting is not included for the mainline widening portion of the project but is included for the I-17/SR303L System Interchange.
- Upgrades to ITS or FMS is not included.
- In accordance with the adjacent project under construction, mainline SR 303L shoulder widening will be 4-foot of an AC/AB pavement section adjacent to the existing PCCP, and 6-foot of compacted AB graded towards the median. A design exception will be requested.
- System interchange ramps with I-17 will be constructed as two-lane ramps, with tapers as needed for lane drops and lane additions.
- I-17 frontage roads are not included.
- Widening of I-17 is not included.
- Environmental mitigation costs are not included.
- 20% has been added to the construction costs for unidentified items that have not been quantified.

The funding for the design and construction of the 51st Avenue and 43rd Avenue traffic interchanges and associated mainline and ramp paving has been obtained separately and is not included in the estimate.

5.2 Project Cost Estimate

The estimate of probable project costs for this DCR Update is approximately $261,606,000 in 2022 dollars. The estimated cost for SR 303L/I-17 System Interchange and third general purpose lane from 51st Avenue to I-17 is $217,778,700 and the estimated cost for SR 303L mainline and bridges at 67th Avenue and the third general purpose lane from Lake Pleasant Parkway to 51st Avenue is $43,827,300.

(Continued on Page 70)

ARIZONA DEPARTMENT OF TRANSPORTATION

Estimated Engineering Construction Cost

DETAILED COST ESTIMATE, DCR UPDATE PREFERRED ALTERNATIVE

Project Number: M698701X, SR 303L DESIGN CONCEPT REPORT UPDATE — March 9, 2022

Location: SR 303L, LAKE PLEASANT PARKWAY TO I-17 PHASE 1

303/17 SYSTEM TI AND THIRD GPL BETWEEN 51ST AVE AND I-17

ITEM NO.		ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001		CLEARING AND GRUBBING	L.SUM	1	$1,000,000.00	$1,000,000.00
2020041		REMOVAL OF PIPE	L.FT.	1,525	$40.00	$61,000.00
2020048		REMOVAL OF STRUCTURE (CATCH BASIN)	EACH	19	$1,000.00	$19,000.00
2020165		REMOVE (CONCRETE LINED DITCH)	L.FT.	187	$40.00	$7,480.00
2020053		REMOVE (BRIDGE SIGN PANEL)	EACH	8	$1,000.00	$8,000.00
2020057		REMOVE AND SALVAGE (BRIDGE SIGN STRUCTURE)	EACH	3	$6,000.00	$18,000.00
2020060		REMOVE AND SALVAGE (CANTILVER SIGN STRUCTURE)	EACH	2	$4,000.00	$8,000.00
2030301		ROADWAY EXCAVATION	CU.YD.	81,500	$12.00	$978,000.00
2030904		BORROW (IN PLACE)	CU.YD.	857,900	$14.00	$12,010,600.00
2090005		FURNISH WATER	M.GAL.	106,100	$6.00	$636,600.00
3030022		AGGREGATE BASE, CLASS 2	CU.YD.	23,122	$65.00	$1,502,930.00
4010016		PORTLAND CEMENT CONCRETE PAVEMENT (14")	SQ.YD.	150,548	$90.00	$13,549,320.00
4090003		ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL)	TON	2,416	$130.00	$314,080.00
5012524		STORM DRAIN PIPE, 24"	L.FT.	6,814	$120.00	$817,680.00
5012530		STORM DRAIN PIPE, 30"	L.FT.	1,152	$135.00	$155,520.00
5012536		STORM DRAIN PIPE 36"	L.FT.	451	$160.00	$72,160.00
5012548		STORM DRAIN PIPE, 48"	L.FT.	2,135	$320.00	$683,200.00
5014253		FLARED END SECTION (	EACH	23	$2,500.00	$57,500.00
5030606		CONCRETE CATCH BASIN (C-15.92)	EACH	107	$8,000.00	$856,000.00
5030609		CONCRETE CATCH BASIN (C-15.80)	EACH	16	$8,000.00	$128,000.00
5050001		MANHOLE (C-18.10) (NO. 1) (FOR PIPES 6" TO 36")	EACH	12	$8,000.00	$96,000.00
6060046		BRIDGE SIGN STRUCTURE (SD9.20, TYPE 2F)	EACH	1	$65,000.00	$65,000.00
6060047		BRIDGE SIGN STRUCTURE (SD9.20, TYPE 3F)	EACH	3	$85,000.00	$255,000.00
6060048		BRIDGE SIGN STRUCTURE (SD9.20, TYPE 4F)	EACH	1	$95,000.00	$95,000.00
6060058		BRIDGE SIGN STRUCTURE (TAPERED TUBE, SINGLE BEAM, 70' 1" TO 85')	EACH	2	$27,500.00	$55,000.00
6060059		BRIDGE SIGN STRUCTURE (TAPERED TUBE, SINGLE BEAM, 85'1" TO 100')	EACH	2	$32,000.00	$64,000.00
6060074		FOUNDATION FOR BRIDGE SIGN STRUCTURE (TAPERED TUBE)	EACH	8	$7,000.00	$56,000.00
6060076		FOUNDATION FOR BRIDGE SIGN STRUCTURE (SD9.20, TYPE 2F)	EACH	2	$10,000.00	$20,000.00
6060078		FOUNDATION FOR BRIDGE SIGN STRUCTURE (SD9.20, TYPE 3F)	EACH	6	$12,500.00	$75,000.00
6060079		FOUNDATION FOR BRIDGE SIGN STRUCTURE (SD9.20, TYPE 4F)	EACH	2	$15,000.00	$30,000.00
6060131		CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 1C)	EACH	1	$42,000.00	$42,000.00
6060132		CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 2C)	EACH	10	$45,000.00	$450,000.00
6060133		CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 3C)	EACH	6	$50,000.00	$300,000.00
6060163		SIGN STRUCTURE (MEDIAN) (TWO-SIDED)	EACH	1	$60,000.00	$60,000.00
6060239		FOUNDATION FOR SIGN STRUCTURE (MEDIAN)	EACH	1	$12,000.00	$12,000.00
6060254		FOUNDATION FOR CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 1C)	EACH	1	$12,000.00	$12,000.00
6060255		FOUNDATION FOR CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 2C)	EACH	10	$12,000.00	$120,000.00
6060256		FOUNDATION FOR CANTILEVER SIGN STRUCTURE (SD9.10, TYPE 3C)	EACH	6	$12,000.00	$72,000.00
6080010		SIGN PANEL (	SQ.FT.	7,506	$30.00	$225,180.00
6080055		SIGN PANEL (BRIDGE MOUNTED SIGN)	EACH	3	$3,000.00	$9,000.00
7010003		MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	L.SUM	1	$8,582,000.00	$8,582,000.00
7040005		PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	352,140	$0.40	$140,856.00
7040006		PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	179,350	$0.40	$71,740.00
7040074		PAVEMENT SYMBOL (EXTRUDED THERMOPLASTIC) (ALKYD) (0.090")	EACH	96	$300.00	$28,800.00
7060013		PAVEMENT MARKER, RAISED, TYPE C	EACH	4,890	$2.50	$12,225.00
7330032		TRAFFIC SIGNAL (COMPLETE)	EACH	2	$300,000.00	$600,000.00
7360300		ROADWAY LIGHTING	L.SUM	1	$1,760,000.00	$1,760,000.00
8050003		SEEDING (CLASS II)	ACRE	12	$4,200.00	$50,400.00
8101013		EROSION CONTROL (1%)	L.SUM	1	$1,073,000.00	$1,073,000.00
9010001		MOBILIZATION	L.SUM	1	$8,582,000.00	$8,582,000.00
9040201		MEDIAN CABLE BARRIER (	L.FT.	9,687	$25.00	$242,175.00
9040223		MEDIAN CABLE BARRIER END TERMINAL (	EACH	10	$4,500.00	$45,000.00
9050006		GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	150	$35.00	$5,250.00

ITEM NO.		ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
9050026		GUARD RAIL TERMINAL (	EACH	6	$4,500.00	$27,000.00
9050419		GUARD RAIL TRANSITION (THRIE BEAM TRANSITION)	EACH	20	$5,000.00	$100,000.00
9080085		CONCRETE CURB AND GUTTER (C-05.10, TYPE C & C-1)	L.FT.	42,016	$40.00	$1,680,640.00
9100001		CONCRETE BARRIER	L.FT.	16,519	$120.00	$1,982,280.00
9130007		RIPRAP (DUMPED) (6")	CU.YD.	15	$120.00	$1,800.00
9130010		RIPRAP (GROUTED) (6")	CU.YD.	15	$160.00	$2,400.00
9210016		MEDIAN PAVING (DECORATIVE PAVEMENT)	SQ.YD.	0	$100.00	$0.00
9240126		MISCELLANEOUS WORK (ITS)	L.SUM	1	$500,000.00	$500,000.00
9240129		MISCELLANEOUS WORK (GRANITE MULCH AND LANDSCAPING)	SQ.YD.	139,300	$6.00	$835,800.00
9140153		RETAINING WALL (	SQ.FT.	135,000	$100.00	$13,500,000.00
9240170		CONTRACTOR QUALITY CONTROL	L.SUM	1	$1,609,000.00	$1,609,000.00
9250001		CONSTRUCTION SURVEYING AND LAYOUT	L.SUM	1	$2,146,000.00	$2,146,000.00
		SUBTOTAL ROADWAY				**$78,574,616.00**
9999903	C	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 7)(SW)	L.SUM	1	$5,768,546.00	$5,768,546.00
9999903	D	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 8)(SW)	L.SUM	1	$3,373,353.00	$3,373,353.00
9999903	E	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 9)(ES)	L.SUM	1	$5,713,311.00	$5,713,311.00
9999903	F	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 11)(NW)	L.SUM	1	$30,223,021.00	$30,223,021.00
9999903	G	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 12)(NW)	L.SUM	1	$5,614,317.00	$5,614,317.00
		SUBTOTAL STRUCTURES				**$50,692,548.00**
		20% UNIDENTIFIED ITEMS (ROADWAY + STRUCTURES)	L.SUM	1	$25,853,000	$25,853,000.00
		TOTAL ROADWAY + STRUCTURES				**$155,120,200.00**
		CONSTRUCTION ENGINEERING (10%)		10%	$15,512,000.00	$15,512,000.00
		CONSTRUCTION POST DESIGN SERVICES (1%)		1%	$1,551,200.00	$1,551,200.00
		CONSTRUCTION CONTINGENCY (5%)		5%	$7,756,000.00	$7,756,000.00
		PCCP MATERIAL QUALITY ($2/SY)		150,500	$2.00	$301,000.00
		PCCP SMOOTHNESS INCENTIVE ($7,000/LANE-MILE)		10.0	$7,000.00	$70,000.00
		ICAP (10.50%)		10.50%	$18,769,700.00	$18,769,700.00
		PROJECT CONSTRUCTION SUBTOTAL				**$199,080,100.00**
		ENVIRONMENTAL UPDATE AND PUBLIC INVOLVEMENT		0.50%	$995,400.00	$995,400.00
		DESIGN		8.00%	$15,926,400.00	$15,926,400.00
		ENVIRONMENTAL UPDATE, PUBLIC INVOLVEMENT AND DESIGN ICAP (10.50%)		10.50%	$1,776,800.00	$1,776,800.00
		PRIOR RIGHTS UTILITY RELOCATION				
		UTILITY RELOCATION ICAP (10.50%)		10.50%	$0.00	$0.00
		PROJECT TOTAL				**$217,778,700.00**

ARIZONA DEPARTMENT OF TRANSPORTATION

Estimated Engineering Construction Cost

DETAILED COST ESTIMATE, DCR UPDATE PREFERRED ALTERNATIVE

Project Number: M698701X, SR 303L DESIGN CONCEPT REPORT UPDATE — March 9, 2022

Location: SR 303L, LAKE PLEASANT PARKWAY TO I-17 PHASE 2

THIRD GPL LAKE PLEASANT PKWY TO 51ST AVE WITH MAINLINE AND BRIDGES AT 67TH AVE (NOT CROSSROAD OR RAMPS)

ITEM NO.		ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
2010001		CLEARING AND GRUBBING	L.SUM	1	$400,000.00	$400,000.00
2020041		REMOVAL OF PIPE	L.FT.	300	$40.00	$12,000.00
2020048		REMOVAL OF STRUCTURE (CATCH BASIN)	EACH	6	$1,000.00	$6,000.00
2030301		ROADWAY EXCAVATION	CU.YD.	55,600	$20.00	$1,112,000.00
2030401		DRAINAGE EXCAVATION	CU.YD.	1,600	$15.00	$24,000.00
2030904		BORROW (IN PLACE)	CU.YD.	198,200	$16.00	$3,171,200.00
2090005		FURNISH WATER	M.GAL.	42,800	$6.00	$256,800.00
3030022		AGGREGATE BASE, CLASS 2	CU.YD.	9,191	$65.00	$597,415.00
4010016		PORTLAND CEMENT CONCRETE PAVEMENT (14")	SQ.YD.	29,972	$90.00	$2,697,480.00
4090003		ASPHALTIC CONCRETE (MISCELLANEOUS STRUCTURAL)	TON	4,190	$130.00	$544,700.00
5012524		STORM DRAIN PIPE, 24"	L.FT.	2,940	$120.00	$352,800.00
5012530		STORM DRAIN PIPE, 30"	L.FT.	800	$135.00	$108,000.00
5014253		FLARED END SECTION (	EACH	4	$2,500.00	$10,000.00
5030606		CONCRETE CATCH BASIN (C-15.92)	EACH	32	$8,000.00	$256,000.00
5030609		CONCRETE CATCH BASIN (C-15.80)	EACH	10	$8,000.00	$80,000.00
5050001		MANHOLE (C-18.10) (NO. 1) (FOR PIPES 6" TO 36")	EACH	4	$8,000.00	$32,000.00
7010003		MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	L.SUM	1	$1,594,000.00	$1,594,000.00
7040005		PAVEMENT MARKING (WHITE EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	150,920	$0.40	$60,368.00
7040006		PAVEMENT MARKING (YELLOW EXTRUDED THERMOPLASTIC) (0.090")	L.FT.	76,870	$0.40	$30,748.00
7060013		PAVEMENT MARKER, RAISED, TYPE C	EACH	2,100	$2.50	$5,250.00
8050003		SEEDING (CLASS II)	ACRE	22	$4,200.00	$92,400.00
8101013		EROSION CONTROL (1%)	L.SUM	1	$199,000.00	$199,000.00
9010001		MOBILIZATION	L.SUM	1	$1,594,000.00	$1,594,000.00
9040201		MEDIAN CABLE BARRIER (	L.FT.	20,608	$25.00	$515,200.00
9040223		MEDIAN CABLE BARRIER END TERMINAL (	EACH	46	$4,500.00	$207,000.00
9050006		GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	100	$35.00	$3,500.00
9050026		GUARD RAIL TERMINAL (	EACH	4	$4,500.00	$18,000.00
9050419		GUARD RAIL TRANSITION (THRIE BEAM TRANSITION)	EACH	6	$5,000.00	$30,000.00
9080065		CONCRETE CURB AND GUTTER (C-05.10, TYPE C & C-1)	L.FT.	3,995	$40.00	$159,800.00
9100001		CONCRETE BARRIER	L.FT.	2,868	$120.00	$344,160.00
9240126		MISCELLANEOUS WORK (ITS)	L.SUM	1	$250,000.00	$250,000.00
9240129		MISCELLANEOUS WORK (GRANITE MULCH AND LANDSCAPING)	SQ.YD.	54,700	$6.00	$328,200.00
9240170		CONTRACTOR QUALITY CONTROL	L.SUM	1	$299,000.00	$299,000.00
9250001		CONSTRUCTION SURVEYING AND LAYOUT	L.SUM	1	$398,000.00	$398,000.00
		SUBTOTAL ROADWAY				**$15,789,021.00**
9999903	A	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 1)(67th SB)	L.SUM	1	$4,109,074.00	$4,109,074.00
9999903	B	LUMP SUM STRUCTURE (TOTAL OF PRECEEDING STRUCTURE ITEMS)(ID 2)(67th NB)	L.SUM	1	$4,106,458.00	$4,106,458.00
		SUBTOTAL STRUCTURES				**$8,215,532.00**
		30% UNIDENTIFIED ITEMS (ROADWAY + STRUCTURES)	L.SUM	1	$7,201,370	$7,201,370.00
		TOTAL ROADWAY + STRUCTURES				**$31,205,900.00**

ITEM NO.		ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
		CONSTRUCTION ENGINEERING (10%)		10%	$3,120,600.00	$3,120,600.00
		CONSTRUCTION POST DESIGN SERVICES (1%)		1%	$312,100.00	$312,100.00
		CONSTRUCTION CONTINGENCY (5%)		5%	$1,560,300.00	$1,560,300.00
		PCCP MATERIAL QUALITY ($2/SY)		30,000	$2.00	$60,000.00
		PCCP SMOOTHNESS INCENTIVE ($7,000/LANE-MILE)		4.0	$7,000.00	$28,000.00
		ICAP (10.50%)		10.50%	$3,777,400.00	$3,777,400.00
		PROJECT CONSTRUCTION SUBTOTAL				**$40,064,300.00**
		ENVIRONMENTAL UPDATE AND PUBLIC INVOLVEMENT		0.50%	$200,300.00	$200,300.00
		DESIGN		8.00%	$3,205,100.00	$3,205,100.00
		ENVIRONMENTAL UPDATE, PUBLIC INVOLVEMENT AND DESIGN ICAP (10.50%)		10.50%	$357,600.00	$357,600.00
		PRIOR RIGHTS UTILITY RELOCATION				
		UTILITY RELOCATION ICAP (10.50%)		10.50%	$0.00	$0.00
		PROJECT TOTAL				**$43,827,300.00**

6.0 IMPLEMENTATION PLAN

6.1 Project Implementation

The commitment from the various stakeholders to provide new traffic interchanges at 51st Avenue and 43rd Avenue by summer 2023 has resulted in developing this corridor under multiple phases.

The traffic analysis indicates a need for a third general purpose lane each direction on the SR 303L by the year 2030. The ultimate section would include a fourth general purpose lane plus an HOV lane which would be needed beyond the 2040 horizon year included in this DCR.

6.1.1 Phase 1: 51st and 43rd Avenues Traffic Interchanges

Phase 1 includes construction the 51st and 43rd avenue TIs and is anticipated to open to traffic by Summer 2023, and is currently under final design, and includes:

- Mainline SR 303L paving for 2 general purpose lanes at 51st Avenue and 43rd Avenue
- Mainline SR 303L paving for 12-foot inside shoulder and 10-foot outside shoulder at 51st Avenue and 43rd Avenue
- 51st Avenue and 43rd Avenue overpasses
- 51st Avenue and 43rd Avenue crossroads within ADOT right of way
- Reconstruct existing 51st Avenue and 43rd Avenue ramps as needed
- Temporary connectors from 43rd Avenue mainline paving to the frontage road system
- New north frontage road between 43rd Avenue and 51st Avenue

Figure 53. Phase 1 – 51st and 43rd Avenues Traffic Interchanges

6.1.2 Phases 2 & 3: I-17/SR303L System Interchange and General-Purpose Lane

Phases 2 and 3 include construction of the system ramps at I-17 and a third general-purpose in each direction of travel from Lake Pleasant Parkway to I-17. Phases 2 & 3 are assumed include:

- Construct the 303L/I-17 Ramp ES for two lanes of traffic
- Construct the 303L/I-17 Ramp EN for two lanes of traffic but stripe for one lane of traffic
- Construct the I-17/303L Ramp NW for two lanes of traffic
- Construct the I-17/303L Ramp SW for two lanes of traffic but stripe for one lane of traffic
- Construct SR 303L inside shoulder widening from Lake Pleasant Parkway to I-17
- Restripe SR 303L from Lake Pleasant Parkway to I-17 for three general purpose lanes each direction
- SR 303L mainline paving to include three general purpose lanes at 67th Avenue
- Construct the through lanes and bridges at 67th Avenue, but not the 67th Avenue cross street
- Evaluate the need for enhanced game fence along SR 303L during final design
- Prepare a Change of Access Report for the I-17/SR303L System Interchange during final design
- Prepare a final traffic report using the most recent air quality conformity model at the time of the analysis

To meet the 2030 target date for the I-17/SR 303L system interchange and third general purpose lane completion, the second and third phases design will need to start by (2026) with construction beginning by (2028).

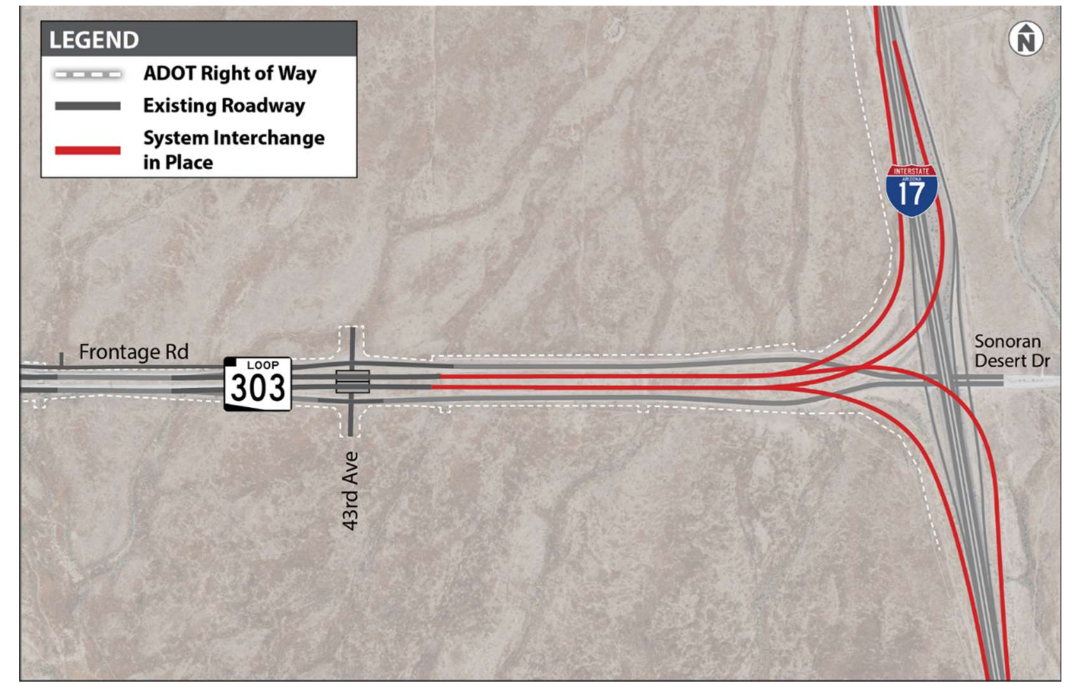

Figure 54. Phase 2 – I-17/SR303L System Interchange Ramps

(Continued on Page 73)

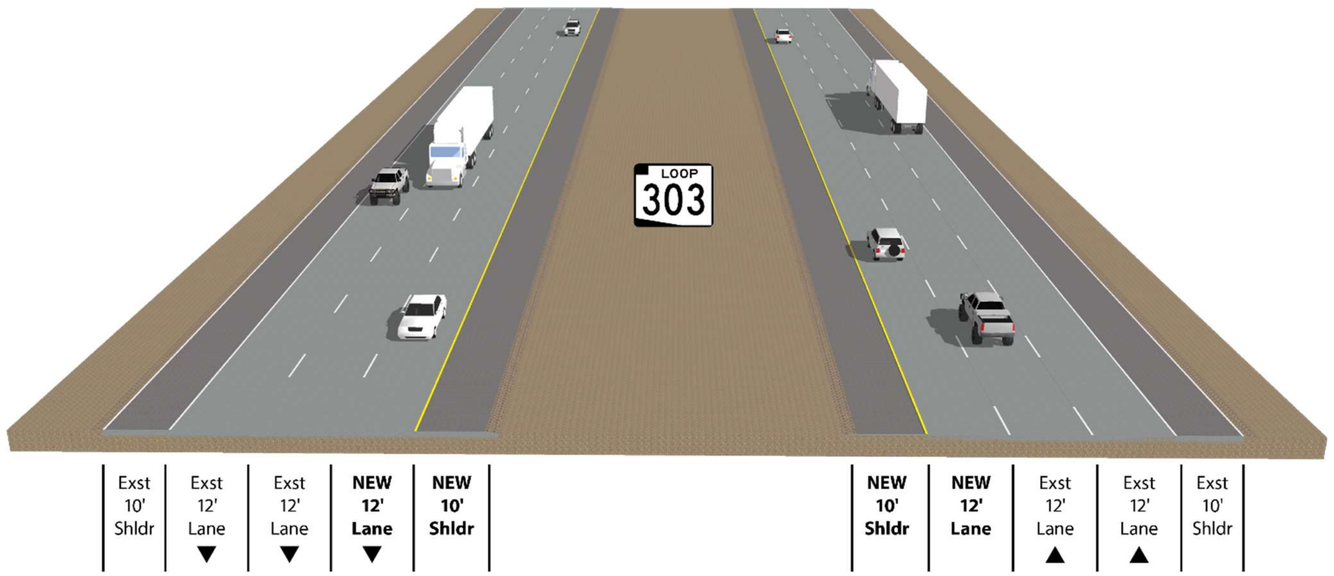

Figure 55. Phase 3 – SR 303L Add Third General Purpose Lane

6.1.3 Future Phases

Future phases include:

- SR 303L mainline paving and striping to 4 general purpose lanes from Lake Pleasant Parkway to the I-17 system interchange ramps
- Widen I-17 NB to accommodate restriping 303L/I-17 Ramp EN for two lanes
- Widen I-17 SB to accommodate restriping I-17/303L Ramp SW for two lanes
- SR 303L mainline paving and striping to add HOV lanes from Lake Pleasant Parkway to the I-17 system interchange ramps
- Construct SR 303L/I-17 DHOV ramp
- Construct median barrier and lighting on SR 303L
- Construct 67th Avenue cross street improvements
- Prepare a DCR to evaluate the need for a fourth general purpose lane both directions of I-17 between SR 74 and Happy Valley Road

Development of the future phases would depend on funding and travel demand beyond 2040. Traffic analysis indicates a need for the 67th Avenue traffic interchange by the year 2040, but timing of construction of the 67th Avenue cross street though the TI area will be dependent on implementation of City streets, area development and traffic need. During final design stages for the 67th Avenue TI, consideration should be given for the implementation of two-lane exit ramps from SR 303L.

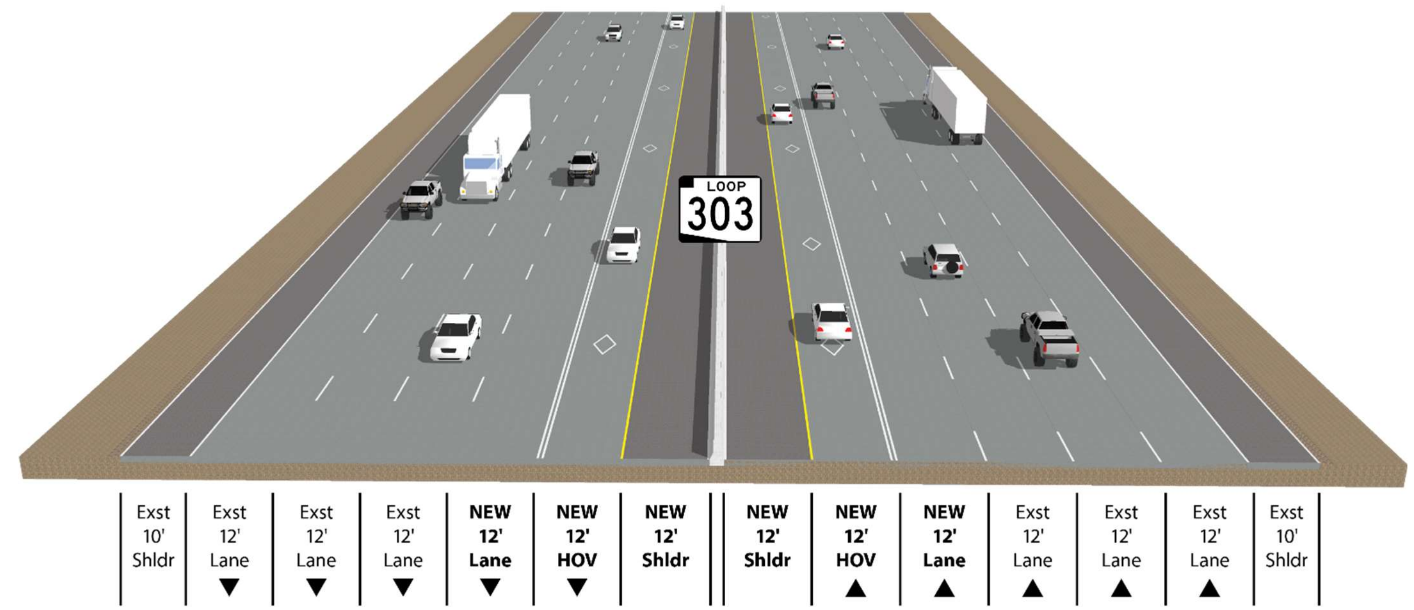

Figure 56. Ultimate SR 303L Cross Section (4 GPL + 1 HOV)

(Continued on Page 74)

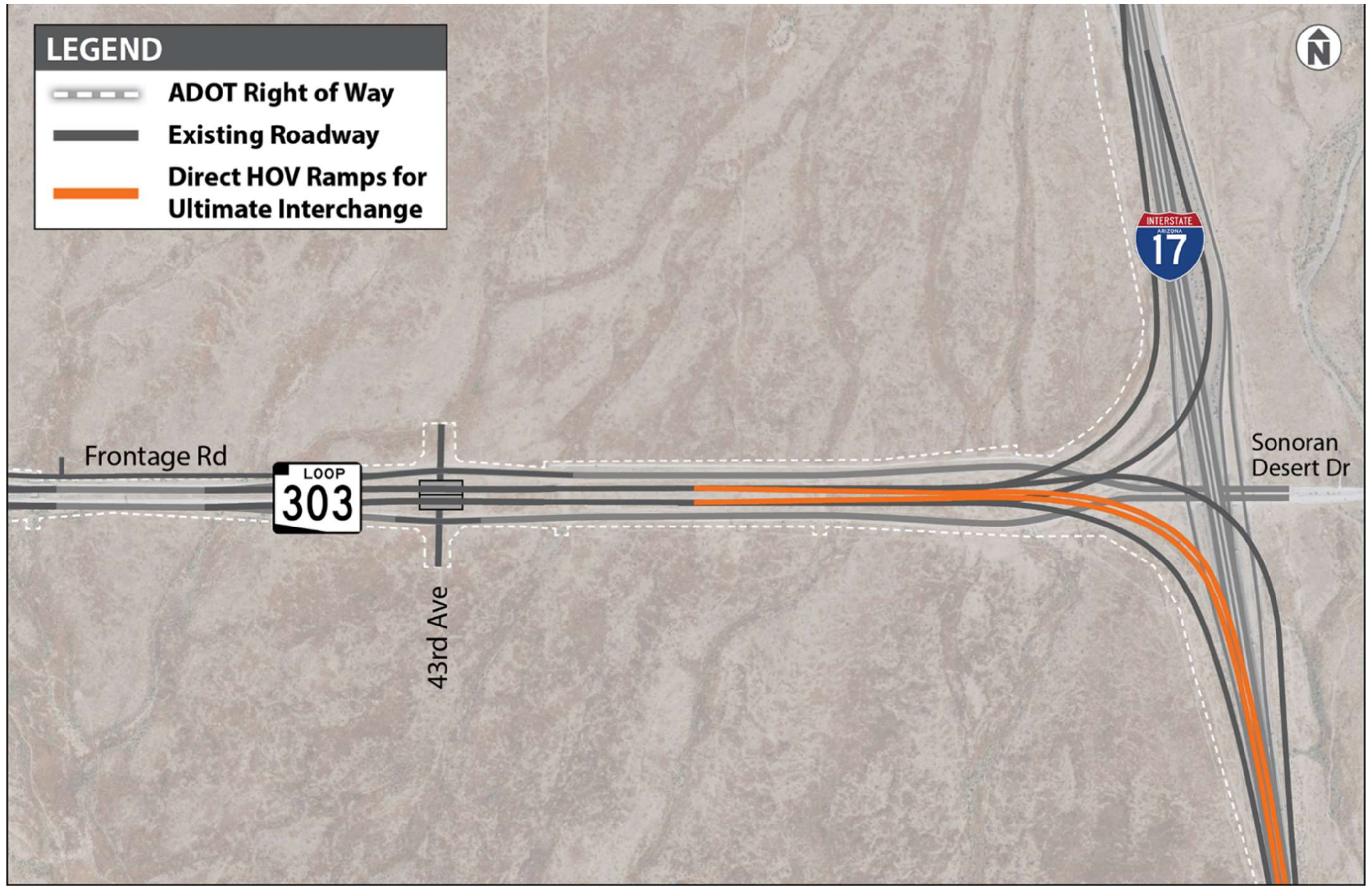

Figure 57. I-17/SR303L Direct HOV Ramp

7.0 AASHTO CONTROLLING DESIGN CRITERIA AND DESIGN EXCEPTIONS

7.1 AASHTO Controlling Design Criteria

American Association of State Highway and Transportation Officials (AASHTO) Controlling Design Criteria has been reviewed for the existing roadway that will remain as part of the proposed improvements. The evaluation assumes the SR 303L, 51st Ave and 43rd Ave Traffic Interchanges project (F042401C, 303-A-NFA) is complete and has revised existing geometry as shown in the most current design plans (Stage V Plans). The evaluation was performed utilizing the current posted speed unless the F042401C project changes the posted speed. Existing features to remain and proposed features for the corridor that do not meet the current AASHTO (2018 Green Book) recommended guidelines are indicated in the following sections.

ADOT Roadway Design Guidelines (2021) criteria has also been reviewed for the existing features to remain and proposed improvements. Existing and proposed features that do not meet the current ADOT RDG are also included in the following sections.

The AASHTO Controlling Design Criteria Report in included in Appendix A.

7.2 AASHTO Non-Conforming Design Elements

The existing 67th Ave two-lane ramps are currently used by mainline traffic and will continue until the SR 303L mainline is constructed over the future 67th Avenue crossroad. This area where mainline traffic temporarily utilizes the existing 67th Ave ramps does not have the normal shoulder widths, but this existing temporary condition will remain until the mainline is constructed over the future 67th Ave and traffic moved to the ultimate location.

The existing 67th Ave ramps were analyzed using the posted speed of 65 mph, resulting in minor deficiencies for stopping sight distance as well as superelevation. The original design speed for the 67th Ave ramps was 55 mph according to the record drawings. ADOT approved posting this section of SR 303L at 65 mph on November 23, 2011. The current posted speed of 65 mph on the 67th Ave ramps will remain until the mainline is constructed and traffic moved to the ultimate location at which time the ramps will no longer carry traffic. When the 67th Ave crossroad is designed and constructed, the existing ramps should be analyzed for the anticipated use and any deficiencies corrected prior to opening the ramps.

Non-conforming AASHTO design elements that would remain or be constructed as part of this project include the following:

The existing superelevation rates do not meet the current AASHTO method 5 rates for the following locations:

303L NB Frontage Rd curve (PI sta. 61+23.57), 4.00% superelevation> 3.50%

303L SB Frontage Rd curve (PI sta. 70+26.03), 2.90% superelevation< 3.9% (addressed in Design Exception/Variance Request)

67th Avenue Ramps A, B, C, and D superelevation as discussed above

The proposed horizontal sight distance does not meet the current AASHTO requirements due to bridge barrier for the following locations:

Ramp ES, HSD = 426’ < 519’

Ramp EN, HSD = 395’ < 516’

Ramp NW, HSD = 381’ < 516’

Ramp SW, HSD = 426’ < 516’

This was noted in the *Final Design Concept Report, SR 303L Happy Valley Road to I-17 (2006)*.

ADOT RDG Non-Conforming Design Elements

The existing shoulder width does not meet the current ADOT requirement for the following location:

303L NB and SB Frontage Rd, 4’ outside shoulder<5’

67th Avenue Ramps A, B, C, and D, 2’ outside shoulder<8’ as discussed above for an existing temporary condition

The proposed shoulder width does not meet the current ADOT requirement for the following location:

SR 303L inside shoulder, 4’ paved and 6’ graded AB shoulder<10’ paved.

A Design Variance Request was approved by ADOT on May 10, 2022 for the F042401C project. The request included a Design Variance for the 51st Ave Ramp D superelevation, a Roadway Design Guidelines (RDG) Design Exception for the SB Frontage Road superelevation near the Sonoran Desert Drive intersection, two RDG Design Exceptions for the NB and SB Frontage Road shoulder widths, and three Design Deviations to document the areas within the project where superelevation rates exceed the calculated cross slope values. None of the design elements in the F042401C project violate AASHTO criteria.

7.3 AASHTO Design Exceptions

A Design Exception/Variance Request will be submitted during final design for Phase 2 for stopping sight distance on the new system interchange ramp bridges and for SR 303L inside paved shoulder width.

A Design Exception/Variance Request will be submitted during final design for Phase 3 for adverse crown on 67th Avenue Ramp C and SR 303L inside paved shoulder width.

8.0 SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONSIDERATIONS

8.1 Previous Environmental Studies

Three environmental assessments (EAs) have been prepared prior to the original freeway construction:

- An EA in 2004 for the SR101L Interchange to New River
- An EA in 2006 for one-half mile south of Happy Valley Parkway to 43rd Avenue
- Another EA in 2006 from 43rd Avenue to I-17 and included the SR 303L/I-17 system interchange, three service interchanges on I-17, and a service interchange on 43rd Avenue

Categorical exclusions have been used to address minor design changes and interim improvements and investigations.

8.2 Environmental Clearance Requirements

An update to the 2006 Environmental Clearance for SR 303L Happy Valley Road to I-17 will be needed to address additional improvements and ROW needs that have evolved during design. The appropriate level of environmental documentation shall be determined in consultation with ADOT Environmental Planning.

Cultural resources were evaluated in the previous EAs and DCRs for the development of the SR 303L alignment. Archaeological and historical resources previously recorded and mapped within 300 feet to either side of the selected alignment centerline were identified, evaluated, and determinations of these resources were made by the State Historic Preservation Office. The SR 303L corridor was previously investigated for cultural resources by Strohmeyer and Lundin (2007). The current project will require extending the areas measuring approximately 400 feet (length) by 200 feet (width) at the proposed 43rd Avenue, 51st Avenue, and 67th Avenue TIs, on both the north and south sides. Land jurisdiction of the areas is TSMC and Arizona State Trust land. These areas were surveyed with negative results by Tactikos (2021).Section 106 consultation has been conducted by ADOT with the State Historic Preservation Office, ASLD, the Arizona State Museum, the City of Phoenix Historic Preservation Office, the Pueblo Grande Museum, and affiliated Tribes. Any new ROW or temporary construction easements (TCE) that have not been previously surveyed for cultural resources would require survey and documentation during the environmental clearance process in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the Arizona Antiquities Act, and the State Historic Preservation Act.

No federally listed endangered or threatened species or designated habitat have the potential of occurring in the project area. Two candidate species, the Sonoran Desert tortoise (*Gopherus agassizii*), and the monarch butterfly (*Danaus plexippus*) have potential to occur. Potential Sonoran Desert tortoise habitat exists adjacent to SR 303L in several locations within the study area. The AZGFD's list of special status species within 2 miles of the project vicinity includes the Arizona toad (*Anaxyrus microscaphus*) and the Phoenix talussnail (*Maricopella allynsmithi*), which are classified as Species of Greatest Conservation Need in Arizona.

Native plants that are protected under Arizona's Native Plant Law are found in the project area, particularly where the TIs would be developed. These species include various cactus species, such as cholla, prickly pear, and saguaro, and leguminous trees such as paloverde, mesquite, and ironwood. Other protected native plant species occurring in the project area include agaves and saguaro. ADOT will adhere to ASLD's native plant removal procedures and requirements if removal of any protected native plants is necessary for project construction.

ADOT approved a Biological Evaluation (BE) for construction of the 51st and 43rd Ave TIs on November 8, 2021. It is anticipated a Biological Evaluation Short Form (BESF) would be developed during the environmental clearance process for the remaining construction phases, which would determine conservation measures that would be needed to minimize impacts on species from project construction activities.

The Corps approved ADOT's Preconstruction Notification under Regional General Permit No. 96, Routine Transportation Activities, for the 51st and 43rd Ave TIs on February 7, 2022. Coordination with ADOT Environmental Planning regarding any additional documentation necessary to comply with Section 404 of the CWA should be completed during the environmental clearance process for the remaining construction phases. Because more than one acre would be disturbed during construction, an Arizona Pollutant Discharge Elimination System permit would be required. A Storm Water Pollution Prevention Plan would also be developed as part of the project during final design.

Pursuant to the ADOT 2017 Noise Abatement Policy and FHWA guidance, a noise impact analysis would be required at noise-sensitive land uses within the project area and at existing trails that parallel and intersect the SR303L to determine whether noise mitigation measures are warranted:

- The Maricopa Trail along the west side of North Lake Pleasant Parkway near milepost (MP) 131.5
- A trail extending from the CAP Canal and intersecting the highway near MP 134
- A trail along New River intersecting the highway near MP 134
- Two trails along Deadman Wash intersecting the highway near MP 134
- A trail along the unpaved portion of 51st Avenue intersecting the highway near MP 136.7

ADOT should coordinate with the Cities and ASLD during the noise evaluation so that any planned developments are considered.

ADOT approved a preliminary initial site assessment was prepared to identify potential hazardous materials within the project area, as well as an asbestos/lead-based paint sampling report to identify any concerns for construction on October 26, 2021, for the construction of the 51st and 43rd Ave TIs. A preliminary initial site assessment and asbestos/lead-based paint sampling report would be prepared during the environmental clearance process for the remaining construction phases.