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MEMORIAL DRIVE PROJECT NEWBERRY SPRINGS, CA

County of San Bernardino

Prepared by:



DAVID EVANS
AND ASSOCIATES INC.

December 18, 2018



December 18, 2018

Job No. NSAM0000-0002

Money Samra
10415 Edgebrook Way
Northridge, CA 91326

**RE: Traffic Impact Study – Memorial Drive Project – Newberry Springs
San Bernardino County, California**

Dear Mr. Samra;

David Evans and Associates, Inc. is pleased to submit this Traffic Impact Study (TIS) Report for the proposed Memorial Drive Project. The proposed project is an approximate 12,525 GSF Tire Shop which will provide mechanic services, tire sales and repair, an enclosed truck wash, and an impound yard. The proposed project is located along Memorial Dr southeast of the Fort Cady Rd in the unincorporated community of Newberry Springs in San Bernardino County, California.

The report examines the traffic impacts specifically for the project and presents recommended traffic improvements. The report also addresses the impacts of overall growth within the area to assure that cumulative traffic mitigations can be addressed.

We are pleased to have been of assistance to you in processing and obtaining approval for the project. If you have any questions or comments, please feel free to contact me at 760-524-9115.

Respectfully submitted,

David Evans and Associates, Inc.



Robert A. Kilpatrick, P.E., T.E.
Senior Project Manager / Senior Associate





TABLE OF CONTENTS

1	INTRODUCTION	1
2	EXISTING CONDITION	4
	Existing Street System	4
	Existing Traffic Volumes.....	4
	Capacity Analysis Methodologies.....	6
	Current Significant Impact Threshold Guidelines.....	6
	Interim Significant Impact Threshold Guidelines.....	7
2.1	Existing Traffic Analysis	7
3	PROJECT OPENING – YEAR 2019	9
3.1	Year 2019 Ambient Condition	9
	Year 2019 Ambient Traffic Analysis	9
3.2	Year 2019 Ambient and Proposed Project Condition	11
	Project Trip Generation	11
	Project Trip Distribution.....	11
	Year 2019 Ambient and Proposed Project Traffic Analysis	17
4	BUILDOUT – YEAR 2040	19
	Year 2040 Future Traffic Analysis	20
5	PROJECT MITIGATION AND SUMMARY	22
6	APPENDICES.....	23

TABLE OF FIGURES

Figure 1: Vicinity Map.....	2
Figure 2: Site Plan	3
Figure 3: Existing Traffic Volumes.....	5
Figure 4: Existing Condition Intersection Geometrics	8
Figure 5: Year 2019 Ambient Traffic Volumes	10
Figure 6: Project Trip Distribution.....	12
Figure 7: Diverted Link Trip Distribution	13
Figure 8: Primary Project Trips.....	14
Figure 9: Diverted Link Project Trips	15
Figure 10: Total Project Trips	16
Figure 11: Year 2019 Ambient and Proposed Project Traffic Volumes	18
Figure 12: Year 2040 Future Traffic Volumes.....	21



TABLE OF TABLES

Table 2-1: HCM 6 – LOS Criteria for TWSC	6
Table 2: Intersection Thresholds of Significance for Traffic Impact Studies	6
Table 3: Intersection Capacity Analysis – Existing Condition.....	7
Table 4: Intersection Capacity Analysis – Year 2019 Ambient Condition.....	9
Table 5: Project Trip Generation	11
Table 6: Intersection Capacity Analysis – Year 2019 Ambient + Proposed Project Condition....	17
Table 7: Intersection Capacity Analysis - Year 2040 Future Condition	20

TABLE OF APPENDICES

APPENDIX A: Scope Memo/Memorandum of Understanding
APPENDIX B: Model Plots
APPENDIX C: Intersection Capacity Analysis Calculations

1 INTRODUCTION

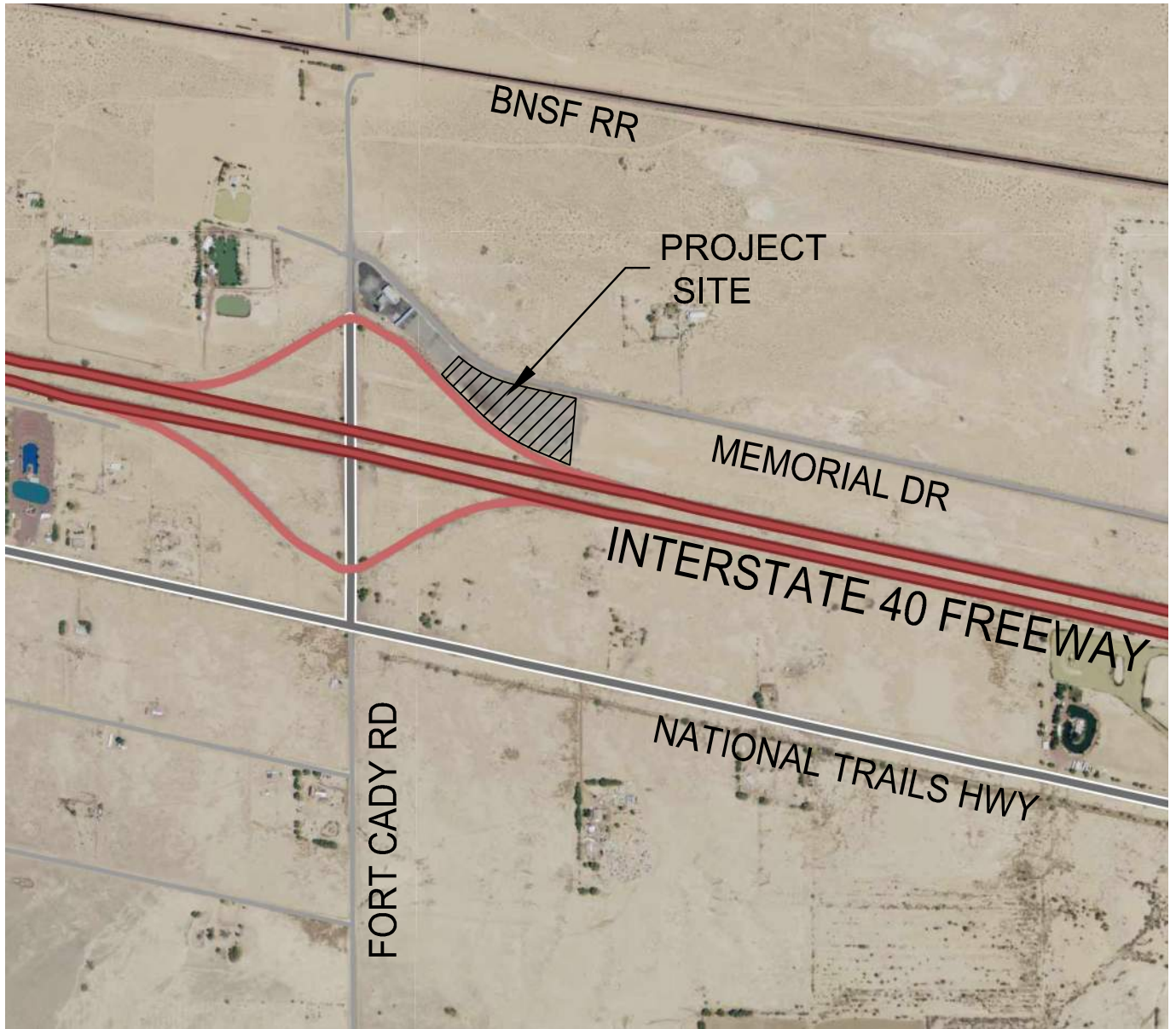
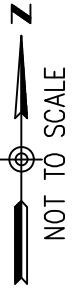
This report identifies the traffic impacts and presents recommendations for access and traffic mitigation for the proposed Memorial Drive Project. The proposed project is an approximate 12,525 GSF Tire Shop which will provide mechanic services, tire sales and repair, an enclosed truck wash, and an impound yard adjacent to an existing commercial development consisting of a Gas Station with Convenience Store. The proposed project is located along Memorial Dr southeast of Fort Cady Rd in the unincorporated community of Newberry Springs in San Bernardino County, California. *Figure 1* illustrates the vicinity map and project location and *Figure 2* illustrates the proposed project site plan. The proposed project is bounded to the north by vacant land, I-40 Freeway to the south, Gas Station with Convenience Store (not a part) to the west, and vacant land to the east.

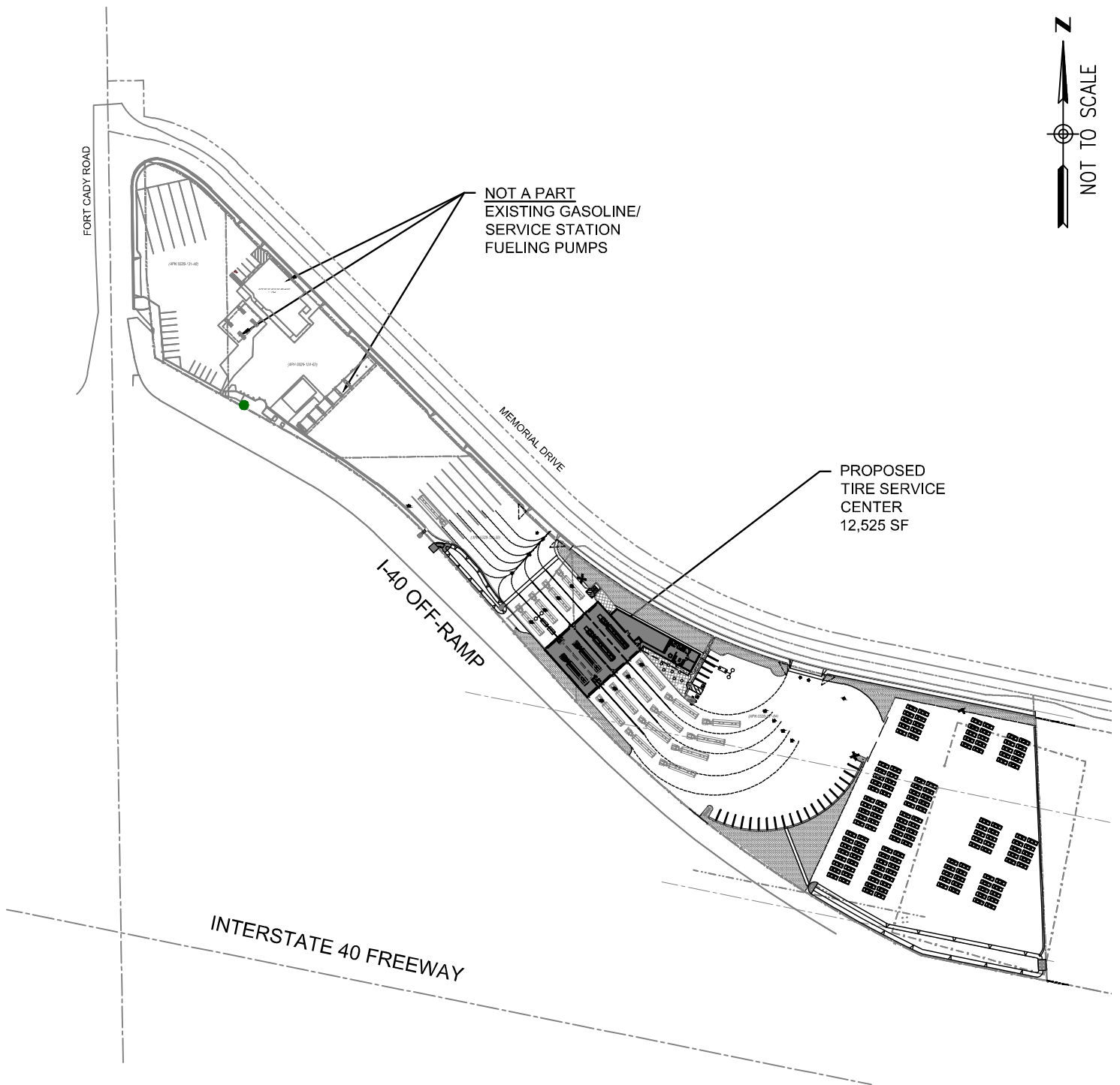
The intent of this Traffic Impact Study (TIS) is to address the impacts and mitigations required for the proposed development. This report identifies five study scenarios. The scenarios include an Existing Condition, Year 2019 Ambient Condition, Year 2019 Ambient and Proposed Project Condition, Year 2040 Future Condition, and Year 2040 Future and Proposed Project Condition.

The Year 2019 Ambient Condition addresses impacts due to ambient growth up to the Opening year 2019 within the study area. The ambient growth is estimated as an annual 1.1% growth rate. The Year 2019 Ambient Condition considers a trip distribution utilizing existing intersections included in the study area.

The Year 2019 Ambient and Proposed Project Condition addresses impacts due to Project Traffic and ambient growth up to the Opening year 2019 within the study area. Project specific impacts are identified based on Section 10.8.1 and Section 10.8.2 of the County of San Bernardino Draft Interim Traffic Impact Study Guidelines. The Guideline identifies that any study intersection that is operating at a LOS 'E' or 'F' for any scenario without project traffic shall mitigate any impacts so as to bring the intersection back to the overall level of delay established prior to project traffic being added.

The Year 2040 Future Condition addresses impacts due to ambient growth up to the Buildout Year 2040 within the study area. The Buildout Year volumes are the result of the ambient growth up to the Buildout Year 2040 added to the existing volumes. The resulting total growth applied to the area roadways is estimated to be 21%, 1% per year.





2 EXISTING CONDITION

Existing Street System

The following roadways provide access to and within the study area;

Fort Cady Road is a north-south local roadway. It is a two lane roadway (one lane in each direction).

Memorial Drive is relatively an east-west roadway. It is a two lane roadway (one lane in each direction). Memorial Drive traverses parallel to the I-40 Freeway.

I-40 Freeway is primarily an east-west north-south route that provides regional access to the Newberry Springs community. This roadway is primarily a four-lane divided highway with two lanes in each direction and has a grade-separated interchange at Fort Cady Road.

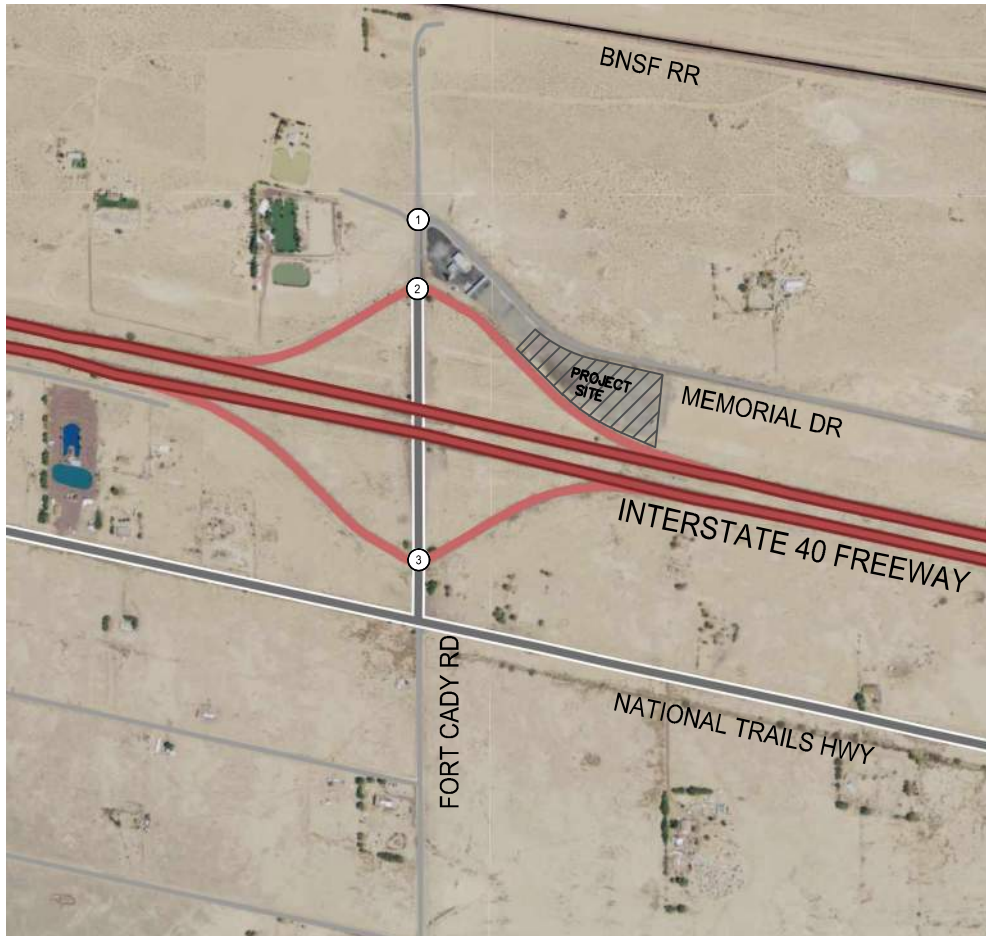
The project proposes to provide access via two new driveways on Memorial Drive. The proposed project is located at the southeast of the corner of Fort Cady Rd and Memorial Dr in the unincorporated community of Newberry Springs in San Bernardino County, California. Based on potential traffic impacts to the area roadways and coordination with the County of San Bernardino, three existing have been identified for analysis;

1. Fort Cady Road at Memorial Drive
2. Fort Cady Road at I-40 Westbound Ramps
3. Fort Cady Road at I-40 Eastbound Ramps

All the study intersections are two-way-stop-controlled, with Fort Cady Road operating free.

Existing Traffic Volumes

Figure 3 illustrates the existing peak hour traffic volumes in the study area. Turn movement counts were obtained from Newport Traffic Studies, an independent traffic data collection company. Turn movement counts were collected during the Friday PM (4-6 PM) and Sunday Midday (12-3 PM) peak hour at the above-mentioned existing intersections identified for detailed analysis. These counts were conducted in November 2018. The resulting turning movement volumes are presented in the *APPENDIX C* of this report.



LEGEND

XX/XX - FRI/SUN PEAK HOUR VOLUMES

① - STUDY INTERSECTIONS

⏹ - STOP CONTROLLED INTERSECTION



① FORT CADY RD / MEMORIAL DR	
1/1 1/1 1/1	1/1 1/1 30/22
1/1 1/1 1/1	1/1 1/1 18/19
② FORT CADY RD / I-40 WB RAMPS	
17/26 23/3	18/26 1/1 6/11
	2/1 17/2
③ FORT CADY RD / I-40 EB RAMPS	
5/11 24/3	
13/2 1/1 3/4	4/3 3/3

Capacity Analysis Methodologies

The San Bernardino County Traffic Impact Study (TIS) Guidelines require that intersection analysis be performed using the latest version of the Transportation Research Board (TRB), Highway Capacity Manual (HCM) methodology. As such the TIS intersection capacity analysis identifies the Level of Service and Delay for each condition consistent with the HCM 6 methodology. Intersection capacity analyses were conducted using Synchro software (1), which implements the methods of the Highway Capacity Manual, 6th Edition (HCM 6) used in this report. The traffic analysis methodology concepts presented in Chapter 20 of the Highway Capacity Manual (HCM 6) (2) were utilized to calculate intersection Level of Service (LOS) for a two way stop controlled (TWSC) intersection. The LOS is determined for each minor-street movement (or shared movement), as major-street left turns, by using the criteria provided in *Table 2-1* referenced from HCM 6 LOS thresholds for two way stop controlled (TWSC) as provided in the HCM 6 Chapter 20.

Table 2-1: HCM 6 – LOS Criteria for TWSC

Control Delay (s/veh)	LOS by Volume-to-Capacity Ratio	
	v/c ≤1.0	v/c >1.0
0 - 10	A	F
> 10 -15	B	F
> 15 - 25	C	F
> 25 - 35	D	F
> 35 - 50	E	F
> 50	F	F
Note: The LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole. Source: Highway Capacity Manual 6 th Edition, Exhibit 20-2.		

Current Significant Impact Threshold Guidelines

The Current Significant Impact Threshold is provided in the San Bernardino County Road Planning and Design Standards Section 10 Traffic Studies. Under the Section 10.12 Recommendations the instruction is “In the event that an analysis indicates unsatisfactory Levels of Service on study area streets, a description of proposed improvements that return intersections to Level of Service “C” shall be included except at locations where the County has already identified a project. The Section 10.12 Part D Significant Impact identifies the total project peak hour trip threshold by existing LOS value. The Significant Impact thresholds are provided in *Table 2*.

Table 2: Intersection Thresholds of Significance for Traffic Impact Studies

Existing LOS	Total Project Peak Hour Trip Generation
A	500
B	250
C	150
D	50
E	30
F	15

Source: San Bernardino County Road Planning and Design Standards

1 Trafficware Ltd, version 10.

2 Transportation Research Board, Washington D.C., 2010.

Interim Significant Impact Threshold Guidelines

The Interim Significant Impact Threshold is provided in the San Bernardino County Interim Traffic Impact Study Guidelines Section 10.8 Determination of Impacts. The interim guideline identifies the acceptable level of service for all study intersections is LOS D.

Any study intersection that is operating at LOS E or LOS F is to be mitigated when project traffic increases the overall level of delay established prior to project traffic being added.

In the event of a conflict between Chapter 10 (Current Significant Impact Threshold Guidelines), as currently adopted, and the proposed guidelines (Interim Significant Impact Threshold Guidelines), the adopted version of Chapter 10 shall take precedence.

2.1 Existing Traffic Analysis

Intersection capacity analysis were conducted for the study intersection to determine an existing intersection level-of-service (LOS), based on the existing intersection geometrics and the AM and PM peak hour traffic volumes. The results of the analysis are shown in *Table 3* and provided in *APPENDIX C. Figure 4* illustrates the existing intersection geometrics utilized in the capacity analysis.

Table 3: Intersection Capacity Analysis – Existing Condition

Intersection	Jurisdiction	Friday		Sunday	
		Delay (1)	LOS(2)	Delay (1)	LOS(2)
1 Fort Cady Road and Memorial Drive (3)	Newberry Springs (County)	9.5	A	9.3	A
2 Fort Cady Road and I-40 WB Ramps (3)	Newberry Springs (Caltrans)	8.9	A	9.0	A
3 Fort Cady Road and I-40 EB Ramps (3)	Newberry Springs (Caltrans)	9.6	A	8.8	A

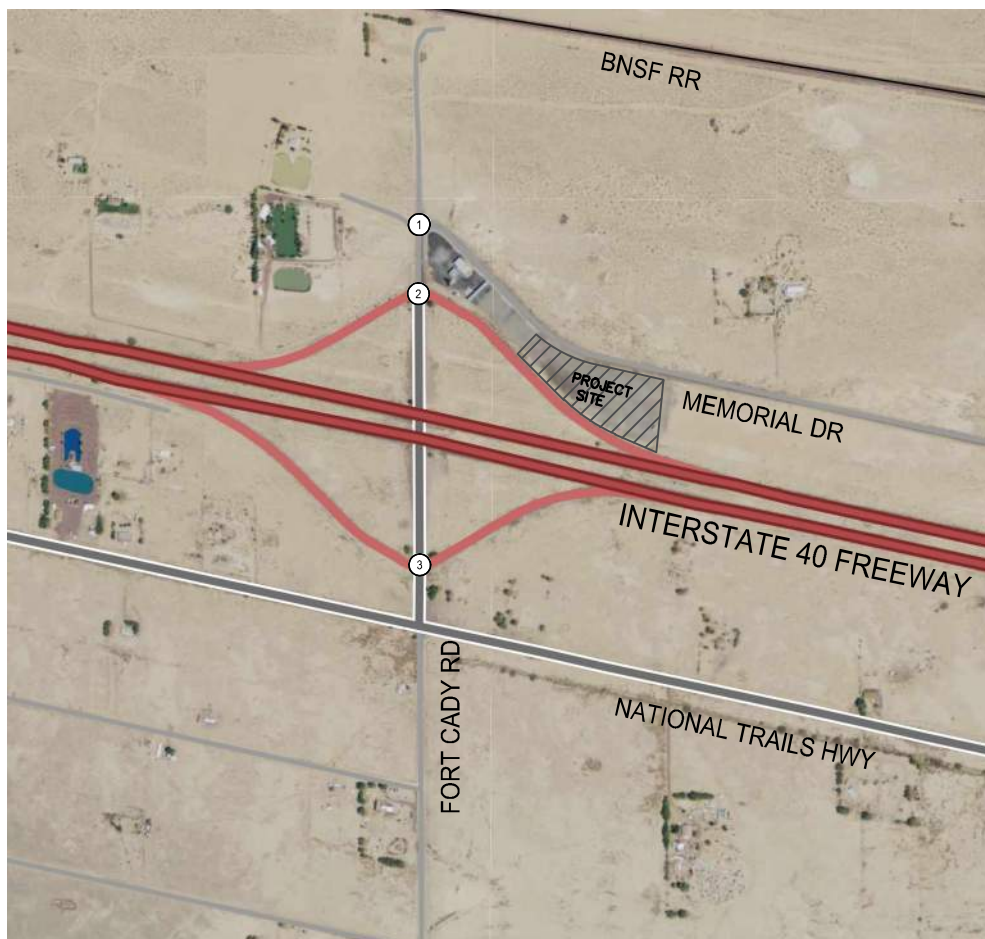
(1) Delay –In Seconds

(2) LOS – Level of Service

(3) Un-Signalized Intersection

Source: **David Evans and Associates, Inc.**

As provided in *Table 3* under Existing Condition, all of the study intersections are operating at an acceptable LOS A.



① FORT CADY RD / MEMORIAL DR	

② FORT CADY RD / I-40 WB RAMP	

③ FORT CADY RD / I-40 EB RAMP	

LEGEND

- EXISTING GEOMETRICS
- STUDY INTERSECTIONS
- STOP CONTROLLED APPROACH

3 PROJECT OPENING – YEAR 2019

3.1 Year 2019 Ambient Condition

The project is anticipated to open in the Year 2019. To analyze the project impacts, the inclusion of traffic generated by regional ambient growth within the study area is necessary. Typically, ambient growth is expected over the years at rates ranging from 1% to 2% annually, a 1.1% annual increase was utilized. The Year 2019 Ambient Condition addresses impacts due to ambient growth up to the project opening year 2019. *Figure 6* illustrates Year 2019 Ambient Traffic Volumes.

Year 2019 Ambient Traffic Analysis

Intersection capacity analysis for the Year 2019 Ambient Condition was performed using the methodology presented in *Chapter 2*. The results of the analysis are shown in *Table 4* and provided in *APPENDIX C*.

Table 4: Intersection Capacity Analysis – Year 2019 Ambient Condition

Intersection	Jurisdiction	Friday		Sunday	
		Delay (1)	LOS(2)	Delay (1)	LOS(2)
1 Fort Cady Road and Memorial Drive (3)	Newberry Springs (County)	9.6	A	9.4	A
2 Fort Cady Road and I-40 WB Ramps (3)	Newberry Springs (Caltrans)	8.9	A	9.0	A
3 Fort Cady Road and I-40 EB Ramps (3)	Newberry Springs (Caltrans)	9.6	A	8.9	A

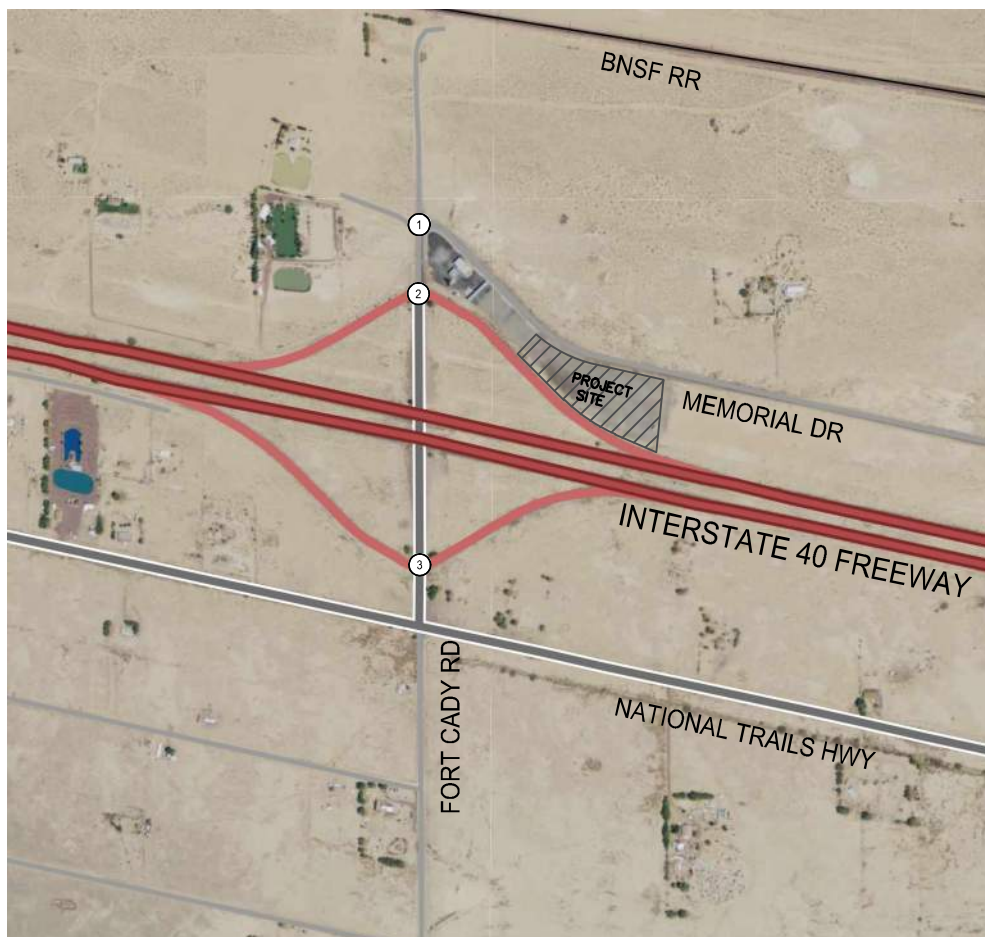
(1) Delay –In Seconds

(2) LOS – Level of Service

(3) Un-Signalized Intersection

Source: **David Evans and Associates, Inc.**

As provided in *Table 4* under Year 2019 Ambient Condition, all of the study intersections are anticipated to continue to operate at an acceptable LOS A.



LEGEND

XX/XX - FRI/SUN PEAK HOUR VOLUMES

① - STUDY INTERSECTIONS

⏹ - STOP CONTROLLED INTERSECTION



① FORT CADY RD / MEMORIAL DR	

② FORT CADY RD / I-40 WB RAMPS	

③ FORT CADY RD / I-40 EB RAMPS	

3.2 Year 2019 Ambient and Proposed Project Condition

Project Trip Generation

The proposed site includes a Tire Shop which will provide several Truck Services and an impound yard. The Tire Shop trip generation factors are provided in the ITE Trip Generation Manual, 10th Edition, under land use ITE 848. The ITE Trip Generation Manual, 10th Edition does not provide trip generation rates for an Impound Yard. The intended use of the impound yard is for storage of vehicles wrecked in traffic collisions within a 5 mile radius of the project site. The collision data query obtained from Transportation Injury Mapping System (TIMS) developed by SafeTREC for the period of January 1, 2017 to December 31, 2017 resulted in five injury collisions. This would translate to a negligible 0.027 daily trips.

Table 5 summarizes the estimated trip generation for the project site during the Friday (4-6 PM) peak and Sunday (12-3 PM) peak periods. These peak periods correspond to the peak periods of the adjoining I-40 Freeway.

The project is highway oriented, as a result of the adjacent freeway characteristics a diverted link trip factor of 80% is applied to the trip generation. The diverted link trip factor is consistent with Traffic Studies completed for area projects adjoining the I-40 Freeway.

Table 5: Project Trip Generation

Use		Daily	FRIDAY/SUNDAY		
			In	Out	Total
1	Tire Shop				
	(ITE 848) Per 1,000 GSF	28.52	1.71	2.27	3.98
	12,525 Square Feet Gross Floor Area	357	22	28	50
	Diverted Link Trips (80%)	286	18	22	40
	Primary Trips (20%)	71	4	6	10

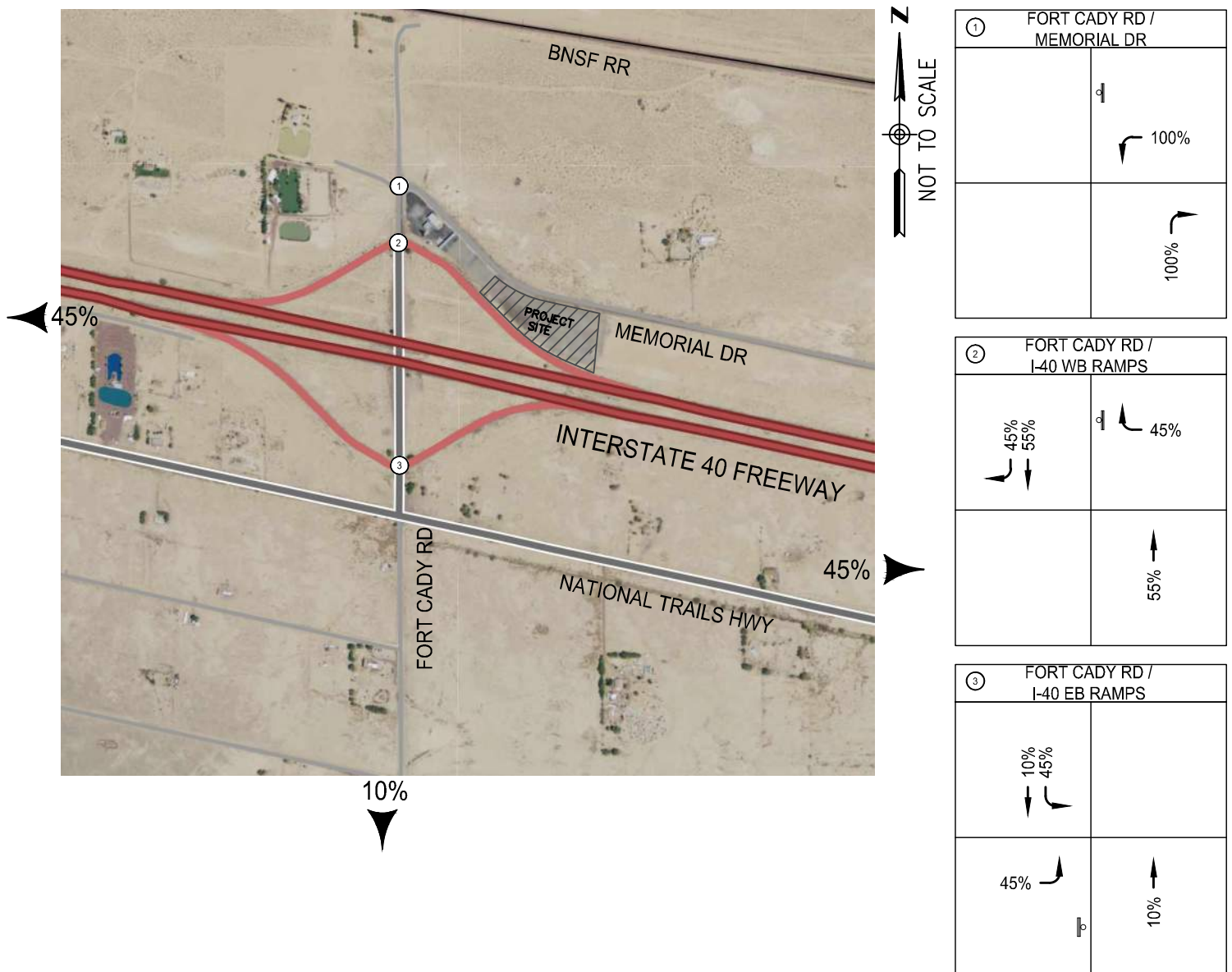
Source: "Trip Generation Manual, Institute of Transportation Engineers", 10th Edition

As presented in *Table 5* it is estimated that the project will generate 357 total daily trips, 50 total trips during the Friday PM peak and Sunday Midday peak periods.

Project Trip Distribution

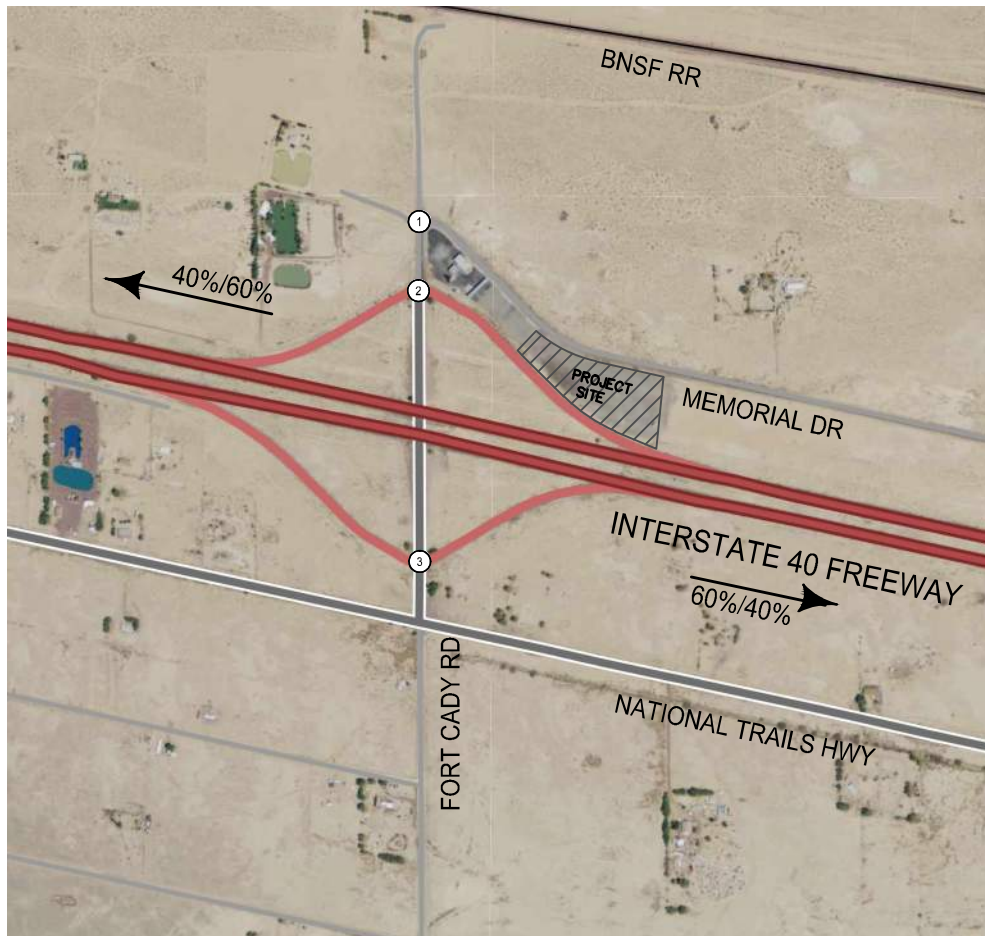
To address the impacts of the estimated project traffic, the trips were distributed and assigned to the surrounding streets and study intersection. The project traffic was distributed based on the anticipated project utilization. Once the distribution pattern was established, project trips were assigned to the area streets that serve the project. The project trips were developed based on the primary trips and diverted link trips. The primary trip distribution provides the general project trip distribution. The diverted link trip distribution provides the general freeway diverted project trip distribution.

Figure 6 illustrates the general and specific estimated primary project trip distribution pattern. *Figure 7* illustrates the diverted link trip distribution. *Figure 8* illustrates the primary project trips. *Figure 9* illustrates the diverted link project trips. *Figure 10* illustrates the estimated Total Project Trips.



LEGEND

- XX% - GENERAL PROJECT TRIP DISTRIBUTION
- XX% - SPECIFIC PROJECT TRIP PERCENTAGE
- ① - STUDY INTERSECTION
- ⊥ - STOP CONTROLLED INTERSECTION



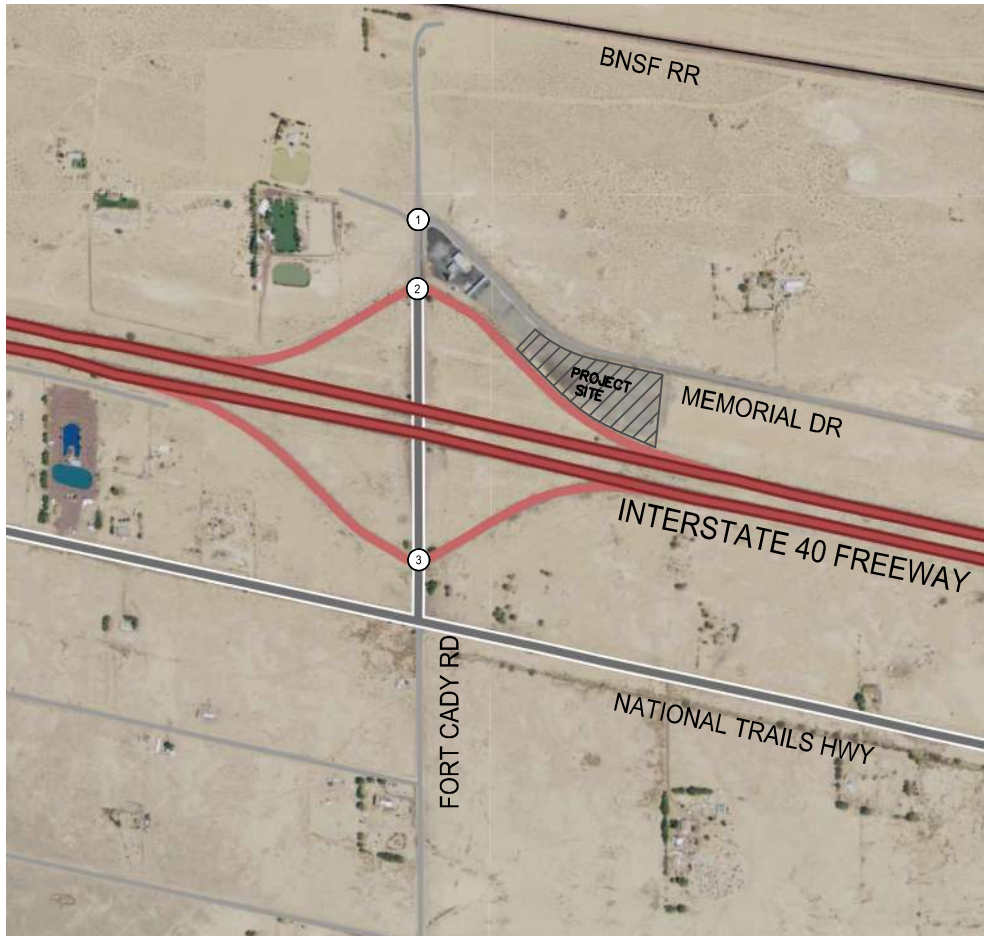
① FORT CADY RD / MEMORIAL DR	

② FORT CADY RD / I-40 WB RAMPS	

③ FORT CADY RD / I-40 EB RAMPS	

LEGEND

- GENERAL DIVERTED LINK TRIP DISTRIBUTION
- SPECIFIC DIVERTED LINK PROJECT TRIP PERCENTAGE
- ③ - STUDY INTERSECTION
- STOP CONTROLLED INTERSECTION



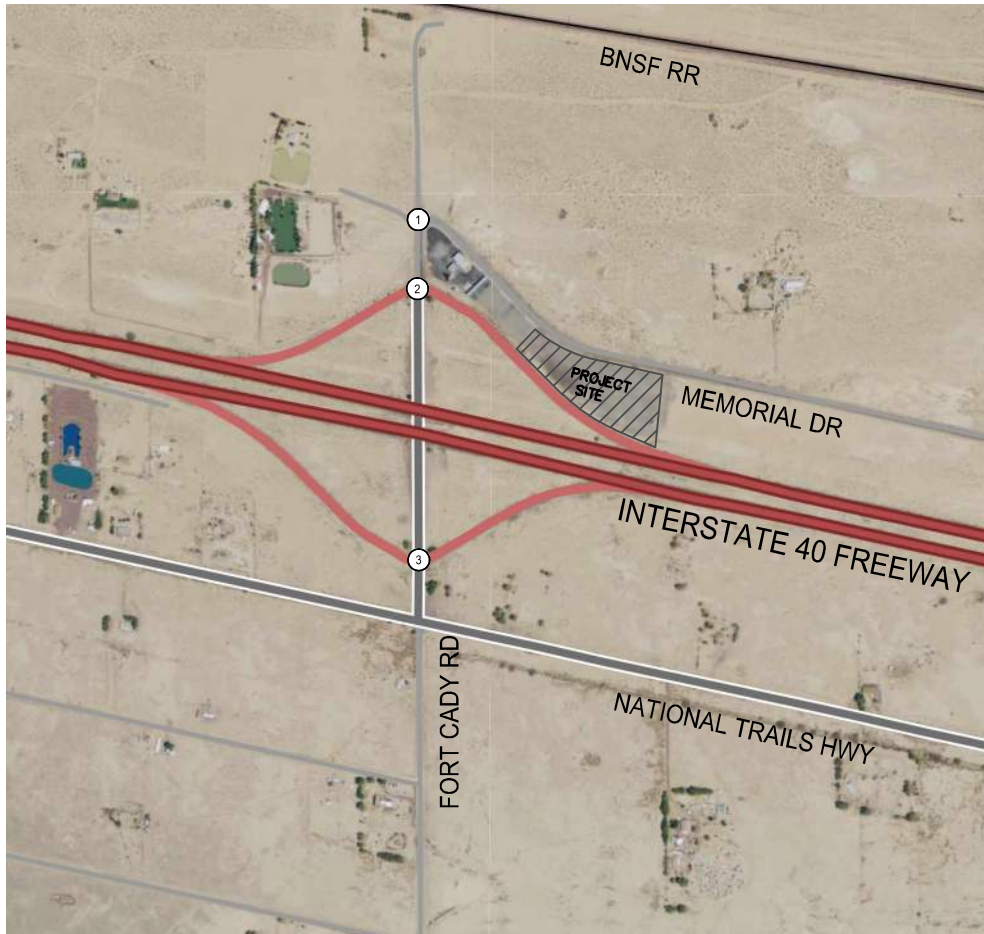
PRIMARY PROJECT TRIPS

FRIDAY TRIPS - 4 IN / 6 OUT
SUNDAY TRIPS - 4 IN / 6 OUT

① FORT CADY RD / MEMORIAL DR	
② FORT CADY RD / I-40 WB RAMPS	
③ FORT CADY RD / I-40 EB RAMPS	

LEGEND

- XX/XX - PRIMARY PROJECT TRIPS
- ① - STUDY INTERSECTION
- STOP CONTROLLED INTERSECTION



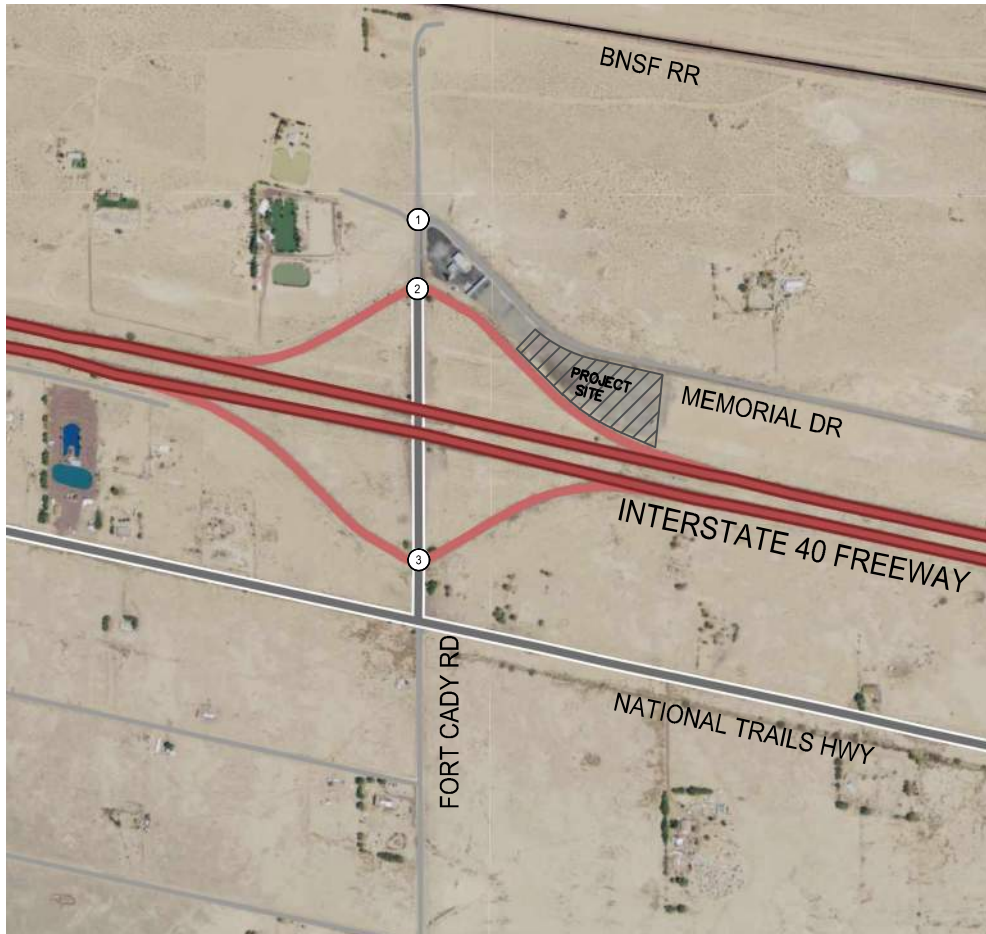
DIVERTED LINK PROJECT TRIPS

FRIDAY TRIPS - 18 IN / 22 OUT
SUNDAY TRIPS - 18 IN / 22 OUT

① FORT CADY RD / MEMORIAL DR	
② FORT CADY RD / I-40 WB RAMPS	
③ FORT CADY RD / I-40 EB RAMPS	

LEGEND

- XX/XX - DIVERTED LINK PROJECT TRIP
- ② - STUDY INTERSECTION
- STOP CONTROLLED INTERSECTION



TOTAL PROJECT TRIPS

FRIDAY TRIPS - 22 IN / 28 OUT
SUNDAY TRIPS - 22 IN / 28 OUT

① FORT CADY RD / MEMORIAL DR	
③ FORT CADY RD / I-40 WB RAMP	
③ FORT CADY RD / I-40 EB RAMP	

LEGEND

- XX/XX - TOTAL PROJECT TRIP
- ② - STUDY INTERSECTION
- STOP CONTROLLED INTERSECTION

Year 2019 Ambient and Proposed Project Traffic Analysis

Based on the proposed project trip generation, traffic distribution and assignment patterns intersection capacity analyses were conducted to assess the estimated project impacts. The project trips were added to the Year 2019 Ambient Traffic Volumes to develop the Year 2019 Ambient and Proposed Project Traffic Volumes, illustrated in *Figure 11*.

Intersection capacity analysis for the Year 2019 Ambient and Proposed Project Condition was performed using the methodology presented in *Chapter 2*. The results of the analysis are shown in *Table 6* and provided in *APPENDIX C*.

Table 6: Intersection Capacity Analysis – Year 2019 Ambient + Proposed Project Condition

Intersection	Jurisdiction	Friday		Sunday	
		Delay (1)	LOS(2)	Delay (1)	LOS(2)
1 Fort Cady Road and Memorial Drive (3)	Newberry Springs (County)	10.0	B	9.8	A
2 Fort Cady Road and I-40 WB Ramps (3)	Newberry Springs (Caltrans)	9.0	A	9.3	A
3 Fort Cady Road and I-40 EB Ramps (3)	Newberry Springs (Caltrans)	10.3	B	9.8	A

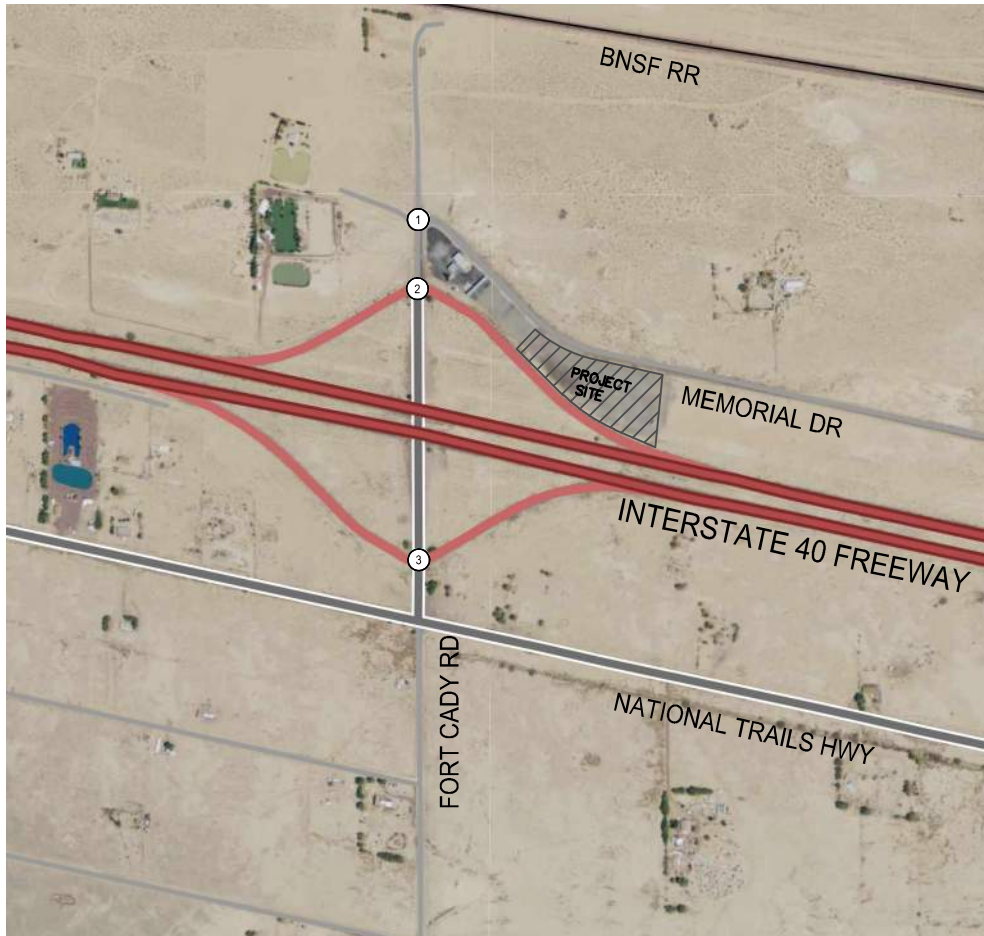
(1) Delay –In Seconds

(2) LOS – Level of Service

(3) Un-Signalized Intersection

Source: **David Evans and Associates, Inc.**

As presented in *Table 6* under Year 2019 Ambient and Proposed Project Condition, most of the study intersections are anticipated to operate at an acceptable LOS B or better.



LEGEND

XX/XX - FRI/SUN PEAK HOUR VOLUMES

① - STUDY INTERSECTIONS

⏹ - STOP CONTROLLED INTERSECTION



① FORT CADY RD / MEMORIAL DR	
2/2 2/2 2/2	2/2 2/2 61/53
2/2 2/2 2/2	2/2 2/2 48/49

② FORT CADY RD / I-40 WB RAMPS	
30/44 42/17	30/43 2/2 7/12
	3/2 36/16

③ FORT CADY RD / I-40 EB RAMPS	
7/13 42/16	
31/15 2/2 4/5	6/5 4/4

4 BUILDOUT – YEAR 2040

The Buildout Year 2040 Condition addresses impacts due to ambient growth up to the Year 2040. The San Bernardino Transportation Analysis Model (SBTAM) Traffic Model Year 2040 I-40 freeway Volumes were reviewed to determine the growth of the freeway. The demand to a highway commercial land use is proportionally related to the increase in freeway volume.

The Year 2040 Volumes were developed from post processing the I-40 Freeway Volumes. The post processing referenced Base Year Volumes, Caltrans published 2016 Volumes, and Year 2040 Model Volumes. The Base Year is compared to the Caltrans published 2016 Volumes and an adjustment is made to the future 2040 Model Volumes. The Buildout Year 2040 Volumes were estimated from the Caltrans published 2016 versus the adjusted Buildout Year 2040 Volumes, which resulted in a total growth of 102% over a 24 year span (2016 to 2040). The resulting growth is 4.25 % per year.

The volumes on Fort Cady Road and Memorial Drive north of National Trails Highway-East (between Memorial Drive and the I-40 Eastbound Freeway Ramps) have shown a gradual decline from 2001 to 2007. The volume data is provided in *APPENDIX B*. The recorded Average Daily Traffic Volumes as follows:

1984 at 10 trips
1993 at 20 trips
2001 at 936 trips
2007 at 759 trips

The total growth applied to the area roadways is estimated to be 21%, 1% per year. The applied growth is a conservative estimate since historical volume counts have shown that the area traffic has been on the decline for the past 20 years.

The Buildout Year volumes are the result of the ambient growth up to the Buildout Year 2040 added to the existing volumes. The *Figure 12* illustrates Year 2040 Ambient Traffic Volumes.

Year 2040 Future Traffic Analysis

Intersection capacity analysis for the Year 2040 Future Condition was performed using the methodology presented in *Chapter 2*. The results of the analysis are shown in *Table 7* and provided in *APPENDIX C*.

Table 7: Intersection Capacity Analysis - Year 2040 Future Condition

Intersection	Jurisdiction	Friday		Sunday	
		Delay (1)	LOS(2)	Delay (1)	LOS(2)
1 Fort Cady Road and Memorial Drive (3)	Newberry Springs (County)	10.0	B	9.8	A
2 Fort Cady Road and I-40 WB Ramps (3)	Newberry Springs (Caltrans)	9.1	A	9.4	A
3 Fort Cady Road and I-40 EB Ramps (3)	Newberry Springs (Caltrans)	10.5	B	9.8	A

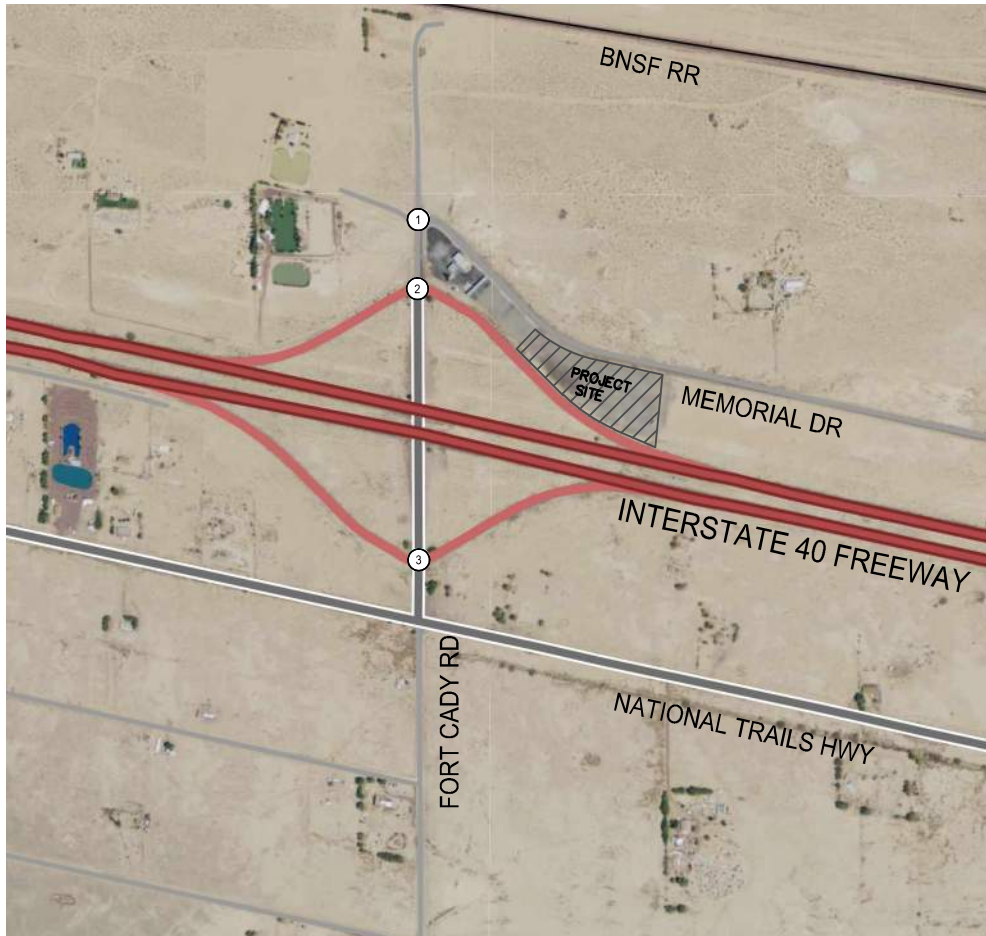
(1) Delay –In Seconds

(2) LOS – Level of Service

(3) Un-Signalized Intersection

Source: **David Evans and Associates, Inc.**

As provided in *Table 7* under Year 2040 Future Condition, the study intersections are anticipated to continue to operate at an acceptable LOS C or better.



LEGEND

XX/XX - FRI/SUN PEAK HOUR VOLUMES

① - STUDY INTERSECTIONS

⏹ - STOP CONTROLLED INTERSECTION

① FORT CADY RD / MEMORIAL DR	
② FORT CADY RD / I-40 WB RAMP	
③ FORT CADY RD / I-40 EB RAMP	

5 PROJECT MITIGATION AND SUMMARY

In summary, the project as presented will not cause significant impacts to the intersections. The proposed mitigations by condition are as follows.

Year 2019 Project Mitigations

To accommodate project traffic, specific traffic mitigations have been identified. The project specific mitigation consists of the recommended improvements for Memorial Drive along the project frontage. The project recommended mitigations include;

1. Construct the project driveway approach on Memorial Drive. Memorial Drive and Project Driveway "A" will provide right-in right-out access.
2. Construct the project driveway approach on Memorial Drive. Memorial Drive and Project Driveway "B" will provide full access.



6 APPENDICES

APPENDIX A Scope Memo/Memorandum of Understanding

APPENDIX B Model Plots

APPENDIX C Intersection Capacity Analysis Calculations