TERRIBLE HERBST CONVENIENCE STORE AND FUELING STATION

TRAFFIC IMPACT ANALYSIS

COUNTY OF SAN BERNARDINO

PREPARED BY:

John Kain, AICP
jkain@urbanxroads.com
(949) 336-5990

Marlie Whiteman, PE
mwhiteman@urbanxroads.com
(949) 336-5991

Janette Cachola
jcachola@urbanxroads.com
(949) 336-5989

DECEMBER 20, 2019

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

This Page Intentionally Left Blank

LIST OF TABLES

This Page Intentionally Left Blank

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
CA MUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
DIF	Development Impact Fee
E+P	Existing Plus Project
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HOV	High Occupancy Vehicle
ITE	Institute of Transportation Engineers
LOS	Level of Service
N/A	Not Applicable
PeMS	Performance Measurement System
PHF	Peak Hour Factor
Project	Terrible Herbst Convenience Store and Fueling Station
RTP	Regional Transportation Plan
SBCTA	San Bernardino County Transportation Authority
SBTAM	San Bernardino Transportation Analysis Model
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
SHS	State Highway System
TIA	Traffic Impact Analysis
Vphgpl	Vehicles Per Hour Green Per Lane
WP	With Project

This Page Intentionally Left Blank

1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Terrible Herbst Convenience Store and Fueling Station (referred to as "Project") located north of Yates Well Road and east of Interstate 15 (I-15) at the I-15 / Yates Well Road interchange in the County of San Bernardino.

The purpose of this traffic impact analysis is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and to recommend improvements to achieve acceptable circulation system operational conditions. This traffic study has been prepared in accordance with the San Bernardino County Congestion Management Program (CMP) Guidelines for CMP Traffic Impact Analysis Reports (Appendix B, 2016 Update), the San Bernardino County Transportation Impact Study Guidelines (July 9, 2019), and through consultation with County of San Bernardino staff during the scoping process. (1) The Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TIA.

1.1 PROJECT OVERVIEW

The proposed Project consists of a fueling station with 7,500 square-foot convenience store and 22 vehicle fueling positions (vfp), which is estimated to be completed and occupied by the year 2021. Vehicular and truck traffic access will be provided via one driveway located near the east edge of the Project, providing access via Yates Well Road (see Exhibit 1-1). Fire department access will also be available via a gated access at the I-15 northbound Ramp. Regional access to the Project site is available from the I-15 Freeway via the Yates Well Road interchange.

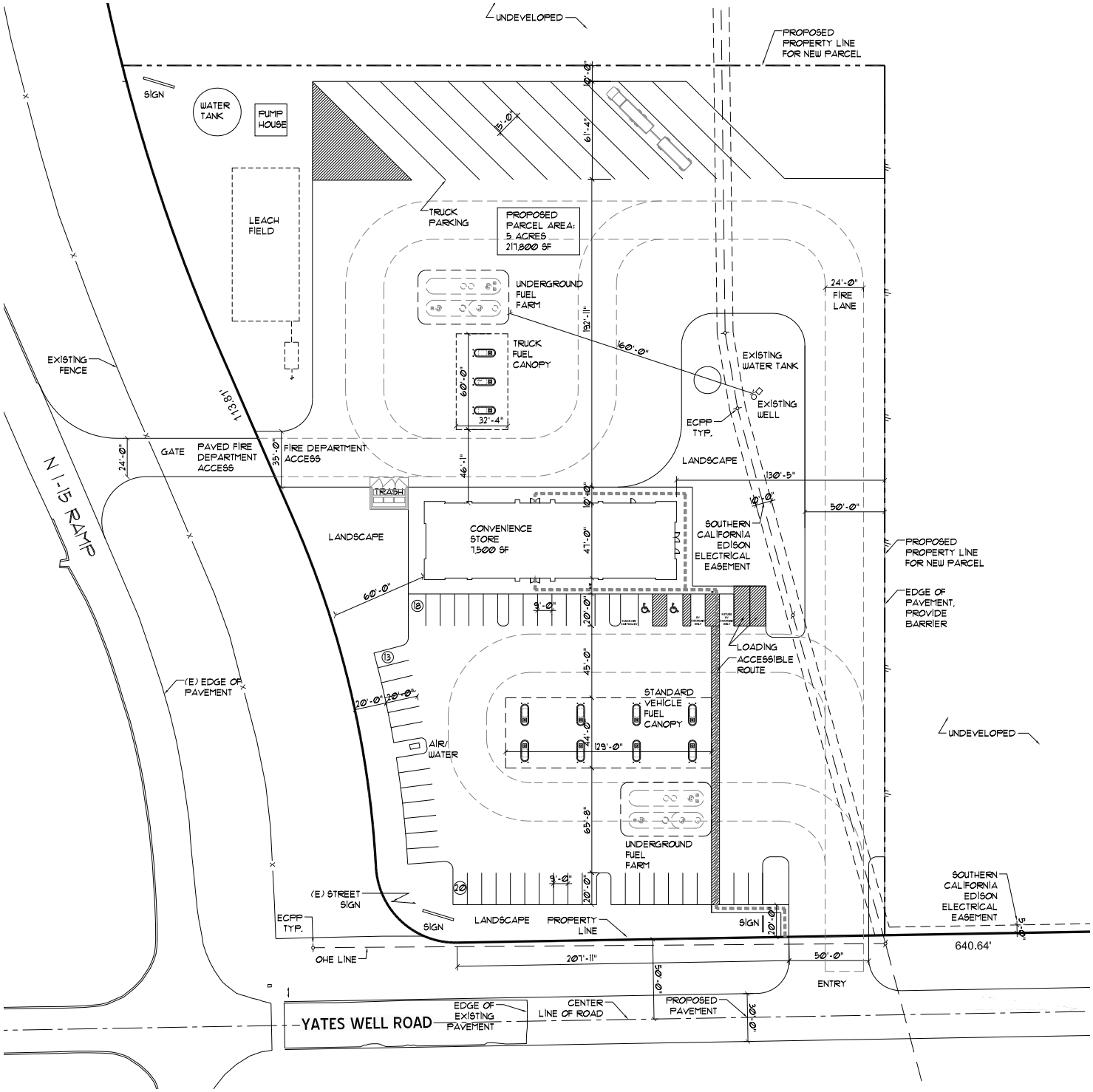
Trips generated by the Project's proposed land uses have been estimated based on trip generation rates included in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition, 2017. (2) The Project is estimated to generate a net total of 5,071 trip-ends per day on a typical weekday with approximately 618 AM peak hour trips and 506 PM peak hour trips, and a major portion of these trips are already traveling on the adjacent freeway and are diverted to/from the project (3,651 daily, 446 AM peak hour, and 364 PM peak hour diverted trips). The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

1.2 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential impacts to traffic and circulation have been assessed for each of the following conditions:

- Existing (2019)
- Opening Year Cumulative (2021) Without Project
- Opening Year Cumulative (2021) With Project
- Horizon Year (2040) Without Project
- Horizon Year (2040) With Project ±15 Acre Commercial

EXHIBIT 1-1: PRELIMINARY SITE PLAN



12884 - 01.dwg

The proposed commercial development will require County approval of a General Plan Amendment (GPA), rezoning and a Conditional Use Permit (CUP) to designate the property for "Commercial Highway" (CH) use. The applicant proposes that the GPA and rezoning will apply to a ±20-acre parcel, with a Tentative Parcel Map (TPM) to divide the five-acres for the convenience store and fueling station. Cross access will be provided to the northern ±15-acre portion of the site for possible future development. The Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial scenario will account for future traffic conditions with development of the entire ±20-acre parcel.

1.2.1 EXISTING (2019) CONDITIONS

Existing (2019) conditions represents the baseline traffic conditions as they existed at the time this report was prepared. Peak period traffic counts have been conducted at the existing ramp intersections along Yates Well Road, and mainline I-15 volumes have been extracted from Caltrans Performance Measurement System (PeMS) database for a typical Fall 2019 week (October 13 to October 19).

1.2.2 OPENING YEAR CUMULATIVE (2021) CONDITIONS

To account for growth in traffic between Existing (2019) traffic conditions and the Project Opening Year Cumulative (2021), a growth rate of 4.04 percent was assumed (2.0 percent per year, compounded annually over 2 years). The 2.0 percent annual growth rate is intended to capture non-specific ambient traffic growth.

1.2.3 HORIZON YEAR (2040) CONDITIONS

Traffic projections for Horizon Year (2040) with Project conditions were derived from the San Bernardino County General Plan. The Horizon Year (2040) conditions analysis are utilized to determine long range cumulative lane requirements.

1.3 STUDY AREA

1.3.1 INTERSECTIONS

The following 3 study area intersections listed in Table 1-1 and shown on Exhibit 1-2 were selected for this TIA:

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location
1	I-15 Southbound Ramps & Yates Well Road
2	I-15 Northbound Ramps & Yates Well Road
3	Project Driveway & Yates Well Road

EXHIBIT 1-2: LOCATION MAP

LEGEND:

- ② = EXISTING ANALYSIS LOCATION
- ① = FUTURE ANALYSIS LOCATION
- = DIRT ROAD

N

12884 - 01.dwg

URBAN CROSSROADS

1.3.2 FREEWAY MAINLINE SEGMENTS

The freeway mainline analysis locations include the segments on either side of the I-15 Freeway and Yates Well Road interchange. The study area freeway mainline analysis locations include four I-15 Freeway mainline segments for the northbound and southbound directions of flow as listed in Table 1-2:

TABLE 1-2: FREEWAY MAINLINE SEGMENT ANALYSIS LOCATIONS

ID	Freeway Mainline Segments
1	I-15 Freeway – Southbound, North of Yates Well Road
2	I-15 Freeway – Southbound, South of Yates Well Road
3	I-15 Freeway – Northbound, North of Yates Well Road
4	I-15 Freeway – Northbound, South of Yates Well Road

1.3.3 FREEWAY MERGE/DIVERGE RAMP JUNCTIONS

The study area freeway merge/diverge ramp junction analysis locations include four I-15 freeway ramp junctions for both northbound and southbound directions of flow as listed in Table 1-3:

TABLE 1-3: FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS LOCATIONS

ID	Freeway Merge/Diverge Ramp Junction Analysis Locations
1	I-15 Freeway – Southbound, Off-Ramp at Yates Well Road
2	I-15 Freeway – Southbound, On-Ramp at Yates Well Road
3	I-15 Freeway – Northbound, On-Ramp at Yates Well Road
4	I-15 Freeway – Northbound, Off-Ramp at Yates Well Road

1.4 LEVELS OF SERVICE

This section provides a summary of study area service levels. Section 2 *Methodologies* provides information on the methodologies used in the analysis and Section 5 *Opening Year Cumulative (2021) Traffic Conditions*, and Section 6 *Horizon Year (2040) Traffic Conditions* includes the detailed analysis. A summary of LOS results for all analysis scenarios is presented on Exhibit 1-3.

1.4.1 EXISTING (2019) CONDITIONS

The two existing study area intersections (I-15 Southbound Ramps at Yates Well Road and I-15 Northbound Ramps at Yates Well Road) were found to operate at an acceptable LOS (LOS D or better) during the peak hours under Existing traffic conditions.

1.4.2 OPENING YEAR CUMULATIVE (2021) CONDITIONS

The study area intersections are anticipated to operate at an acceptable LOS during the peak hours under Opening Year Cumulative (2021) Without Project and With Project traffic conditions, with access improvements. Basic freeway segment analysis and freeway merge / diverge analysis

do not result in any study area deficiencies for Opening Year Cumulative (2021) Without Project and With Project traffic conditions.

1.4.3 HORIZON YEAR (2040) CONDITIONS

Study area intersections are anticipated to operate at an acceptable LOS during the peak hours under Horizon Year (2040) Without Project conditions. Without added lane improvements, the following study area intersections are anticipated to operate at a deficient LOS during one or both peak hours under Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial traffic conditions:

- I-15 Southbound Ramps & Yates Well Road (#1) – LOS F AM and PM peak hours
- I-15 Northbound Ramps & Yates Well Road (#2) – LOS E PM peak hour only
- Project Driveway & Yates Well Road (#3) – LOS F AM and PM peak hours

With cumulative future lane improvements (see Exhibit 6-5), acceptable LOS operations are provided at study area intersections.

Basic freeway segment analysis and freeway merge / diverge analysis do not result in study area deficiencies for Horizon Year (2040) Without Project and With Project traffic conditions.

1.5 FRIDAY AND WEEKEND TRAFFIC CONDITIONS

This section provides information regarding peak hours on a Friday and weekend day (Sunday), when traffic conditions are worse than typical mid-week peak hours. Directional mainline I-15 traffic volumes on weekdays, Friday, and weekend days have been extracted from the Caltrans Performance Measurement System (PeMS) database for a typical Fall 2019 week (October 13 to October 19). These volumes are utilized to estimate traffic conditions with the project in the study area for afternoon peak hours on a Friday and peak weekend day (Sunday).

The results of the Friday and weekend Opening Year (2021) With Project conditions indicates that study area intersections experience acceptable operations, with Project access improvements (see Exhibit 5-3). Basic freeway segment analysis and freeway merge / diverge analysis do not result in any study area deficiencies for Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions.

1.6 RECOMMENDATIONS

The following recommendations are based on the improvements needed to provide acceptable LOS in the study area. Exhibits 5-3 and 6-5 show the site adjacent recommendations for Opening Year (2021) and Horizon Year (2040) conditions, respectively.

Recommendation 1.1 – Opening Year Cumulative (2021) With Project Roadway Segment Improvements – The following roadway segment improvements are necessary to accommodate site access:

- Between the I-15 northbound intersection and the main Project entry, a transitioning width of paved roadway is required on the north side of the roadway centerline as shown on Exhibit 5-3.

- Between the I-15 northbound intersection and the main Project entry, Yates Well Road shall be improved to accommodate one eastbound travel lane on Exhibit 5-3.

Recommendation 1.2 – Opening Year Cumulative (2021) With Project Right-of-Way Dedication

- The Project should dedicate 52 feet of right of way for ultimate provision of a Major Highway half section along the Project frontage as indicated on Exhibit 5-3.

Recommendation 1.3 – Opening Year Cumulative (2021) With Project Intersection Improvements

Project Driveway & Yates Well Road (#3) – Construct the Project driveway at Yates Well Road as follows:

- Provide stop control for travelers exiting the Project driveway
- Construct north leg with one shared outbound left/right turn lane, and one inbound lane
- Provide eastbound shared left/through lane
- Provide appropriate paved roadway transitions to existing dirt roads east and south of the intersection (see Exhibit 5-3).

Recommendation 1.4 – Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial Roadway Segment Improvements – Contribute on a fair share basis to the following roadway segment improvements to accommodate future cumulative conditions and maintain consistency with the San Bernardino General Plan:

- Yates Well Road should ultimately be widened to provide Major Highway half-section width, including 1 westbound through lane, 1 westbound right turn lane (for I-15 northbound ramp access), 1 eastbound left turn lane, 1 eastbound through lane, and 1 eastbound right turn lane (for the Yates Well Road – Ivanpah Road corridor) along the Project frontage.

Recommendation 1.5 – Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial Intersection Improvements – Contribute on a fair share basis to the following intersection improvements to accommodate future cumulative conditions and maintain consistency with the San Bernardino General Plan:

I-15 Southbound Ramps & Yates Well Road (#1) –

- Provide traffic signal control
- Add southbound left turn lane

I-15 Northbound Ramps & Yates Well Road (#2) –

- Provide traffic signal control
- Add northbound right turn lane

Project Driveway & Yates Well Road (#3) – Update the Project driveway intersection configuration at Yates Well Road as follows:

- Provide traffic signal control

- Construct south leg of the intersection to include 1 northbound left turn lane and 1 northbound shared through/right lane
- Provide separate southbound right turn lane
- Provide separate eastbound left turn lane
- Provide separate eastbound right turn lane.

Truck turning paths are addressed in coordination with site lane recommendations on Exhibit 5-3 (for Opening Year 2021) and 6-5 (for Horizon Year 2040).

2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with the SBCTA CMP and California Department of Transportation (Caltrans) traffic study guidelines. (1) (3)

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The Transportation Research Board's Highway Capacity Manual (HCM) 6th Edition methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (4) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The County of San Bernardino and Caltrans require signalized intersection operations analysis based on the methodology described in the HCM 6th Edition. Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections, LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1. Study area intersections have been evaluated using the Synchro (Version 10) analysis software package.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
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.	55.01 to 80.00	E	F
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	80.01 and up	F	F

Source: HCM, 6th Edition

Consistent with Appendix B of the SBCTA CMP, the following saturation flow rates, in vehicles per hour green per lane (vphgpl), will be utilized in the traffic analysis for signalized intersections:

Existing and Opening Year Cumulative (2021) Traffic Conditions:

- Exclusive through: 1800 vphgpl
- Exclusive left: 1700 vphgpl
- Exclusive right: 1800 vphgpl
- Exclusive dual left: 1600 vphgpl
- Exclusive triple left: 1500 vphgpl

Horizon Year (2040) Traffic Conditions:

- Exclusive through: 1900 vphgpl
- Exclusive left: 1800 vphgpl
- Exclusive right: 1900 vphgpl
- Exclusive dual left: 1700 vphgpl
- Exclusive triple left: 1600 vphgpl

Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Common practice for LOS analysis is to use a peak 15-minute rate of flow.

However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (4)

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of Hesperia and Caltrans require the operations of unsignalized intersections be evaluated using the methodology described the HCM 6th Edition. (4) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F	F

Source: HCM, 6th Edition

At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by the California Department of Transportation (Caltrans) and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TIA uses the signal warrant criteria presented in the latest edition of the Caltrans California Manual on Uniform Traffic Control Devices (CA MUTCD) for all unsignalized study area intersections. (5)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (5) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Warrant 3 is appropriate to use for this TIA because it provides

specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

Future unsignalized intersections, that currently do not exist, have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets.

As shown in Table 2-3, traffic signal warrant analyses were performed for the following unsignalized study area intersections during the peak weekday conditions wherein the Project is anticipated to contribute the highest trips:

TABLE 2-3: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

ID	Intersection Location
1	I-15 Southbound Ramps & Yates Well Road
2	I-15 Northbound Ramps & Yates Well Road
3	Project Driveway & Yates Well Road

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Area Conditions* of this report. The traffic signal warrant analyses for future conditions are presented in Section 5 *Opening Year Cumulative (2021) Traffic Analysis,* and Section 6 *Horizon Year (2040) Traffic Analysis* of this report.

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.4 FREEWAY MAINLINE SEGMENT ANALYSIS METHODOLOGY

The freeway segment analysis is based on the methodology described in the HCM and performed using Highway Capacity Software (HCS) 7. The performance measure preferred by Caltrans to calculate LOS is density. Density is expressed in terms of passenger cars per mile per lane. Table 2-4 illustrates the freeway segment LOS descriptions for each density range utilized for this analysis.

TABLE 2-4: DESCRIPTION OF FREEWAY MAINLINE LOS

Level of Service	Description	Density Range (pc/mi/ln)[1]
A	Free-flow operations in which vehicles are relatively unimpeded in their ability to maneuver within the traffic stream. Effects of incidents are easily absorbed.	0.0 – 11.0
B	Relative free-flow operations in which vehicle maneuvers within the traffic stream are slightly restricted. Effects of minor incidents are easily absorbed.	11.1 – 18.0
C	Travel is still at relative free-flow speeds, but freedom to maneuver within the traffic stream is noticeably restricted. Minor incidents may be absorbed, but local deterioration in service will be substantial. Queues begin to form behind significant blockages.	18.1 – 26.0
D	Speeds begin to decline slightly and flows and densities begin to increase more quickly. Freedom to maneuver is noticeably limited. Minor incidents can be expected to create queuing as the traffic stream has little space to absorb disruptions.	26.1 – 35.0
E	Operation at capacity. Vehicles are closely spaced with little room to maneuver. Any disruption in the traffic stream can establish a disruption wave that propagates throughout the upstream traffic flow. Any incident can be expected to produce a serious disruption in traffic flow and extensive queuing.	35.1 – 45.0
F	Breakdown in vehicle flow.	>45.0

[1] pc/mi/ln = passenger cars per mile per lane. Source: HCM, 6th Edition

The number of lanes for existing baseline conditions has been obtained from field observations conducted by Urban Crossroads in December 2019. These existing freeway geometrics have been utilized for Existing, Opening Year Cumulative (2021), and Horizon Year (2040) conditions.

The I-15 Freeway mainline volume data were obtained from the Caltrans Performance Measurement System (PeMS) website for the segments of the I-15 Freeway interchanges at Yates Well Road. Truck traffic, represented as a percentage of total traffic and actual vehicles (as opposed to PCE volumes) have been utilized for the purposes of the basic freeway segment analysis. (6)

2.5 FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS

Although the HCM indicates the influence area for a merge/diverge junction is 1,500 feet, the analysis presented in this traffic study has been performed at ramp locations with respect to the nearest on or off ramp at each interchange in an effort to be consistent with Caltrans guidance/comments on other projects Urban Crossroads has worked on in the region.

The merge/diverge analysis is based on the HCM Ramps and Ramp Junctions analysis method and performed using HCS 7 software. The measure of effectiveness (reported in passenger car/mile/lane) are calculated based on the existing number of travel lanes, number of lanes at the on and off ramps both at the analysis junction and at upstream and downstream locations (if applicable) and acceleration/deceleration lengths at each merge/diverge point. Table 2-5 presents the merge/diverge area level of service descriptions for each density range utilized for this analysis.

TABLE 2-5: DESCRIPTION OF FREEWAY MERGE AND DIVERGE LOS

Level of Service	Density Range (pc/mi/ln)[1]
A	≤10.0
B	10.0 – 20.0
C	20.0 – 28.0
D	28.0 – 35.0
E	>35.0
F	Demand Exceeds Capacity

[1] pc/mi/ln = passenger cars per mile per lane. Source: HCM, 6th Edition

Similar to the basic freeway segment analysis, the I-15 Freeway mainline volume data were obtained from the Caltrans maintained PeMS website for the segments of the I-15 Freeway interchange at Yates Well Road. The ramp data (per the count data presented in Appendix 3.1) were then utilized to flow conserve the mainline volumes to determine the remaining I-15 Freeway mainline segment volumes. Flow conservation checks ensure that traffic flows from north to south (and vice versa) of the interchange area with no unexplained loss of vehicles. The data was obtained from October 2019.

In an effort to conduct a conservative analysis, the maximum value observed within the 3-day period was utilized for the weekday morning (AM) and weekday evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic and actual vehicles (as opposed to PCE volumes) have been utilized for the purposes of the freeway ramp junction (merge/diverge) analysis. (6)

2.6 MINIMUM LEVEL OF SERVICE (LOS)

2.6.1 COUNTY OF SAN BERNARDINO

For the purposes of this traffic analysis, and consistent with the County of San Bernardino TIA Guidelines, the following LOS will be utilized for study area intersections located within the County: Require development to achieve a peak hour Level of Service (LOS) D or better at intersections where LOS E may be permitted. Therefore, any intersection operating at LOS E or F will be considered deficient for the purposes of this analysis.

2.6.2 CALTRANS

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on the State Highway System (SHS) facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than this target LOS, the existing LOS should be maintained. Caltrans acknowledges that the region-wide goal for an acceptable LOS on all freeways, roadway segments, and intersections is LOS D. Consistent with the Caltrans LOS threshold of LOS D and in excess of the CMP stated LOS threshold of LOS E, LOS D will be used as the target LOS for freeway ramps, freeway segments, and freeway merge/diverge ramp junctions.

2.7 THRESHOLDS OF SIGNIFICANCE

To determine whether the addition of project traffic at an unsignalized study intersection results in a significant project-related impact, the following thresholds of significance will be utilized:

- The addition of project related traffic causes the intersection to move from an LOS C or better to an LOS D or worse in the Desert region.

  OR

- The project adds 5.0 seconds or more of delay to an intersection that is already projected to operate without project traffic at an LOS D, E, or F in the Desert region (per Section 10.5.2 b))

  AND

- One or both of the following conditions are met:
  - The project adds ten (10) or more trips to any approach
  - The intersection meets the peak hour traffic signal warrant after the addition of project traffic (per Section 10.5.2 c)).

Cumulative traffic impacts are created as a result of a combination of the proposed Project together with other future developments contributing to the overall traffic impacts requiring additional improvements to maintain acceptable level of service operations with or without the Project. A Project's contribution to a significant cumulative impact can be reduced to less-than-significant if the Project is required to implement or fund its fair share of improvements designed to alleviate its cumulatively considerable contribution to the impact. Cumulatively considerable is defined as the addition of 50 or more peak hour trips, and all facilities that would receive 50 or more peak hour trips from the Project are evaluated in this report.

This Page Intentionally Left Blank

3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the County of San Bernardino General Plan Circulation Network, and a review of existing peak hour intersection operations, traffic signal warrant, queuing, and freeway mainline analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the scoping agreement with County of San Bernardino staff (Appendix 1.1), the study area includes a total of 3 existing and future intersections as shown previously on Exhibit 1-2 where the Project is anticipated to contribute 50 or more peak hour trips. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 COUNTY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT

The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the County of San Bernardino in the vicinity of the proposed Project as identified on the County's General Plan Circulation Element have been reviewed.

Yates Well Road is classified as a Major Highway on the San Bernardino County General Plan Circulation Element. Yates Well Road is shown as a southeasterly corridor connecting to Nipton Road at Ivanpah Road as a Major Highway. Major Highways can accommodate four travel lanes and may have a raised median or continuous left turn lane.

Exhibit 3-2 shows the County of San Bernardino General Plan Circulation Element for the study area, and Exhibit 3-3 illustrates the County of San Bernardino roadway cross-sections for a Major Highway.

3.3 TRANSIT SERVICE

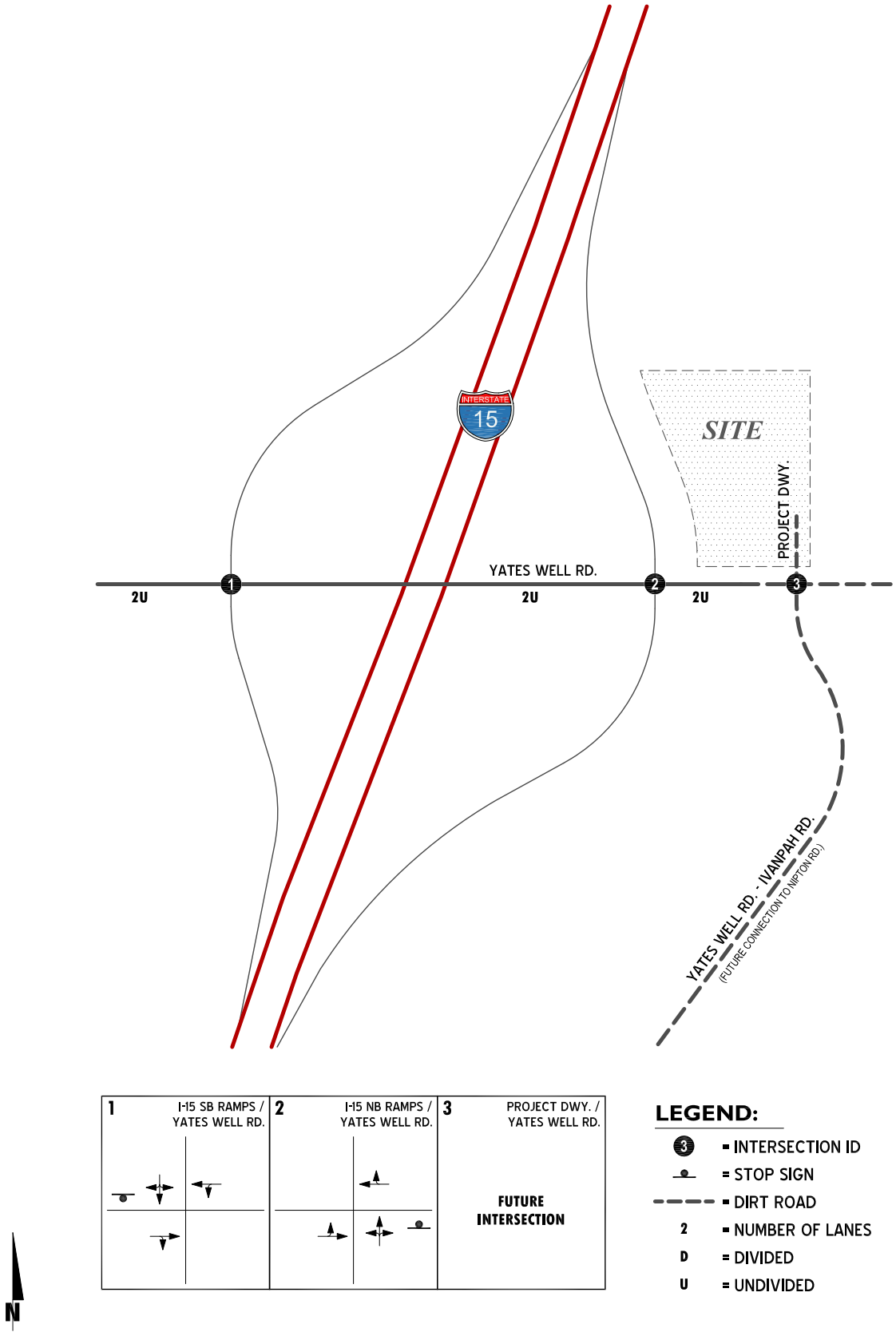
The study area is not currently served by transit. The rural locale for a land use that is intended to serve freeway travelers does not lend itself to transit usage. However, transit service is reviewed and updated by local agencies periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

3.4 EXISTING TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in October 2019. Consistent with standard engineering practice, these traffic counts were conducted either on Tuesday, Wednesday, or Thursday due to potential fluctuations in traffic that typically occur on Mondays, Fridays, Holidays, or weekends. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS

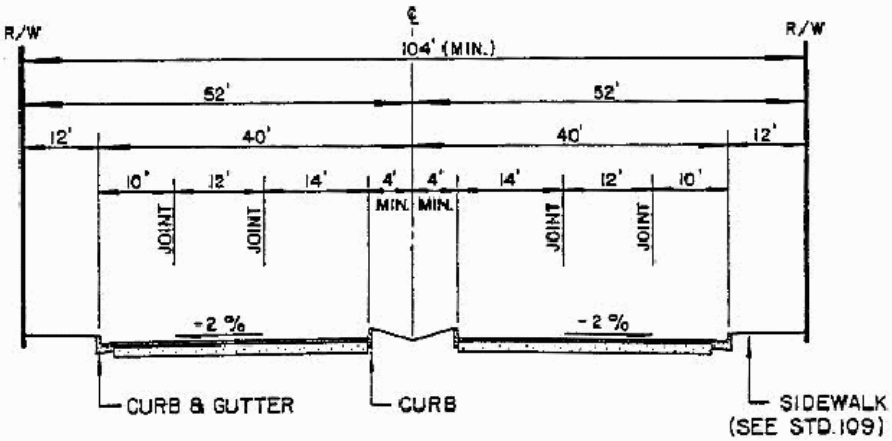


12884 - 01.dwg

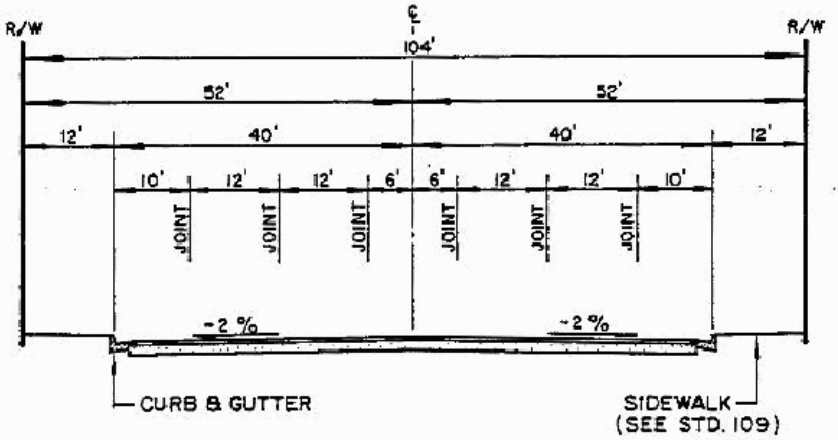
EXHIBIT 3-2: COUNTY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT

SOURCE: 2019 SAN BERNARDINO COUNTYWIDE PLAN

EXHIBIT 3-3: COUNTY OF SAN BERNARDINO MAJOR HIGHWAY ROADWAY CROSS-SECTIONS



TYPICAL SECTION
WITH RAISED MEDIAN



TYPICAL SECTION
WITH CONTINUOUS LEFT TURN LANE

NOTES:

1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. DRAINAGE FACILITIES SHALL BE PROVIDED TO DEWATER RAISED MEDIAN AREAS.
3. 10' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

SAN BERNARDINO COUNTY TRANSPORTATION DEPARTMENT			
DATE: ISO 12'91	JOHN R. SHONE DIRECTOR OF TRANSPORTATION	MAJOR HIGHWAY	101

12884 - 01.dwg

The weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area, which are based on the traffic conditions in October 2019. However, peak afternoon Friday and Sunday conditions are also evaluated in Section 7 of this report for Opening Year (2021) conditions.

The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access, and where there are currently no uses generating traffic. The traffic counts collected in October 2019 include the vehicle classifications as shown below:

- Passenger Cars
- 2-Axle Trucks
- 3-Axle Trucks
- 4 or More Axle Trucks

Truck percentages are applied to each scenario, consistent with existing rates. Existing weekday ADT volumes on arterial highways throughout the study area are shown on Exhibit 3-4.

3.5 INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1, which indicates that the existing study area intersections are currently operating at an acceptable LOS during the peak hours (i.e., LOS D or better). The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

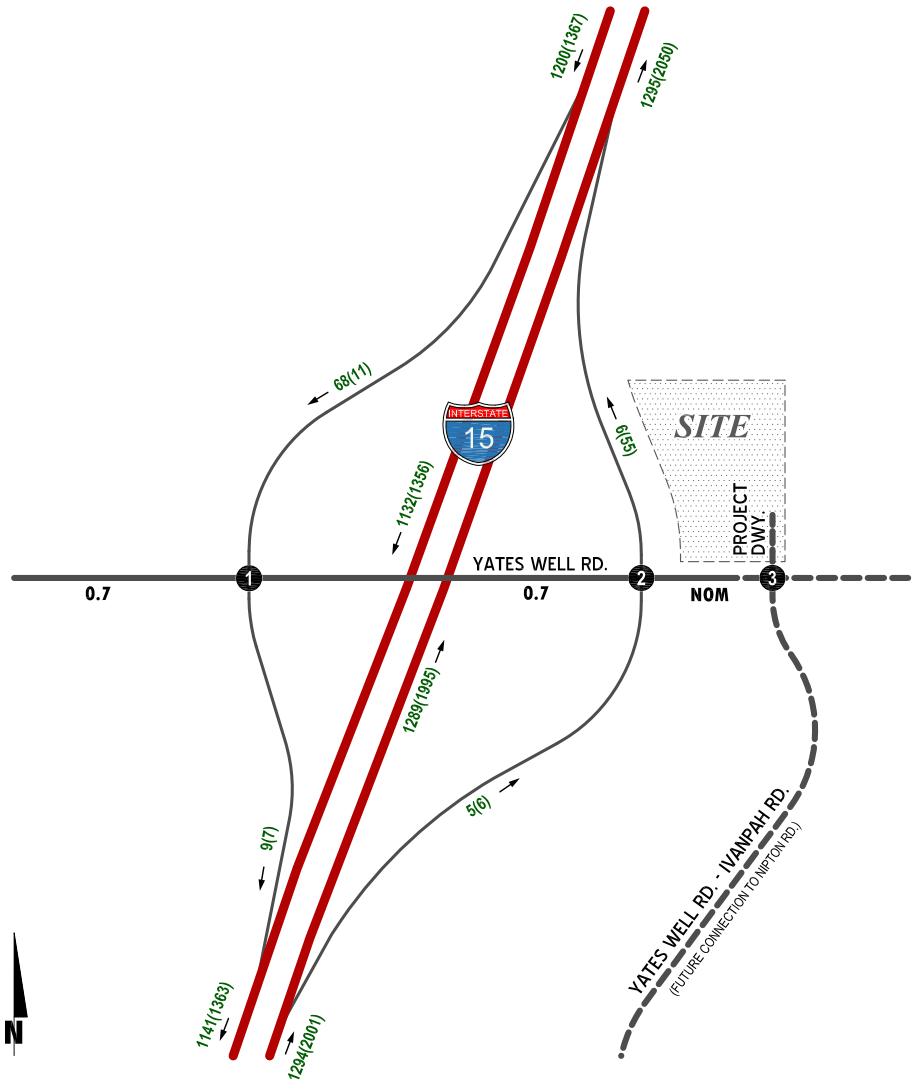
3.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

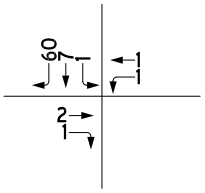
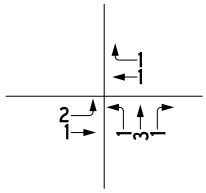
Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. Study area intersections currently do not warrant a traffic signal under Existing (2019) traffic conditions. Existing (2019) traffic conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

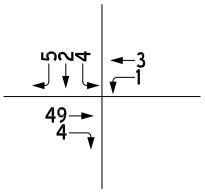
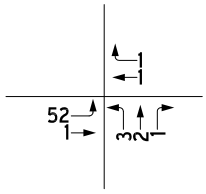
3.7 BASIC FREEWAY SEGMENT ANALYSIS

Existing (2019) mainline directional volumes for the AM and PM peak hours are provided on Exhibit 3-4. As shown in Table 3-2, the I-15 Freeway segments analyzed for this study currently operate at an acceptable LOS (i.e., LOS D or better) during the peak hours for Existing (2019) traffic conditions. Existing (2019) basic freeway segment analysis worksheets are provided in Appendix 3.4.

EXHIBIT 3-4: EXISTING (2019) TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES		
1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
		FUTURE INTERSECTION

PM PEAK HOUR INTERSECTION VOLUMES		
1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
		FUTURE INTERSECTION

LEGEND:

- ③ = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

3.8 FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Existing (2019) conditions and the results of this analysis are presented in Table 3-3. As shown in Table 3-3, the I-15 Freeway ramp merge and diverge areas at Yates Well Road currently operate at LOS D or better during the peak hours under Existing (2019) traffic conditions. Existing (2019) freeway ramp junction operations analysis worksheets are provided in Appendix 3.5.

TABLE 3-1: INTERSECTION ANALYSIS FOR EXISTING (2019) CONDITIONS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (Secs)		Level of Service[2]	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	I-15 SB Ramps / Yates Well Rd.	CSS	0	0	0	0	1!	0	0	1	0	0.5	0.5	0	8.7	8.9	A	A
2	I-15 NB Ramps / Yates Well Rd.	CSS	0	1!	0	0	0	0	0.5	0.5	0	0	1	0	7.7	9.8	A	A
3	Project Dwy. / Yates Well Rd.		Intersection Does Not Exist															

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right Lane

[2] Per the Highway Capacity Manual 6th Edition (HCM6), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. Delay and level of service is calculated using Synchro 10.1 analysis software.

[3] CSS = Cross-street Stop

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]3-1

TABLE 3-2: BASIC FREEWAY SEGMENT ANALYSIS FOR EXISTING (2019) CONDITIONS

Freeway	Direction	Mainline Segment Location	Lanes[1]	Volume		Density [2]		LOS [3]	
				AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	North of Yates Well Rd.	2	1,200	1,367	9.6	11.0	A	A
		Between Ramps	2	1,132	1,356	9.1	10.9	A	A
		South of Yates Well Rd.	2	1,141	1,363	9.1	10.9	A	A
	NB	South of Yates Well Rd.	3	1,294	2,001	6.9	10.8	A	A
		Between Ramps	3	1,289	1,995	6.8	10.8	A	A
		North of Yates Well Rd.	3	1,295	2,050	6.9	16.6	A	B

[1] Number of lanes are in the specified direction and is based on existing conditions.

[1] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[3] Level of service determined using HCS7: Basic Segments software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]3-2

TABLE 3-3: FREEWAY RAMP JUNCTION MERGE/DIVERGE ANALYSIS FOR EXISTING (2019) CONDITIONS

Freeway	Direction	Ramp Location	Junction Type	Lanes on Freeway	Lanes on Ramp	Volume		Density [1]		LOS [2]	
						AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	SB Off Ramp at Yates Well Rd.	Diverge	2	1	68	11	13.6	15.2	B	B
		SB On Ramp at Yates Well Rd.	Merge	2	1	9	7	13.4	15.3	B	B
	NB	NB Off Ramp at Yates Well Rd.	Diverge	3	1	5	6	11.0	15.7	B	B
		NB On Ramp at Yates Well Rd.	Merge	3	1	6	55	10.0	14.2	A	B

[1] Density calculated based on the Highway Capacity Manual (HCM) analysis; (pc/mi/ln) = passenger car per mile per lane

[2] Level of service determined using HCS7 : Ramps and Ramp Junction software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]3-3

4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment, onto the study area roadway network. The proposed Project consists of a fueling station with 7,500 square-foot convenience store and 22 vehicle fueling positions (vfp) and is estimated to be completed and occupied by the year 2021.

Vehicular and truck traffic access will be provided via one driveway located near the east edge of the Project, providing access via Yates Well Road (see Exhibit 1-1). Fire department access will also be available via a gated access at the I-15 northbound Ramp. Regional access to the Project site is available from the I-15 Freeway via the Yates Well Road interchange.

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic that is attracted and produced by a development, and is based upon the specific land uses planned for a given project. In order to develop the traffic characteristics of the proposed project, the trip-generation rates used for this analysis are based upon rates included in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition, 2017). (2) Trip generation rates for the Project are shown in Table 4-1. The trip generation summary illustrating daily, and peak hour trip generation estimates for the proposed Project are shown in Table 4-1. As shown in Table 4-1, the Project is estimated to generate a net total of 5,071 trip-ends per day on a typical weekday with approximately 618 AM peak hour trips and 506 PM peak hour trips.

New trips that are generated by the proposed project are referred to as Primary trips. These trips would be a direct result of the construction and operation of the project. Primary trips include employees and patrons who choose to drive to and from the Project as their main purpose for traveling on I-15.

Many of the trips generated by a service station are not new trips, but instead are already traveling on the adjacent freeway that are diverted to the project. These trips are referred to as Diverted linked trips and are not added to I-15 mainline volumes. They represent travelers on the freeway mainline who use Yates Well Road to travel to and from the project while diverting from their primary route. Diverted linked trips are vehicles already traveling on I-15 that exit the freeway to get gas or food at the project, then continue back onto the freeway. Because these trips are already on the freeway, they are not added to the traveler's primary route but do represent new trips on Yates Well Road and on the I-15 ramps.

This study uses a diverted linked trip percentage of approximately 72 percent of the total trips generated by the project. This percentage is logical given that the project is a traveler-serving land use and does not necessarily generate a great deal of new vehicle trips. This percentage is higher than the diverted linked trip percentage reported for similar use ITE Land Use Code 945 "Gasoline Service Station with Convenience Market" from the ITE Trip Generation Handbook (10th Edition). Because many service stations are located in suburban settings, the land use category would be expected to have a lower diverted linked trip percentage than a service station in the project's remote location.

TABLE 4-1: PROJECT TRIP GENERATION SUMMARY

Trip Generation Rates[1]									
Land Use	ITE LU Code	Quantity[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Super Convenience Market/Gas Station	960	22 VFP	14.04	14.04	28.08	11.48	11.48	22.96	230.52

Trip Generation Results									
Land Use	ITE LU Code	Quantity[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Super Convenience Market/Gas Station	960	22 VFP	309	309	618	253	253	506	5,071
Diverted Trip Ends			**223**	**223**	**446**	**182**	**182**	**364**	**3,651**
Primary Trip Ends			**86**	**86**	**172**	**71**	**71**	**142**	**1,420**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] VFP = Vehicle Fueling Positions

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]4-1

As shown in Table 4-2, It is estimated that there would be 446 total diverted linked trips during the a.m. peak hour and 364 total diverted linked trips during the p.m. peak hour.

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions, or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered to identify the route where the Project traffic would distribute. The Project traffic distribution pattern for primary trips is shown on Exhibit 4-1. This distribution pattern was reviewed and approved by the County of San Bernardino as part of the traffic study scoping process (see Appendix 1.1).

The Project trip distribution was developed based on anticipated travel patterns to and from the Project site. The Project trip distribution was developed based on an understanding of existing travel patterns in the area, the geographical location of the site, and the site's proximity to the state highway system.

4.3 MODAL SPLIT

The traffic reducing potential of public transit, walking, or bicycling have not been considered in this TIA. Essentially, the traffic projections are "conservative" in that these alternative travel modes might be able to reduce the forecasted traffic volumes (employee trips only).

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project.

Estimates of morning and evening peak hour primary volumes at the study intersections are shown on Exhibit 4-2. Estimates of morning and evening peak hour diverted volumes at the study intersections are shown on Exhibit 4-3.

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon two years of background (ambient) growth at 2% per year for 2021 traffic conditions. The total ambient growth is 4.04% for 2021 traffic conditions (growth of 2 percent per year, compounded over two years or $1.02^{2\ \text{years}}$). Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways.

4.6 TRAFFIC FORECASTS

To provide a comprehensive assessment of the deficiencies, two types of analyses, "buildup" and "buildout", were performed in support of this work effort. The "buildup" method was used to approximate Opening Year Cumulative (2021) traffic conditions and is intended to identify the near-term deficiencies on both the existing and planned near-term circulation system.

EXHIBIT 4-1: TRIP DISTRIBUTION FOR PRIMARY/NEW TRIPS

LEGEND:

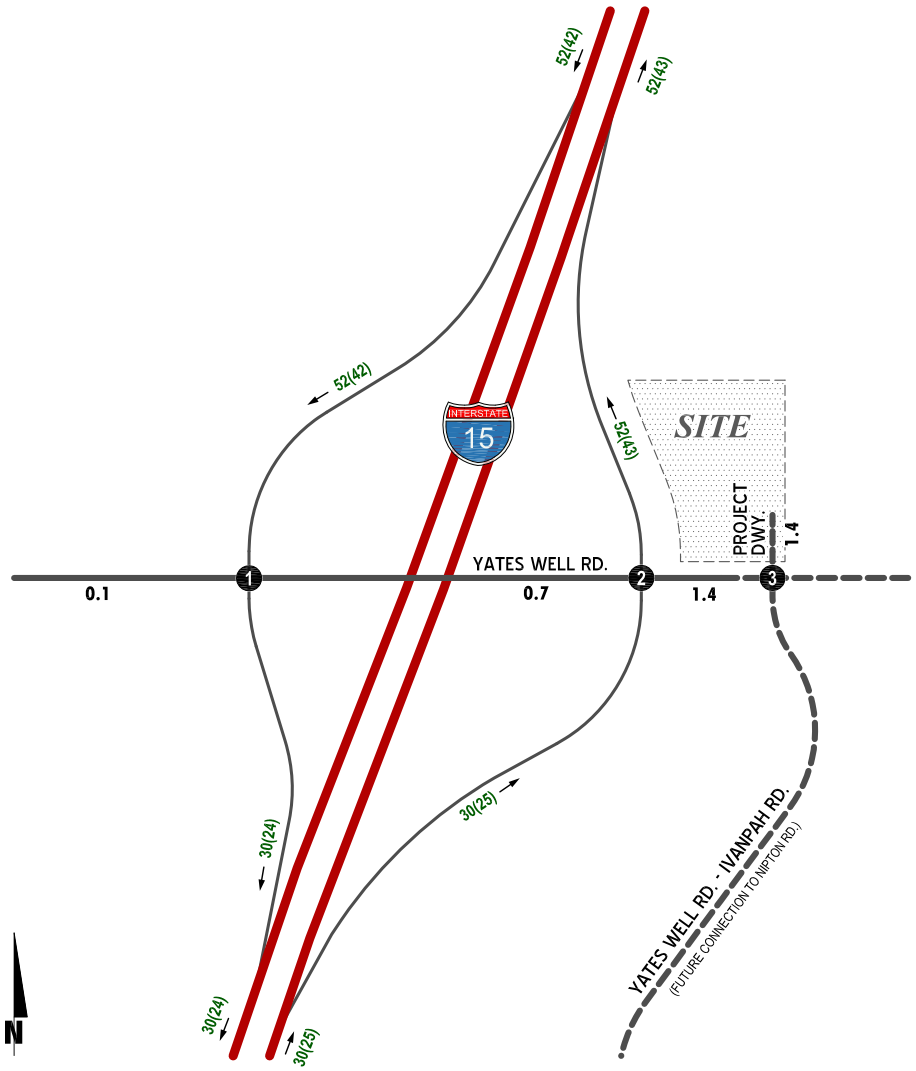
10 = PERCENT NEW TRIPS FROM/TO PROJECT

= FUTURE ROADWAY / DIRT

N

12884 - 01.dwg

EXHIBIT 4-2: PROJECT PRIMARY/NEW TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0 0 52 → 4 ← 30 4 → 0	52 ← 34 0 → 56 → 0 0 30	86 0 → 0 ← 0 86 → 0

PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0 0 42 → 4 ← 24 4 → 0	43 ← 28 0 → 46 → 0 0 25	71 0 → 0 ← 0 71 → 0

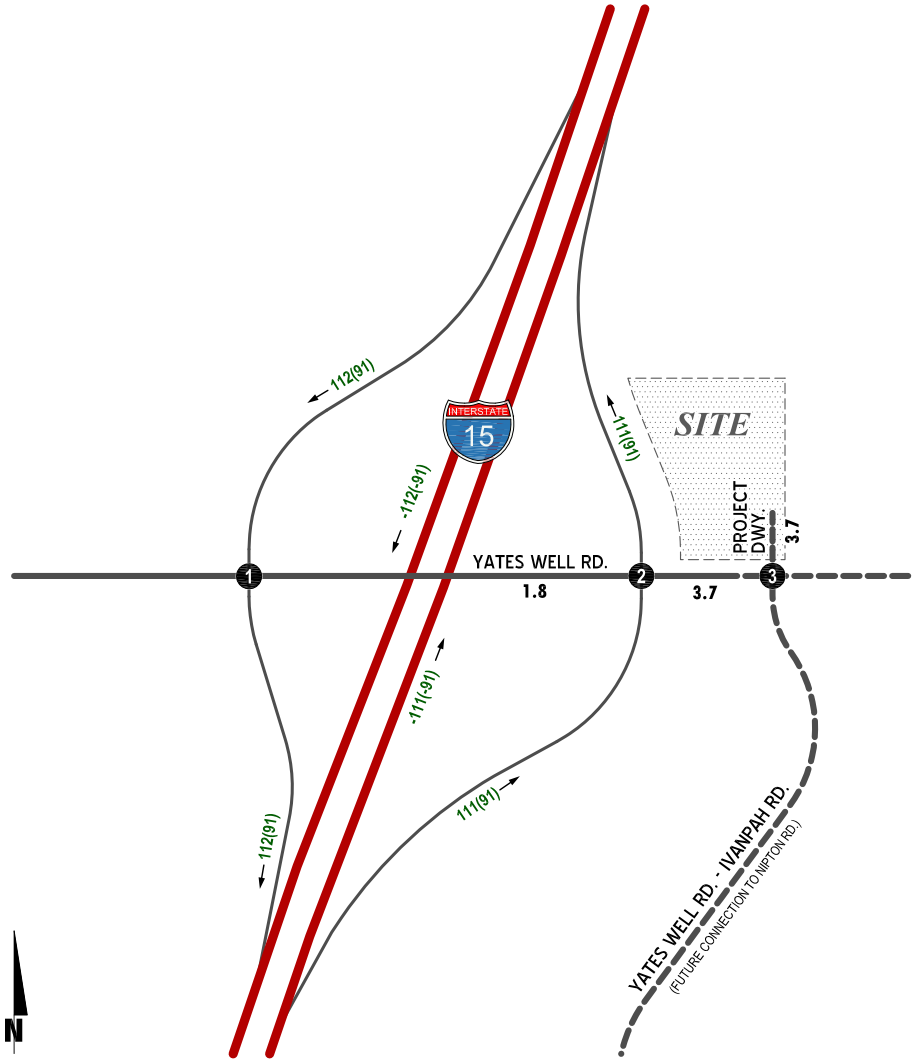
LEGEND:

- 3 = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

12884 - 01.dwg

URBAN CROSSROADS

EXHIBIT 4-3: PROJECT DIVERTED TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0, 0, 112, 0, 112, 0, 0	111, 112, 0, 112, 0, 111	223, 0, 0, 0, 223, 0

PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0, 0, 91, 0, 91, 0, 0	91, 91, 0, 91, 0, 91	182, 0, 0, 0, 182, 0

LEGEND:

- 3 = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

The Opening Year Cumulative (2021) traffic conditions includes background traffic, traffic generated by other cumulative development projects within the study area, and traffic generated by the proposed Project. The "buildout" method was utilized for Horizon Year traffic conditions and is based on regional travel forecasts for 2040 traffic conditions.

4.6.1 NEAR-TERM (2021) TRAFFIC

The near-term traffic analyses include the following traffic conditions, with the various traffic components:

- Opening Year Cumulative (2021) Without Project
    - Existing 2019 counts
    - Ambient growth (4.04%)
- Opening Year Cumulative (2021) With Project
    - Existing 2019 counts
    - Ambient growth (4.04%)
    - Project traffic

4.6.2 HORIZON YEAR (2040) TRAFFIC

Traffic projections for Horizon Year (2040) with Project conditions were developed from County of San Bernardino General Plan traffic volume forecasts with adjustments for refinement, conservation of flow, comparisons between parallel routes, and reasonableness. Horizon Year (2040) turning volumes were compared to Opening Year Cumulative (2021) volumes in order to ensure a minimum growth as a part of the refinement process, where applicable.

This Page Intentionally Left Blank

5 OPENING YEAR CUMULATIVE (2021) TRAFFIC ANALYSIS

This section discusses the traffic forecasts for Opening Year Cumulative (2021) conditions and the resulting peak hour intersection operations, traffic signal warrant, and freeway mainline analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2021) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the Project's frontage and driveways).

5.2 OPENING YEAR CUMULATIVE (2021) VOLUME FORECASTS

To account for background traffic, other known cumulative development projects in the study area were included in addition to 4.04% of ambient growth for Opening Year Cumulative traffic conditions. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2021) Without Project traffic conditions are shown on Exhibit 5-1.

The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2021) With Project traffic conditions are shown on Exhibit 5-2.

5.3 INTERSECTION OPERATIONS ANALYSIS

Opening Year Cumulative (2021) Without and With Project peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1 for both Opening Year Cumulative (2021) Without and With Project traffic conditions.

5.3.1 OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT CONDITIONS

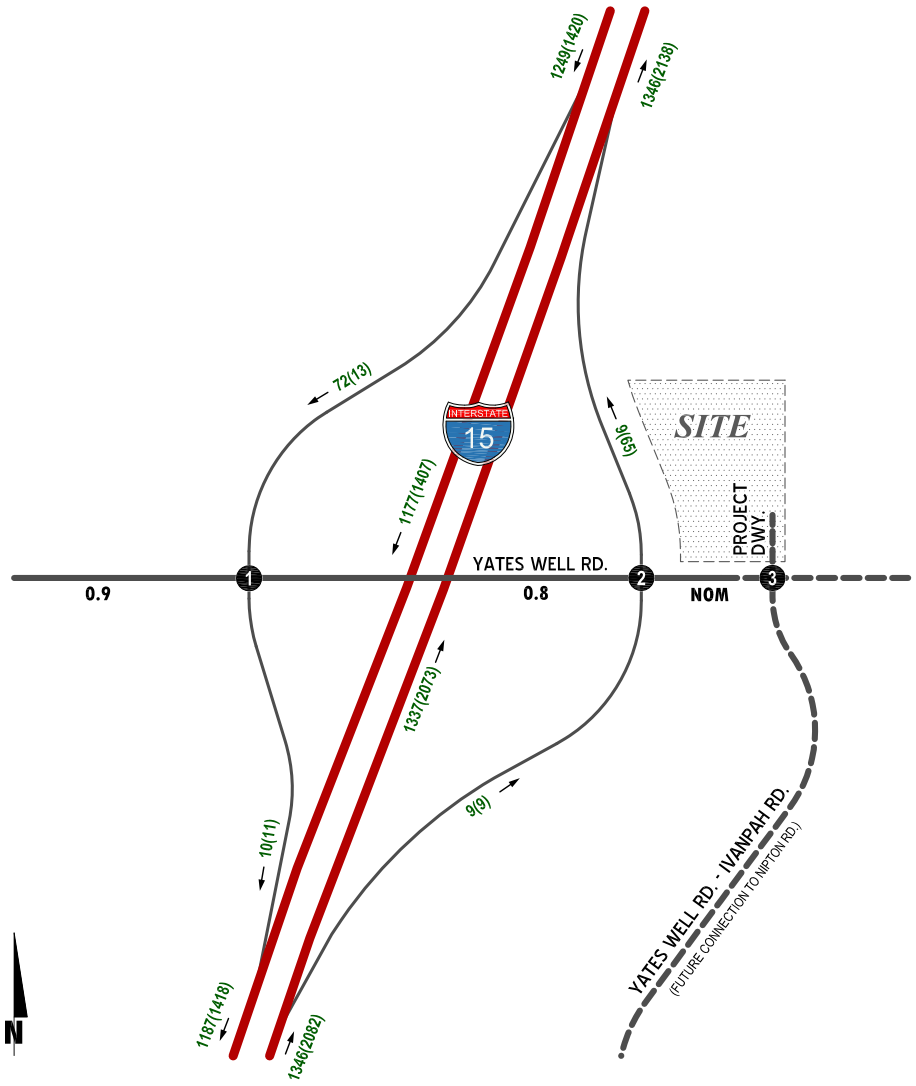
Opening Year Cumulative (2021) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1, which indicates that the study area intersections are anticipated to operate at an acceptable LOS during the peak hours, consistent with Existing (2019) traffic conditions.

The intersection operations analysis worksheets for Opening Year Cumulative (2021) Without Project traffic conditions are included in Appendix 5.1 of this TIA.

5.3.2 OPENING YEAR CUMULATIVE (2021) WITH PROJECT CONDITIONS

With the addition of Project traffic, study area intersections are anticipated to operate at an acceptable LOS during the peak hours, with site access improvements.

EXHIBIT 5-1: OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT TRAFFIC VOLUMES



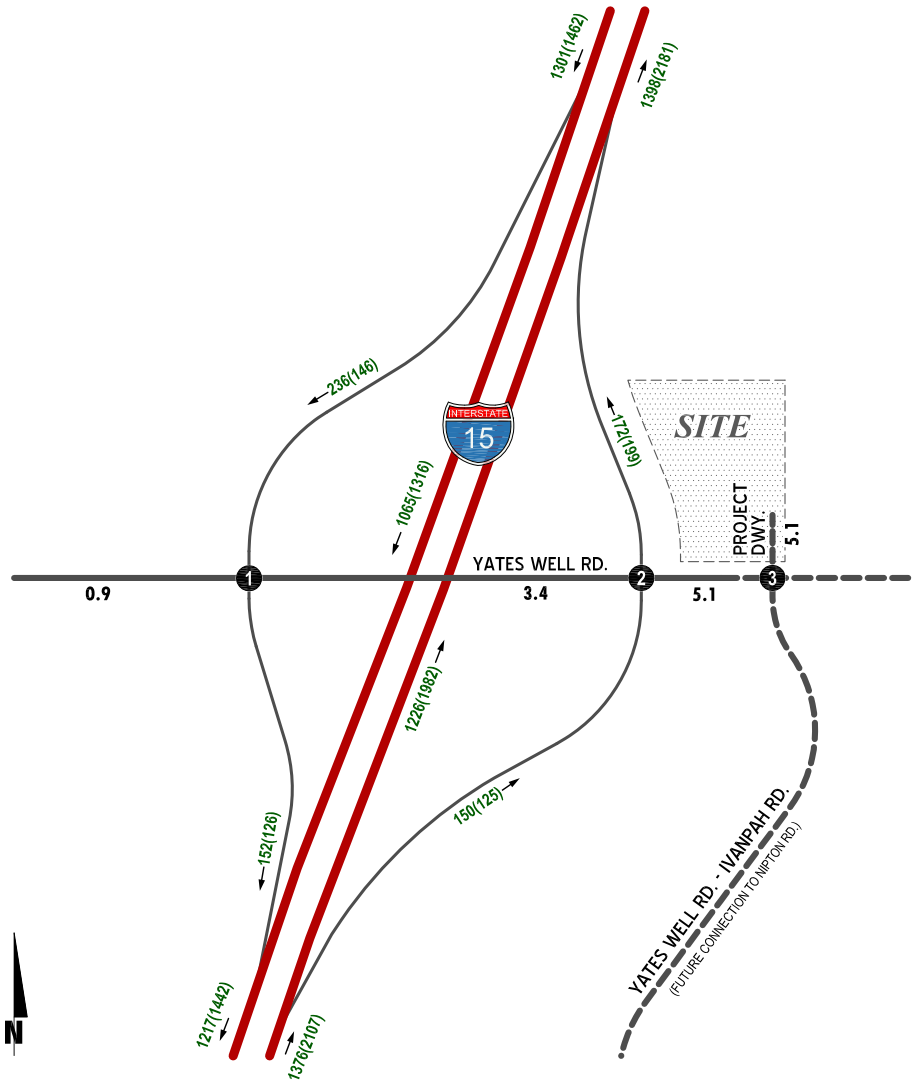
AM PEAK HOUR INTERSECTION VOLUMES		
1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
64 7 1 → 5 1 ← 5 → 2 ↓	1 ← 1 5 → 1 5 3 1 ↑	FUTURE INTERSECTION

PM PEAK HOUR INTERSECTION VOLUMES		
1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
7 2 4 → 6 1 ← 59 → 8 ↓	1 ← 1 62 → 1 6 2 1 ↑	FUTURE INTERSECTION

LEGEND:

- (3) = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- ←10 = PEAK HOUR VOLUME
- ←100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

EXHIBIT 5-2: OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
64, 7, 165 → 9, 143 ←	164, 147 ←	309, 1 → 1, 2 ←
9 → 2 ←	5 → 169, 5, 3, 142 ←	309 → 2

PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
7, 2, 137 → 10, 116 ←	135, 120 ←	253, 1 → 1, 2 ←
63 → 8 ←	62 → 138, 6, 2, 117 ←	253 → 2

LEGEND:

- (3) = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

TABLE 5-1: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) CONDITIONS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												WITHOUT PROJECT				WITH PROJECT			
			Northbound			Southbound			Eastbound			Westbound			Delay[2] (Secs)		Level of Service[2]		Delay[2] (Secs)		Level of Service[2]	
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM	AM	PM	AM	PM
1	I-15 SB Ramps / Yates Well Rd.	CSS	0	0	0	0	1!	0	0	1	0	0.5	0.5	0	8.7	8.9	A	A	20.7	34.3	C	D
2	I-15 NB Ramps / Yates Well Rd.	CSS	0	1!	0	0	0	0	0.5	0.5	0	0	1	0	8.6	10.4	A	B	11.6	14.4	B	B
3	Project Dwy. / Yates Well Rd.	**CSS**	0	0	0	0	**1!**	0	**0.5**	**0.5**	0	0	**1**	0	Future Intersection				9.8	9.5	A	A

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right Lane; **1** = Improvement

[2] Per the Highway Capacity Manual 6th Edition (HCM6), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. Delay and level of service is calculated using Synchro 10.1 analysis software.

[3] CSS = Cross-street Stop

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]5-1

A summary of the peak hour intersection LOS for Opening Year Cumulative (2021) With Project conditions are shown on Table 5-1. The intersection operations analysis worksheets for Opening Year Cumulative (2021) With Project traffic conditions are included in Appendix 5.2 of this TIA.

5.4 TRAFFIC SIGNAL WARRANTS ANALYSIS

Study area intersections are not anticipated to meet traffic signal warrants for Opening Year Cumulative (2021) Without Project or With Project traffic conditions. Worksheets for Opening Year Cumulative (2021) Without and With Project traffic conditions signal warrants are provided in Appendices 5.3 and 5.4, respectively.

5.5 BASIC FREEWAY SEGMENT ANALYSIS

As shown in Table 5-2 and consistent with Existing (2019) traffic conditions, the I-15 Freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours for Opening Year Cumulative (2021) Without Project traffic conditions. Opening Year Cumulative (2021) Without Project basic freeway segment analysis worksheets are provided in Appendix 5.5.

As shown in Table 5-2, with the addition of Project traffic, the I-15 Freeway segments analyzed for this study are anticipated to continue to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours for Opening Year Cumulative (2021) With Project traffic conditions. Opening Year Cumulative (2021) With Project basic freeway segment analysis worksheets are provided in Appendix 5.6.

5.6 FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Opening Year Cumulative (2021) Without Project traffic conditions and the results of this analysis are presented in Table 5-3. As shown in Table 5-3, the I-15 Freeway ramp merge and diverge areas at Yates Well Road are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours under Opening Year Cumulative (2021) Without Project traffic conditions. Opening Year Cumulative (2021) Without Project traffic conditions freeway ramp junction operations analysis worksheets are provided in Appendix 5.7.

As shown in Table 5-3, with the addition of Project traffic, the I-15 Freeway ramp merge and diverge areas at Yates Well Road are anticipated to continue to operate to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours under Opening Year Cumulative (2021) With Project traffic conditions. Opening Year Cumulative (2021) With Project traffic conditions freeway ramp junction operations analysis worksheets are provided in Appendix 5.8.

TABLE 5-2: BASIC FREEWAY SEGMENT ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) CONDITIONS

WITHOUT PROJECT CONDITIONS									
Freeway	Direction	Mainline Segment Location	Lanes[1]	Volume		Density [2]		LOS [3]	
				AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	North of Yates Well Rd.	2	1,249	1,420	10.0	11.4	A	B
		Between Ramps	2	1,177	1,407	9.4	11.3	A	B
		South of Yates Well Rd.	2	1,187	1,418	9.5	11.4	A	B
	NB	South of Yates Well Rd.	3	1,346	2,082	7.1	11.2	A	B
		Between Ramps	3	1,337	2,073	7.1	11.2	A	B
		North of Yates Well Rd.	3	1,346	2,138	7.1	11.5	A	B

WITH PROJECT CONDITIONS									
Freeway	Direction	Mainline Segment Location	Lanes[1]	Volume		Density [2]		LOS [3]	
				AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	North of Yates Well Rd.	2	1,301	1,462	10.4	11.7	A	B
		Between Ramps	2	1,065	1,316	8.5	10.6	A	A
		South of Yates Well Rd.	2	1,217	1,442	9.7	11.6	A	B
	NB	South of Yates Well Rd.	3	1,376	2,107	7.3	11.4	A	B
		Between Ramps	3	1,226	1,982	6.5	10.7	A	A
		North of Yates Well Rd.	3	1,398	2,181	7.4	11.8	A	B

[1] Density calculated based on the Highway Capacity Manual (HCM) analysis; (pc/mi/ln) = passenger car per mile per lane

[2] Level of service determined using HCS7 : Ramps and Ramp Junction software, Version 7.5

[1] Number of lanes are in the specified direction and is based on existing conditions.

[1] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[3] Level of service determined using HCS7: Basic Segments software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]5-2

TABLE 5-3: FREEWAY RAMP JUNCTION MERGE/DIVERGE ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) WITH PROJECT CONDITIONS

WITHOUT PROJECT CONDITIONS											
Freeway	Direction	Ramp Location	Junction Type	Lanes on Freeway	Lanes on Ramp	Volume		Density [1]		LOS [2]	
						AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	SB Off Ramp at Yates Well Rd.	Diverge	2	1	72	13	14.1	15.7	B	B
		SB On Ramp at Yates Well Rd.	Merge	2	1	10	11	13.8	15.8	B	B
	NB	NB Off Ramp at Yates Well Rd.	Diverge	3	1	9	9	11.4	16.2	B	B
		NB On Ramp at Yates Well Rd.	Merge	3	1	9	65	10.3	14.6	B	B

WITH PROJECT CONDITIONS											
Freeway	Direction	Ramp Location	Junction Type	Lanes on Freeway	Lanes on Ramp	Volume		Density [1]		LOS [2]	
						AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	SB Off Ramp at Yates Well Rd.	Diverge	2	1	236	146	14.5	16.1	B	B
		SB On Ramp at Yates Well Rd.	Merge	2	1	152	126	13.9	15.9	B	B
	NB	NB Off Ramp at Yates Well Rd.	Diverge	3	1	150	125	11.8	16.6	B	B
		NB On Ramp at Yates Well Rd.	Merge	3	1	172	199	11.0	15.2	B	B

[1] Density calculated based on the Highway Capacity Manual (HCM) analysis; (pc/mi/ln) = passenger car per mile per lane

[2] Level of service determined using HCS7 : Ramps and Ramp Junction software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]5-3

5.7 NEAR TERM RECOMMENDATIONS

Improvement strategies are recommended at intersections and freeway facilities (if necessary) that have been identified as deficient or as needed for Project access under Opening Year Cumulative (2021) With Project traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better). Exhibit 5-3 shows the Project access recommendations for Opening Year Cumulative (2021) conditions.

5.7.1 RECOMMENDED IMPROVEMENTS FOR ROADWAY SEGMENTS

Between the I-15 northbound intersection and the main Project entry, a transitioning width of paved roadway is required on the north side of the roadway centerline as shown on Exhibit 5-3.

Between the I-15 northbound intersection and the main Project entry, Yates Well Road shall be improved to accommodate one eastbound travel lane on Exhibit 5-3.

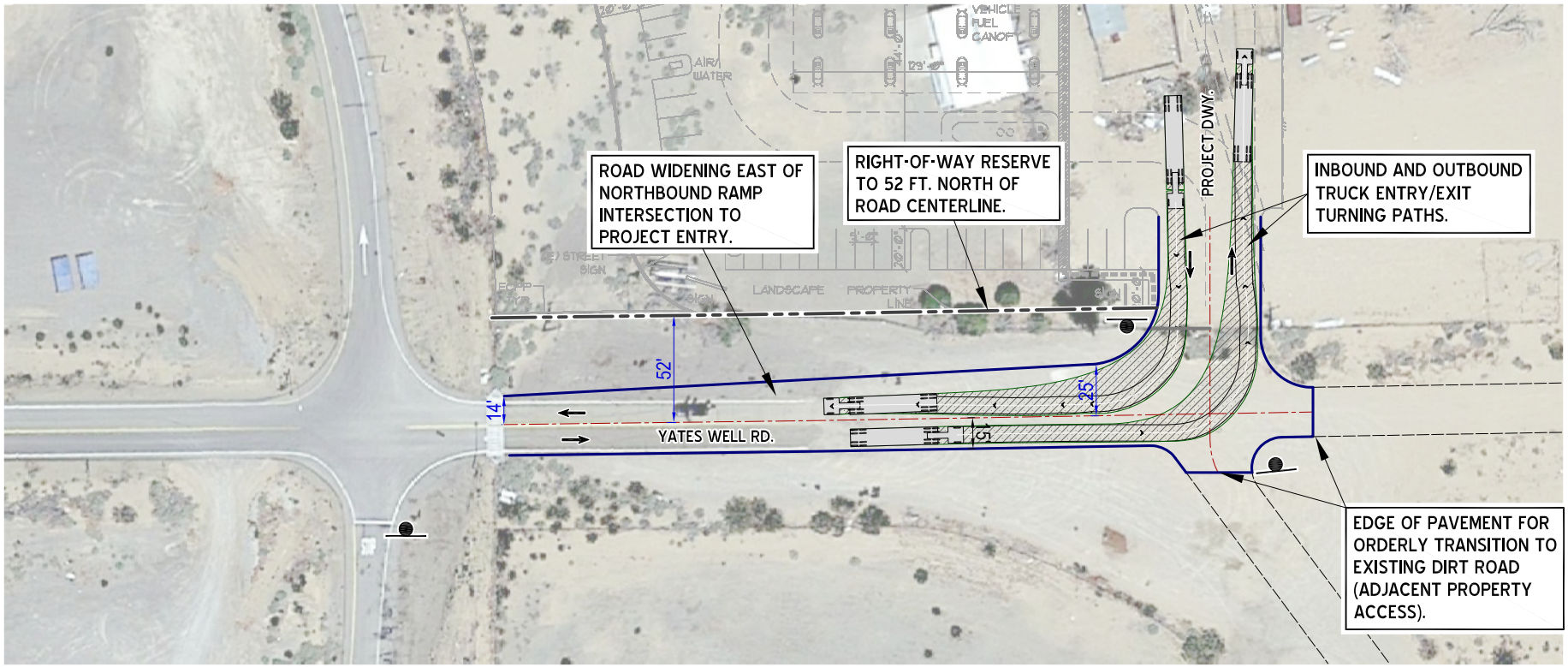
The Project should dedicate 52 feet of right of way for ultimate provision of a Major Highway half section along the Project frontage as indicated on Exhibit 5-3.

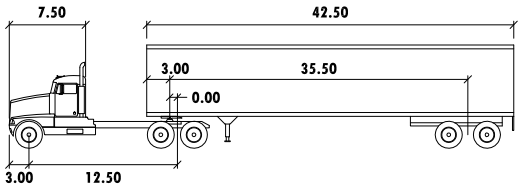
5.7.2 RECOMMENDED IMPROVEMENTS AT INTERSECTIONS

Construct the Project driveway at Yates Well Road for Opening Year Cumulative (2021) conditions as follows (consistent with Table 5-1):

- Provide stop control for travelers exiting the Project driveway
- Construct north leg with one shared outbound left/right turn lane, and one inbound lane
- Provide eastbound shared left/through lane
- Provide appropriate paved roadway transitions to existing dirt roads east and south of the intersection (see Exhibit 5-3).

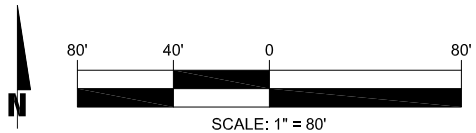
EXHIBIT 5-3: OPENING YEAR CUMULATIVE (2021) LANE IMPROVEMENTS





WB-50

	feet		
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		



LEGEND:

= STOP SIGN

12884 - 01.dwg

URBAN CROSSROADS

This Page Intentionally Left Blank

6 HORIZON YEAR (2040) TRAFFIC ANALYSIS

This section discusses the methods used to develop Horizon Year (2040) Without and With Project and Adjacent ±15 Acre Commercial traffic forecasts and the resulting peak hour intersection operations, traffic signal warrant, freeway off-ramp queuing, freeway mainline analyses.

6.1 BASELINE FUTURE ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year (2040) conditions include the southerly connection of Yates Well Road to Nipton Road as indicated on the San Bernardino County General Plan Circulation Element.

6.2 HORIZON YEAR (2040) WITHOUT PROJECT

The Horizon Year (2040) Without Project analysis scenario includes the forecast volumes based upon the San Bernardino County General Plan with adjustments for refinement, conservation of flow, comparisons between parallel routes, and reasonableness (see Section 4.9 *Horizon Year (2040) Conditions* of this TIA for a detailed discussion of the forecasting methodology). The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Horizon Year (2040) Without Project traffic conditions are shown on Exhibit 6-1.

6.3 HORIZON YEAR (2040) WITH PROJECT AND ADJACENT ±15 ACRE COMMERCIAL

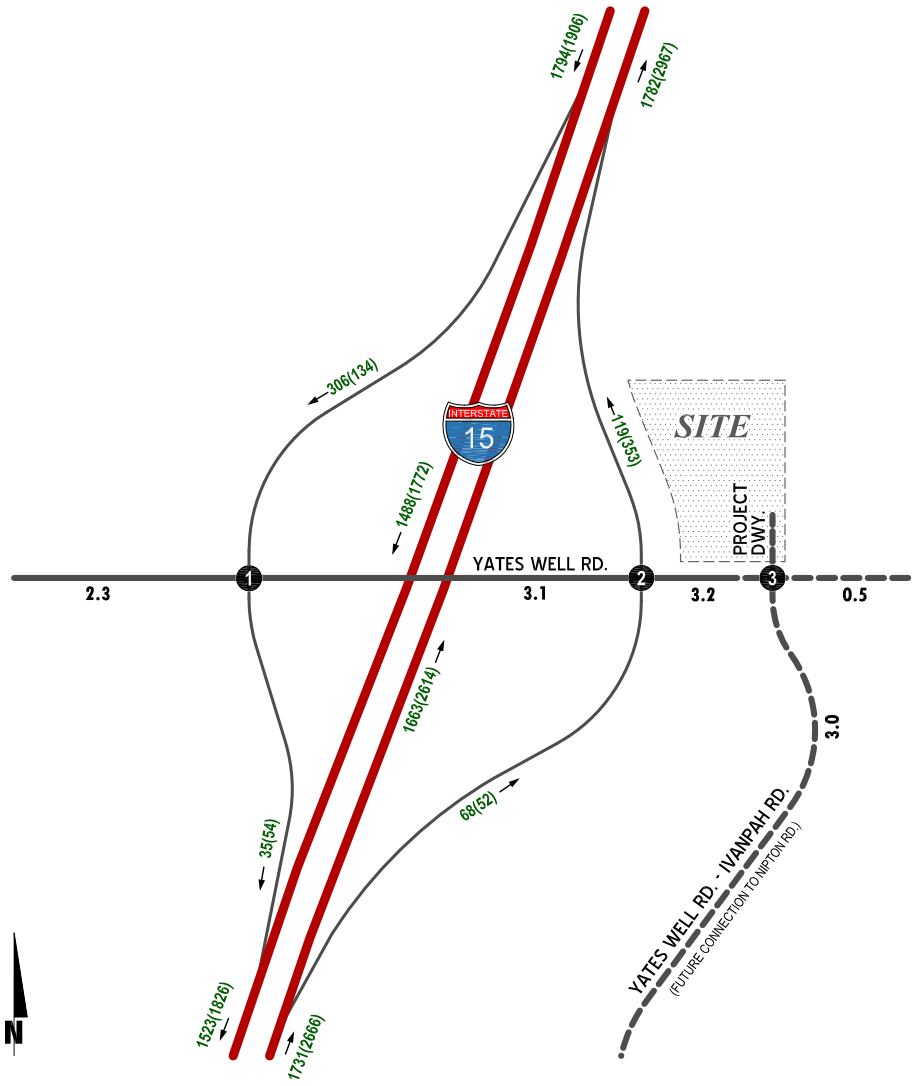
Adjacent to the Project fueling station and convenience store, a potential future 15 acre commercial property is included based upon generic shopping center trip generation characteristics. Table 6-1 shows the trip generation for the adjacent 15 acre commercial property, which results in approximately 141 AM peak hour trips, 572 PM peak hour trips, and 4,663 daily trips, of which 103 AM peak hour trips, 412 PM peak hour trips, and 4,077 daily trips are diverted trips.

Estimates of morning and evening peak hour primary volumes for the 15 acre commercial site at the study intersections are shown on Exhibit 6-2. Estimates of morning and evening peak hour diverted volumes for the 15 acre commercial site at the study intersections are shown on Exhibit 6-3.

The Horizon Year (2040) Without Project analysis scenario includes the forecast volumes documented above, plus the traffic generated by the buildout of the proposed Project (see Section 4.9 *Horizon Year (2040) Conditions* of this TIA for discussion on the post-processing methodology).

The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial traffic conditions are shown on Exhibit 6-4.

EXHIBIT 6-1: HORIZON YEAR (2040) WITHOUT PROJECT TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY.- YATES WELL- IVANPAH RD./ YATES WELL RD.
100 10 196 → 51 ← 7	88 ← 16	19 ← 4
48 → 18 ←	27 → 217 ← 42 4 22	29 → 210 ← 85 5

PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY.- YATES WELL- IVANPAH RD./ YATES WELL RD.
23 3 108 → 61 ← 21	232 ← 46	30 ← 6
125 → 30 ←	118 → 115 ← 36 3 13	20 → 108 ← 248 4

LEGEND:

- ③ = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

TABLE 6-1: ADJACENT ±15 ACRE COMMERCIAL PROPERTY TRIP GENERATION SUMMARY

Trip Generation Rates[1]									
Land Use	ITE LU Code	Quantity[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Shopping Center	820	150 TSF	0.58	0.36	0.94	1.83	1.98	3.81	37.75

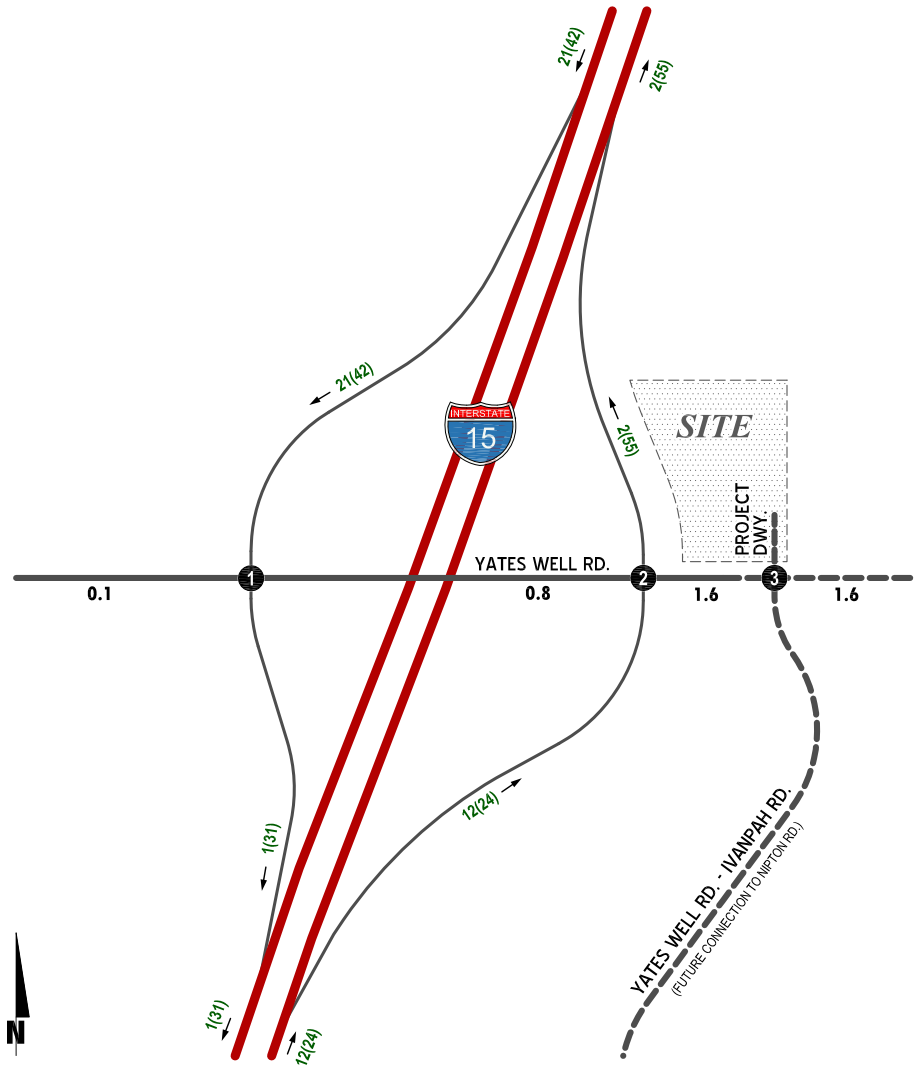
Trip Generation Results									
Land Use	ITE LU Code	Quantity[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Shopping Center	820	150 TSF	87	54	141	275	297	572	5,663
Diverted Trip Ends			**52**	**51**	**103**	**206**	**206**	**412**	**4,077**
Primary Trip Ends			**35**	**3**	**38**	**69**	**91**	**160**	**1,586**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition (2017).

[2] TSF = Thousand Square Feet

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]6-1

EXHIBIT 6-2: ADJACENT ±15 ACRE COMMERCIAL PROPERTY
PRIMARY/NEW TRAFFIC VOLUMES



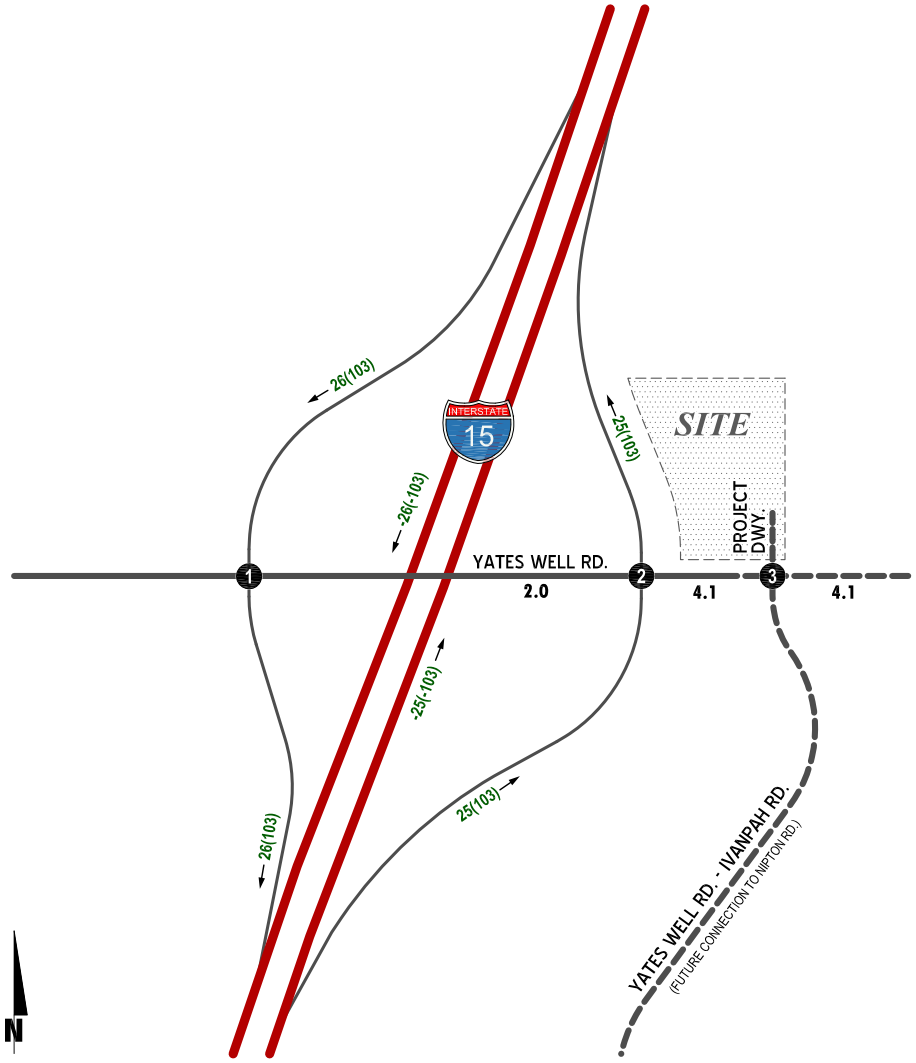
AM PEAK HOUR INTERSECTION VOLUMES		
1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0 0 21 ←0 ←1	←2 ←1	0 0 ←0 ←3
2→ 0→	0→ 23→ 0 0 12	0→ 35→

PM PEAK HOUR INTERSECTION VOLUMES		
1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0 0 42 ←5 ←31	←55 ←36	0 0 ←0 ←91
3→ 0→	0→ 45→ 0 0 24	0→ 69→

LEGEND:

- ③ = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- ←10 = PEAK HOUR VOLUME
- ←100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

EXHIBIT 6-3: ADJACENT ±15 ACRE COMMERCIAL PROPERTY DIVERTED TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0 0 26 ← 0 ← 26	← 25 ← 26	0 0 ← 0 ← 51
0 → 0	0 → 26	0 → 52
	0 0 25	

PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
0 0 103 ← 0 ← 103	← 103 ← 103	0 0 ← 0 ← 206
0 → 0	0 → 103	0 → 206
	0 0 103	

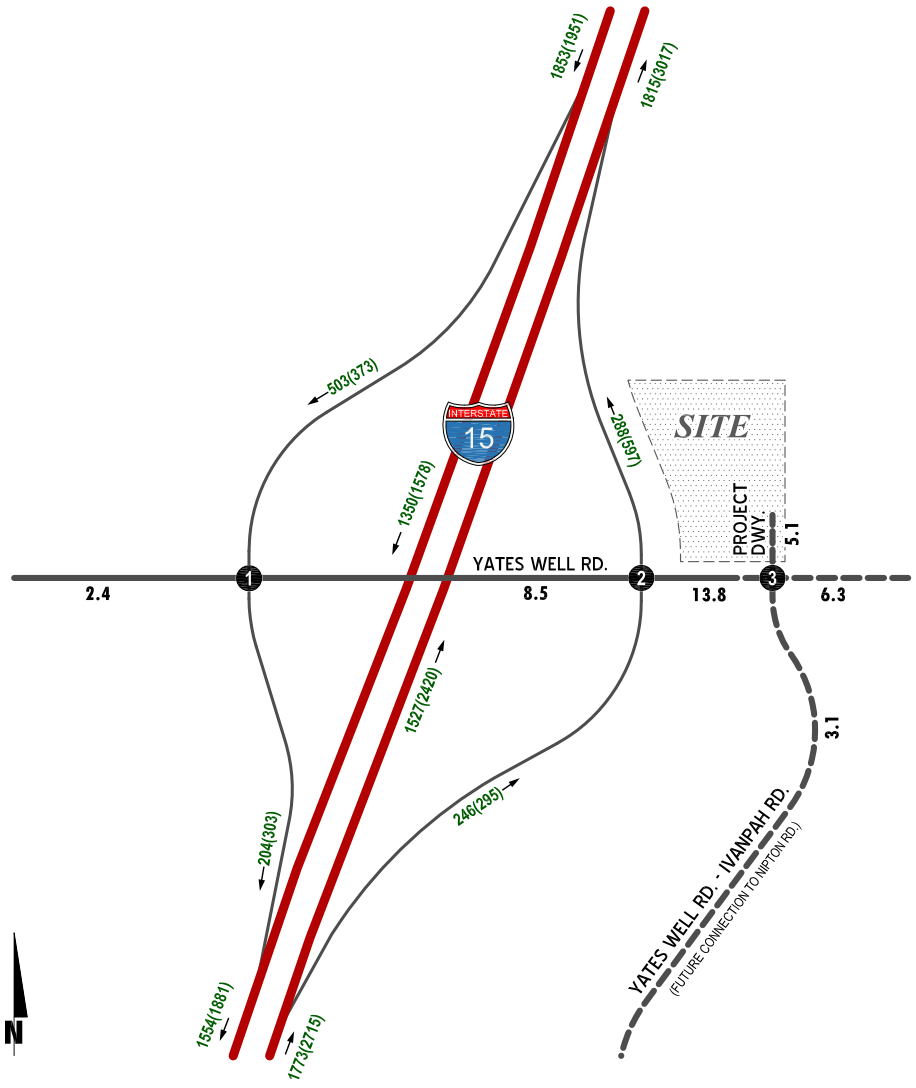
LEGEND:

- ③ = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY
- ←10 = PEAK HOUR VOLUME
- ← 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

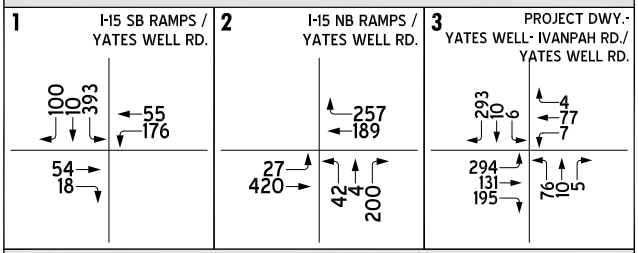
12884 - 01.dwg

URBAN CROSSROADS

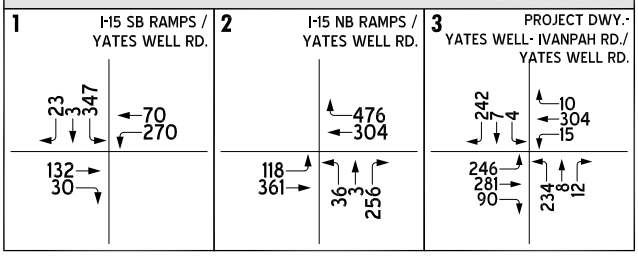
EXHIBIT 6-4: HORIZON YEAR (2040)
WITH PROJECT AND ADJACENT ±15 ACRE COMMERCIAL TRAFFIC VOLUMES



AM PEAK HOUR INTERSECTION VOLUMES



PM PEAK HOUR INTERSECTION VOLUMES



LEGEND:

- 3 = INTERSECTION ID
- = DIRT ROAD
- 10.0 = VEHICLES PER DAY (1000'S)
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

6.4 INTERSECTION OPERATIONS ANALYSIS

Horizon Year (2040) Without and With Project and Adjacent ±15 Acre Commercial peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA.

6.4.1 HORIZON YEAR (2040) WITHOUT PROJECT CONDITIONS

As shown in Table 6-1, the study area intersections are anticipated to operate at an acceptable LOS during the peak hours under Horizon Year (2040) Without Project conditions.

The intersection operations analysis worksheets for Horizon Year Without Project traffic conditions are included in Appendix 6.1 of this TIA.

6.4.2 HORIZON YEAR (2040) WITH PROJECT AND ADJACENT ±15 ACRE COMMERCIAL CONDITIONS

Without added lane improvements, the following study area intersections are anticipated to operate at a deficient LOS during one or both peak hours under Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial traffic conditions:

- I-15 Southbound Ramps & Yates Well Road (#1) – LOS F AM and PM peak hours
- I-15 Northbound Ramps & Yates Well Road (#2) – LOS E PM peak hour only
- Project Driveway & Yates Well Road (#3) – LOS F AM and PM peak hours

A summary of the peak hour intersection LOS for Horizon Year With Project and Adjacent ±15 Acre Commercial conditions are shown on Table 6-2. The intersection operations analysis worksheets for Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial traffic conditions are included in Appendix 6.2 of this TIA.

6.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

For Horizon Year (2040) Without Project conditions, the study area intersections are not anticipated to meet traffic signal warrants.

The following study area intersections are anticipated to meet a traffic signal warrant for Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial traffic conditions:

- I-15 Southbound Ramps & Yates Well Road (#1)
- I-15 Northbound Ramps & Yates Well Road (#2)
- Project Driveway & Yates Well Road (#3)

Worksheets for Horizon Year (2040) Without and With Project and Adjacent ±15 Acre Commercial traffic conditions signal warrants are provided in Appendices 6.3 and 6.4, respectively.

TABLE 6-2: INTERSECTION ANALYSIS FOR HORIZON YEAR (2040) CONDITIONS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												WITHOUT PROJECT				WITH PROJECT AND ADJACENT ±15 ACRE COMMERCIAL			
			Northbound			Southbound			Eastbound			Westbound			Delay[2] (Secs)		Level of Service[2]		Delay[2] (Secs)		Level of Service[2]	
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM	AM	PM	AM	PM
1	I-15 SB Ramps / Yates Well Rd.																					
	- Without Improvements	CSS	0	0	0	0	1!	0	0	1	0	0.5	0.5	0	11.3	11.4	B	B	**>80**	**>80**	**F**	**F**
	- With Improvements	**TS**	0	0	0	**1**	1	0	0	1	0	0.5	0.5	0	-	-	-	-	19.5	27.4	B	C
2	I-15 NB Ramps / Yates Well Rd.																					
	- Without Improvements	CSS	0	1!	0	0	0	0	0.5	0.5	0	0	1	0	11.0	13.0	B	B	19.1	**36.4**	C	**E**
	- With Improvements	**TS**	0.5	0.5	**1**	0	0	0	0.5	0.5	0	0	1	0	-	-	-	-	14.1	15.7	B	B
3	Project Dwy. / Yates Well Rd.																					
	- With Yates Well Rd. - Ivanpah Rd. (Future Roadway)	**CSS**	0	**1!**	0	0	0	0	0	**1**	0	**0.5**	**0.5**	0	9.9	10.9	A	B	-	-	-	-
	- With Project Driveway	**CSS**	0	**1!**	0	**0.5**	**0.5**	**1**	0	**1!**	0	0	**1!**	0	-	-	-	-	**>80**	**>80**	**F**	**F**
	- With Improvements	**TS**	**1**	**1**	0	**0.5**	**0.5**	**1**	**1**	**1**	0	0	**1!**	0	-	-	-	-	52.9	50.3	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right Lane; **1** = Improvement

[2] Per the Highway Capacity Manual 6th Edition (HCM6), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. Delay and level of service is calculated using Synchro 10.1 analysis software.

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[3] CSS = Cross-street Stop

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]6-2

6.6 QUEUING ANALYSIS

For the purpose of this analysis, the 95th percentile queuing of vehicles has been assessed at study area intersections as shown on Table 6-3.

The traffic progression analysis tool and HCM intersection analysis program, Synchro, has been used to assess the potential deficiencies/needs of the intersections with traffic added from the proposed Project. Storage (turn-pocket) length recommendations have been based upon the 95th percentile queue resulting from the Synchro progression analysis. The queue length reported is for the lane with the highest queue in the lane group.

A vehicle is considered queued whenever it is traveling at less than 10 feet/second. A vehicle will only become queued when it is either at the stop bar or behind another queued vehicle. Although only the 95th percentile queue has been reported in the tables, the 50th percentile queue can be found in the appendix alongside the 95th percentile queue for each ramp location. The 50th percentile maximum queue is the maximum back of queue on a typical cycle during the peak hour, while the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes during the peak hour. In other words, if traffic were observed for 100 cycles, the 95th percentile queue would be the queue experienced with the 95th busiest cycle (or 5% of the time). The 50th percentile or average queue represents the typical queue length for peak hour traffic conditions, while the 95th percentile queue is derived from the average queue plus 1.65 standard deviations. The 95th percentile queue is not necessarily ever observed, it is simply based on statistical calculations. As shown on Table 6-3, acceptable storage is provided for study area queues with improvements shown on Exhibit 6-5.

6.7 BASIC FREEWAY SEGMENT ANALYSIS

Horizon Year (2040) Without Project mainline directional volumes for the AM and PM peak hours are provided on Exhibit 6-6. As shown in Table 6-4, the following I-15 Freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours for Horizon Year (2040) Without Project and With Project traffic conditions.

Horizon Year (2040) Without Project basic freeway segment analysis worksheets are provided in Appendix 6.5. Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial basic freeway segment analysis worksheets are provided in Appendix 6.6.

6.8 FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Horizon Year (2040) Without Project traffic conditions and the results of this analysis are presented in Table 6-5. As shown in Table 6-5, the study area I-15 Freeway ramp merge and diverge areas at Yates Well Road are anticipated to operate at to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours under Horizon Year (2040) Without Project and With Project traffic conditions.

TABLE 6-3: PEAK HOUR QUEUING SUMMARY FOR HORIZON YEAR (2040) WITH PROJECT CONDITIONS WITH IMPROVEMENTS

ID	Intersection	Turning Movement Lane	Storage Length Provided[2] (feet)	95th Percentile Queue Length Per Lane (feet)		Acceptable?[4]	
				AM	PM	AM	PM
1	I-15 SB Ramps / Yates Well Rd.						
		SBL	**275**	234	270	YES	YES
		SB T/R	1,700	145	402	YES	YES
		EB T/R	2,100	92	140	YES	YES
		WB L/T	1,130	120	312	YES	YES
2	I-15 NB Ramps / Yates Well Rd.						
		NB L/T	1,800	65	48	YES	YES
		NBR	**150**	100	108	YES	YES
		EB L/T	1,130	190	454	YES	YES
		WBT	200	99	183	YES	YES
		WBR	**330**	69	152	YES	YES
3	Project Dwy. / Yates Well Rd.						
		NBL	**150**	78	138	YES	YES
		NB T/R	**>1000**	30	28	YES	YES
		SB L/T	**>50**	31	26	YES	YES
		SBR	**>50**	126	126	YES	YES
		EBL	**200**	199	199	YES	YES
		EBT	340	198	282	YES	YES
		EBR	**340**	66	41	YES	YES
		WB L/T/R	**>200**	347	356	YES	YES

[1] Queue length calculated using Synchro 10.1 with SimTraffic.

[2] Existing/Proposed pocket length storage (for turning movements) or link distance (for through movements). 100 = Existing; **100** = Proposed (Minimum)

[3] Storage Length is acceptable if the required queuing length is less than or equal to the storage length provided.

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]6-3

TABLE 6-4: BASIC FREEWAY SEGMENT ANALYSIS FOR HORIZON YEAR (2040) CONDITIONS

WITHOUT PROJECT CONDITIONS									
Freeway	Direction	Mainline Segment Location	Lanes[1]	Volume		Density [2]		LOS [3]	
				AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	North of Yates Well Rd.	2	1,794	1,906	14.4	15.3	B	B
		Between Ramps	2	1,488	1,772	11.9	14.2	B	B
		South of Yates Well Rd.	2	1,523	1,826	12.2	14.7	B	B
	NB	South of Yates Well Rd.	3	1,731	2,666	9.2	14.4	A	B
		Between Ramps	3	1,663	2,614	8.8	14.1	A	B
		North of Yates Well Rd.	3	1,782	2,967	9.5	16.0	A	B

WITH PROJECT AND ADJACENT ±15 ACRE COMMERCIAL									
Freeway	Direction	Mainline Segment Location	Lanes[1]	Volume		Density [2]		LOS [3]	
				AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	North of Yates Well Rd.	2	1,853	1,951	14.9	15.7	B	B
		Between Ramps	2	1,350	1,578	10.8	12.7	A	B
		South of Yates Well Rd.	2	1,554	1,881	12.5	15.1	B	B
	NB	South of Yates Well Rd.	3	1,773	2,715	9.4	14.6	A	B
		Between Ramps	3	1,527	2,420	8.1	13.0	A	B
		North of Yates Well Rd.	3	1,815	3,017	9.6	16.3	A	B

[1] Density calculated based on the Highway Capacity Manual (HCM) analysis; (pc/mi/ln) = passenger car per mile per lane

[2] Level of service determined using HCS7 : Ramps and Ramp Junction software, Version 7.5

[1] Number of lanes are in the specified direction and is based on existing conditions.

[1] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[3] Level of service determined using HCS7: Basic Segments software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]6-4

TABLE 6-5: FREEWAY RAMP JUNCTION MERGE/DIVERGE ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) WITH PROJECT CONDITIONS

WITHOUT PROJECT CONDITIONS											
Freeway	Direction	Ramp Location	Junction Type	Lanes on Freeway	Lanes on Ramp	Volume		Density [1]		LOS [2]	
						AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	SB Off Ramp at Yates Well Rd.	Diverge	2	1	306	134	19.3	20.4	B	C
		SB On Ramp at Yates Well Rd.	Merge	2	1	35	54	16.7	19.3	B	B
	NB	NB Off Ramp at Yates Well Rd.	Diverge	3	1	68	52	13.9	19.9	B	B
		NB On Ramp at Yates Well Rd.	Merge	3	1	119	353	12.8	19.8	B	B

WITH PROJECT AND ADJACENT ±15 ACRE COMMERCIAL											
Freeway	Direction	Ramp Location	Junction Type	Lanes on Freeway	Lanes on Ramp	Volume		Density [1]		LOS [2]	
						AM	PM	AM	PM	AM	PM
I-15 Freeway	SB	SB Off Ramp at Yates Well Rd.	Diverge	2	1	503	373	19.9	20.9	B	C
		SB On Ramp at Yates Well Rd.	Merge	2	1	204	303	16.8	19.7	B	B
	NB	NB Off Ramp at Yates Well Rd.	Diverge	3	1	246	295	14.6	20.6	B	C
		NB On Ramp at Yates Well Rd.	Merge	3	1	288	597	13.5	20.8	B	C

[1] Density calculated based on the Highway Capacity Manual (HCM) analysis; (pc/mi/ln) = passenger car per mile per lane

[2] Level of service determined using HCS7 : Ramps and Ramp Junction software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]6-5

Horizon Year (2040) Without Project traffic conditions freeway ramp junction operations analysis worksheets are provided in Appendix 6.7. Horizon Year (2040) With Project and Adjacent ±15 Acre Commercial traffic conditions freeway ramp junction operations analysis worksheets are provided in Appendix 6.8.

6.9 RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections and freeway facilities that have been identified as deficient or as needed for Project access under Horizon Year (2040) traffic conditions in an effort to achieve an acceptable LOS (i.e., LOS D or better). Exhibit 6-3 shows the Project access recommendations for Horizon Year (2040) conditions.

6.9.1 RECOMMENDED IMPROVEMENTS FOR ROADWAY SEGMENTS

Contribute on a fair share basis to the following roadway segment improvements to accommodate future cumulative conditions and maintain consistency with the San Bernardino General Plan:

- Yates Well Road should ultimately be widened to provide Major Highway half-section width, including 1 westbound through lane, 1 westbound right turn lane (for I-15 northbound ramp access), 1 eastbound left turn lane, 1 eastbound through lane, and 1 eastbound right turn lane (for the Yates Well Road – Ivanpah Road corridor) along the Project frontage.

6.9.2 RECOMMENDED IMPROVEMENTS AT INTERSECTIONS

Contribute on a fair share basis to the following intersection improvements to accommodate future cumulative conditions and maintain consistency with the San Bernardino General Plan:

I-15 Southbound Ramps & Yates Well Road (#1) –

- Provide traffic signal control
- Add southbound left turn lane

I-15 Northbound Ramps & Yates Well Road (#2) –

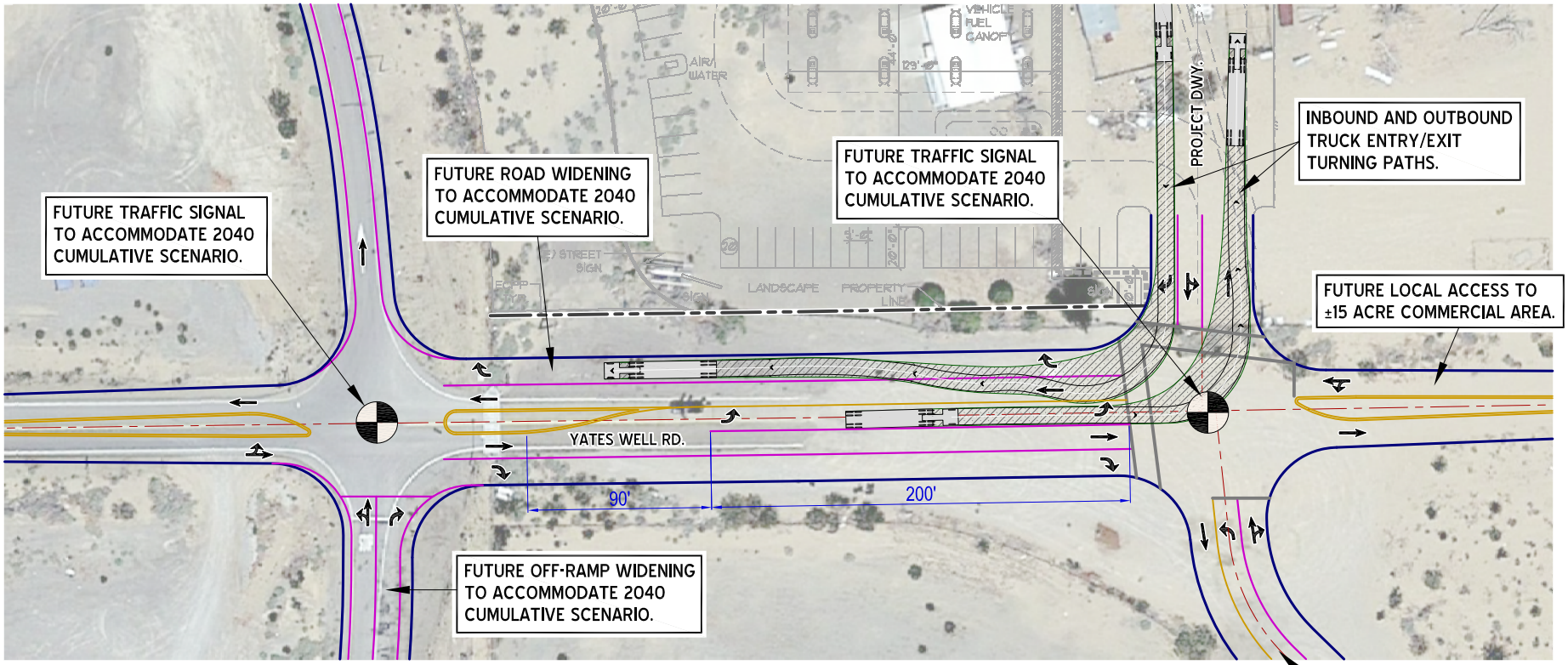
- Provide traffic signal control
- Add northbound right turn lane

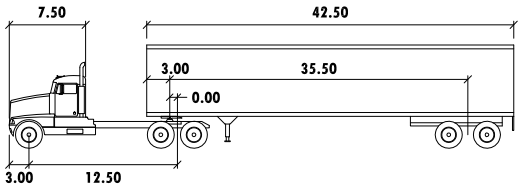
Project Driveway & Yates Well Road (#3) – Update the Project driveway intersection configuration at Yates Well Road as follows:

- Provide traffic signal control
- Construct south leg of the intersection to include 1 northbound left turn lane and 1 northbound shared through/right lane
- Provide separate southbound right turn lane
- Provide separate eastbound left turn lane
- Provide separate eastbound right turn lane.

The Project shall participate in the funding of off-site improvements, which are required for Horizon Year (2040) conditions With Project and Adjacent ±15 Acre Commercial. The Project share of these improvements is addressed in Section 7.6 of this TIA.

EXHIBIT 6-5: HORIZON YEAR (2040) LANE IMPROVEMENTS

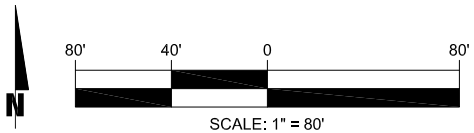




WB-50

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		



LEGEND:

= FUTURE TRAFFIC SIGNAL

12884 - 01.dwg

URBAN CROSSROADS

This Page Intentionally Left Blank

7 SPECIAL ISSUES

Based upon the TIA scope, the following topics are evaluated.

7.1 FRIDAY AND WEEKEND TRAFFIC CONDITIONS

This section provides information regarding peak hours on a Friday and weekend day (Sunday), when traffic conditions are worse than typical mid-week peak hours. Directional mainline I-15 traffic volumes on weekdays, Friday, and weekend days have been extracted from the Caltrans Performance Measurement System (PeMS) database for a typical Fall 2019 week (October 13 to October 19). These volumes are utilized to estimate traffic conditions with the project in the study area for afternoon peak hours on a Friday and peak weekend day (Sunday).

The Friday and weekend PM peak hour volumes which can be expected for Opening Year Cumulative (2021) With Project traffic conditions are shown on Exhibit 7-1.

Project trip generation for Friday and weekend PM peak hour conditions has been estimated and is shown on Table 7-1.

7.1.1 FRIDAY/WEEKEND INTERSECTION OPERATIONS ANALYSIS

Friday and weekend Opening Year Cumulative (2021) With Project peak hour traffic operations have been evaluated for the study area intersections. The intersection analysis results are summarized in Table 7-1, and study area intersections are anticipated to operate at an acceptable LOS for Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions.

Intersection operations analysis worksheets for Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions are included in Appendix 7.1 of this TIA. Traffic signal worksheets are included in Appendix 7.2.

7.1.2 BASIC FREEWAY SEGMENT ANALYSIS

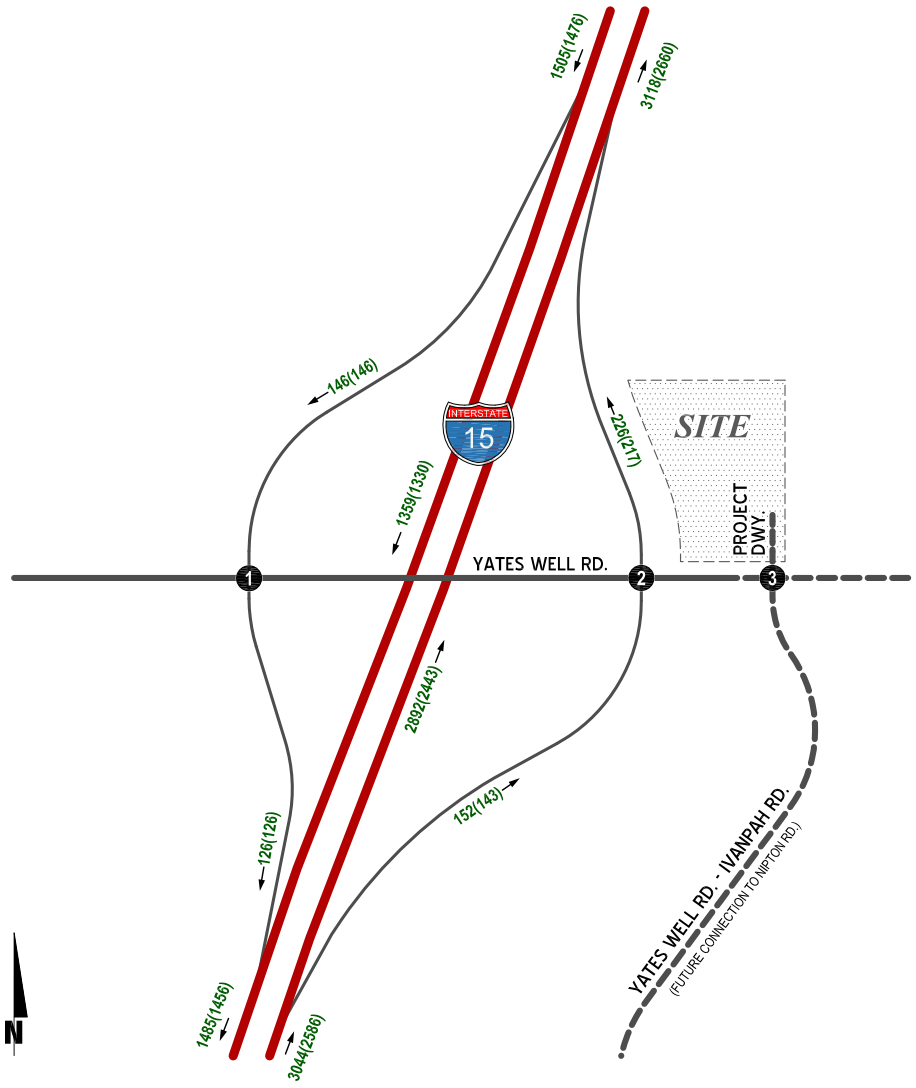
As shown in Table 7-3, the I-15 Freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours for Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions.

Friday and weekend Opening Year Cumulative (2021) With Project basic freeway segment analysis worksheets are provided in Appendix 7.3.

7.1.3 FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions and the results of this analysis are presented in Table 5-4. As shown in Table 5-4, the I-15 Freeway ramp merge and diverge areas at Yates Well Road are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions. Friday and weekend Opening Year Cumulative (2021) With Project traffic conditions freeway ramp junction operations analysis worksheets are provided in Appendix 7.4.

EXHIBIT 7-1: FRIDAY AND WEEKEND
OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC VOLUMES



FRIDAY PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
7, 2, 137, 10, 116, 63, 8	162, 120, 62, 138, 6, 2, 144	280, 1, 1, 2, 280, 2

WEEKEND PM PEAK HOUR INTERSECTION VOLUMES

1 I-15 SB RAMPS / YATES WELL RD.	2 I-15 NB RAMPS / YATES WELL RD.	3 PROJECT DWY. / YATES WELL RD.
7, 2, 137, 10, 116, 63, 8	153, 120, 62, 138, 6, 2, 135	271, 1, 1, 2, 271, 2

LEGEND:

- 3 = INTERSECTION ID
- = DIRT ROAD
- 10 = PEAK HOUR VOLUME
- 100(100) = AM (PM) PEAK HOUR DIRECTIONAL VOLUMES (FREEWAY RAMPS AND MAINLINE AREA)

12884 - 01.dwg

URBAN CROSSROADS

TABLE 7-1: PROJECT FRIDAY/WEEKEND TRIP GENERATION SUMMARY

Land Use	Quantity[1]	Friday PM Peak Hour			Weekend PM Peak Hour		
		In	Out	Total	In	Out	Total
Super Convenience Market/Gas Station	22 VFP	280	280	560	271	271	542

[1] VFP = Vehicle Fueling Positions

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]7-1

TABLE 7-2: FRIDAY/WEEKEND PM PEAK HOUR INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) CONDITIONS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (Secs)		Level of Service[2]	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	Friday	Weekend	Friday	Weekend
1	I-15 SB Ramps / Yates Well Rd.	CSS	0	0	0	0	1!	0	0	1	0	0.5	0.5	0	34.3	34.3	D	D
2	I-15 NB Ramps / Yates Well Rd.	CSS	0	1!	0	0	0	0	0.5	0.5	0	0	1	0	15.8	15.2	C	C
3	Project Dwy. / Yates Well Rd.	**CSS**	0	0	0	0	**1!**	0	**0.5**	**0.5**	0	0	**1**	0	9.6	9.6	A	A

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1! = Shared Left/Through/Right Lane; **1** = Improvement

[2] Per the Highway Capacity Manual 6th Edition (HCM6), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. Delay and level of service is calculated using Synchro 10.1 analysis software.

[3] CSS = Cross-street Stop

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]7-2

TABLE 7-3: FRIDAY/WEEKEND BASIC FREEWAY SEGMENT ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) CONDITIONS

Freeway	Direction	Mainline Segment Location	Lanes[1]	Volume		Density [2]		LOS [3]	
				Friday PM	Weekend PM	Friday PM	Weekend PM	Friday PM	Weekend PM
I-15 Freeway	SB	North of Yates Well Rd.	2	1,505	1,476	12.1	11.8	B	B
		Between Ramps	2	1,359	1,330	10.9	10.6	A	A
		South of Yates Well Rd.	2	1,485	1,456	11.9	11.7	B	B
	NB	South of Yates Well Rd.	3	3,044	2,586	16.6	14.0	B	B
		Between Ramps	3	2,892	2,443	15.7	13.2	B	B
		North of Yates Well Rd.	3	3,118	2,660	17.0	14.4	B	B

[1] Number of lanes are in the specified direction and is based on existing conditions.

[1] Density is measured by passenger cars per mile per lane (pc/mi/ln).

[3] Level of service determined using HCS7: Basic Segments software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]7-3

TABLE 7-4: FRIDAY/WEEKEND FREEWAY RAMP JUNCTION MERGE/DIVERGE ANALYSIS FOR OPENING YEAR CUMULATIVE (2021) CONDITIONS

Freeway	Direction	Ramp Location	Junction Type	Lanes on Freeway	Lanes on Ramp	Volume		Density [1]		LOS [2]	
						Friday PM	Weekend PM	Friday PM	Weekend PM	Friday PM	Weekend PM
I-15 Freeway	SB	SB Off Ramp at Yates Well Rd.	Diverge	2	1	146	146	16.6	16.2	B	B
		SB On Ramp at Yates Well Rd.	Merge	2	1	126	126	16.3	16.0	B	B
	NB	NB Off Ramp at Yates Well Rd	Diverge	3	1	152	143	22.4	19.6	C	B
		NB On Ramp at Yates Well Rd.	Merge	3	1	226	217	20.3	17.8	C	B

[1] Density calculated based on the Highway Capacity Manual (HCM) analysis; (pc/mi/ln) = passenger car per mile per lane

[2] Level of service determined using HCS7 : Ramps and Ramp Junction software, Version 7.5

R:\UXRjobs_12600-13000\12884\Excel\[12884-04 - Report.xlsx]7-4

7.2 TRUCK TURNS

Truck turning templates are used to address how Project truck traffic (e.g., large trucks such as a WB-67) will enter and exit the Project site to determine radii at curb returns, radii of streets per Highway Design Manual, and widths/radii required for on-site maneuvering for two-way truck traffic at the Project driveways. Truck turning paths are shown on Exhibit 5-3 for Opening Year Cumulative (2021) conditions and on Exhibit 6-5 for Horizon Year (2040) conditions.

7.3 VEHICLE MILES TRAVELLED (VMT)

The California Environmental Quality Act (CEQA) procedures for determination of transportation impacts have recently changed to an evaluation of Vehicle Miles Traveled (VMT) rather than vehicle delay or level of service, due to Senate Bill 743 (SB 743). The County of San Bernardino VMT Analysis Guidelines provide a structure for evaluating VMT on a project level basis. Vehicle delay and level of service are still used in County of San Bernardino traffic studies, as presented in earlier sections of this traffic study.

7.3.1 SAN BERNARDINO COUNTY VMT ANALYSIS GUIDELINES

The Transportation Impact Study Guidelines for San Bernardino County includes a CEQA Assessment - VMT Analysis section providing recommendations regarding VMT analysis procedures. Projects are first screened to determine if they serve the local community and have the potential to reduce VMT.

Although the Project is not serving a local community, it provides services to an existing adjacent freeway corridor, resulting in very short trip lengths for traffic that is diverted from the freeway to interact with the gas station and convenience store.

For purposes of SB 743 compliance, the County requires a VMT analysis for land use projects as deemed necessary by the Traffic Division, typically if the Project has the potential to increase the average VMT per Service Population (SP), which in this case consists of employment and visitors.

Normalizing to VMT per SP provides a transportation efficiency that allows for comparison of the project to the remainder of the unincorporated area for purposes of identifying transportation impacts.

Based on the SCAG Connect SoCal Plan Draft PEIR (December 2019), VMT/capita for all vehicles in 2019 was estimated at 28.27 for San Bernardino County. The county average of 28.27 VMT was applied to the Project primary trips which represent potential induced travel activity associated with the Project. The nearest city to the Project (Primm, Nevada) is approximately 13 miles away, so 28 miles per trip is a reasonable estimate for primary Project trips.

The mileage per diverted trip was developed via calculating the length of travel for vehicles exiting the I-15 southbound, traveling to the Project and back to the I-15 southbound in comparison to continuing on the I-15 southbound through the study area. This diversion of less than a mile was then applied as the average Project diverted trip length.

7.4.2 PROJECT EMPLOYMENT, VISITATION, AND VMT ESTIMATES

Approximately 30 employees and 2,506 visitors per day are anticipated for the Terrible Herbst Convenience Store and Fueling Station. The estimate of visitors to the Project is consistent with Client forecasts as well as trip generation estimates.

Approximately 72% of the trips generated by the Project are not new trips, but instead would be trips already traveling on the adjacent freeway that are diverted to the project. Diverted linked trips occur when vehicles already traveling on I-15 exit the freeway to purchase gas or food at the project, then continue back onto the freeway.

The following summary presents the Project VMT for both primary and diverted trips.

Project Travel Component	Daily Trip Generation	Average Trip Length	Project VMT
Primary Trips	1,420	28.2	40,044
Diverted Trips	3,621	0.67	2,426
Total	5,041	8.42	42,470

The resulting total Project VMT amounts to approximately 42,470 annual vehicle miles traveled. When compared to the total Service Population (SP) of 2,536 (30 employees and 2,506 visitors), the resulting VMT / SP is 16.7, which is less than the County average per SP and considered a less than significant impact based upon County criteria.

8 REFERENCES

1. **San Bernardino Associated Governments.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated June 2016.

2. **Institute of Transportation Engineers (ITE).** *Trip Generation Study Manual.* 2017.

3. **California Department of Transportation.** *Guide for the Preparation of Traffic Impact Studies.* December 2002.

4. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 6th Edition. s.l. : National Academy of Sciences, 2016.

5. **California Department of Transportation.** California Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2014.

6. **Transportation, California Department of.** *Freeway Performance Measurement (PeMS).* [Online] http://pems.dot.ca.gov/.

7. **San Bernardino County Transportation Authority.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated 2016.

8. **California Department of Transportation.** *Transportation Concept Report Interstate 15.* District 8 : s.n., September 2012.

This Page Intentionally Left Blank