

# WATSON HIGH DESERT LOGISTICS EAST & WATSON HIGH DESERT LOGISTICS WEST

## TRAFFIC ANALYSIS

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## LIST OF ABBREVIATED TERMS

|          |  |
|----------|--|
| (1)      | Reference  |
| ADT      | Average Daily Traffic                                |
| CA MUTCD | California Manual on Uniform Traffic Control Devices |
| Caltrans | California Department of Transportation              |
| CMP      | Congestion Management Program                        |
| DIF      | Development Impact Fee                               |
| HCM      | Highway Capacity Manual                              |
| HDM      | Highway Design Manual                                |
| ITE      | Institute of Transportation Engineers                |
| LOS      | Level of Service                                     |
| NAVISP   | North Apple Valley Industrial Specific Plan          |
| PCE      | Passenger Car Equivalent                             |
| PHF      | Peak Hour Factor                                     |
| Project  | Watson High Desert Logistics                         |
| SBCTA    | San Bernardino County Transportation Authority       |
| TA       | Traffic Analysis                                     |
| TIF      | Transportation Impact Fees                           |
| v/c      | Volume to Capacity                                   |
| vphgpl   | Vehicles per Hour Green per Lane                     |
| WTA      | Victor Valley Transit Authority                      |

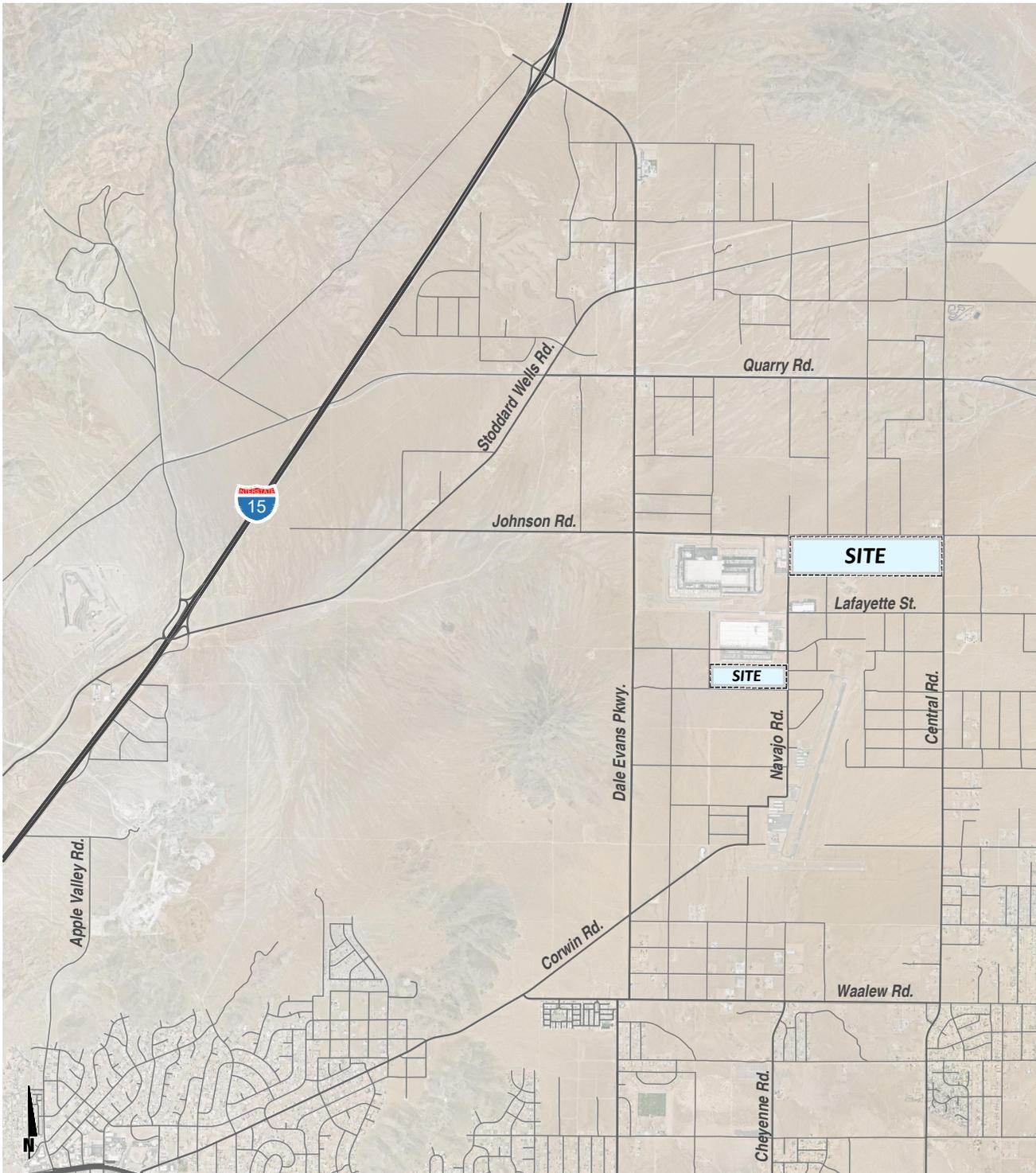
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## 1 SUMMARY OF FINDINGS

This report presents the results of the Traffic Analysis (TA) for the Watson High Desert Logistics (**Project**), which is comprised of two sites located within the North Apple Valley Industrial Specific Plan (NAVISP) in the Town of Apple Valley, as shown on Exhibit 1-1.

The purpose of this TA is to evaluate the potential circulation system deficiencies that may result when the Project is developed and where circulation system (intersection and/or roadway) improvements are needed to maintain acceptable levels of service consistent with the Town's General Plan level of service goals and policies. As the Town has not adopted their own traffic analysis guidelines, they utilize to the San Bernardino County Transportation Impact Study Guidelines (July 9, 2019) (**County Guidelines**). The scope of analysis included in this evaluation is based on County Guidelines and consultation with Town of Apple Valley staff during the TA scoping process. (1) (2) The TA Scoping Agreement is included in Appendix 1.1 and has been reviewed and approved by the Town of Apple Valley.

EXHIBIT 1-1 : LOCATION MAP



## 1.1 PROJECT OVERVIEW

### 1.1.1 LAND USE

The Project consists of the development of three industrial warehouse and distribution buildings within two sites totaling 3,729,100 square feet. The West site consists of a single 896,500-square-foot warehouse building located on the northwest corner of Navajo Road and Los Padres Road, which is immediately south of the existing Big Lots distribution center facility. The East site consists of two buildings (Building 1 with 1,631,800 square feet and Building 2 with 1,200,800 square feet) located on the southeast corner of Navajo Road and Johnson Road. For the purposes of the TA, the Project will assume 100% high-cube fulfillment center (non-sort facility) warehousing use. Preliminary site plans for the Project are shown on Exhibit 1-2 for the West site and Exhibit 1-3 for the East site. Access to the West site will be accommodated via two driveways along Dachshund Avenue and three driveways on Navajo Road. All driveways for the West site are assumed to allow for full access (no turn restrictions). The East site proposes a single driveway on Navajo Road, four driveways along Johnson Road, and four driveways along Central Road. Driveways 2, 5, 6, and 8 for the East site will be restricted to right-in/right-out access only. The Project is anticipated to have an Opening Year of 2027 (for all three buildings). Regional access to the Project site is accommodated from the I-15 Freeway.

### 1.1.2 TRIP GENERATION

In order to develop the traffic characteristics of the proposed project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11<sup>th</sup> Edition, 2021) were utilized to represent the following land uses proposed by the Project (3):

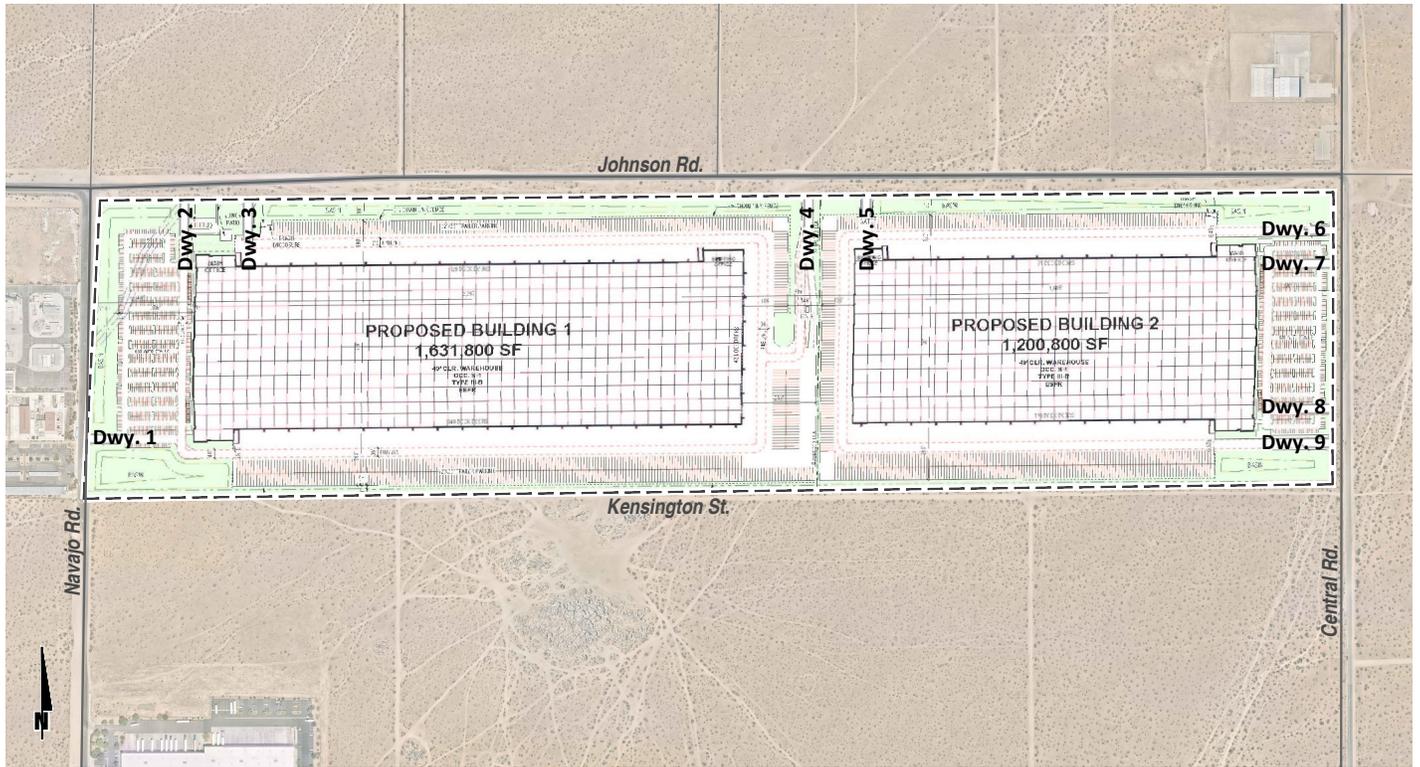
- High-Cube Fulfillment Center Warehouse (ITE Land Use Code 155)

The Project, comprising both the West Site and East Site, is anticipated to generate a total of 6,754 two-way vehicle trip-ends per day with 560 AM peak hour trips and 597 PM peak hour trips (actual vehicles). The Project is anticipated to generate a total of 8,166 Passenger Car Equivalent (PCE) trip-ends per day with 682 AM PCE peak vehicle hour trips and 657 PM PCE peak hour vehicle 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.

EXHIBIT 1-2 : PRELIMINARY SITE PLAN - WEST SIDE



EXHIBIT 1-3 : PRELIMINARY SITE PLAN - EAST SIDE



## 1.2 ANALYSIS SCENARIOS

For the purposes of this TA, potential deficiencies to intersection LOS have been assessed for each of the following conditions:

- Existing (2024) Conditions
- Opening Year Cumulative (2027) Without Project Conditions
- Opening Year Cumulative (2027) With Project Conditions

### 1.2.1 EXISTING (2024) CONDITIONS

Information for Existing (2024) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared. Local schools were in session with in-person instruction at the time of the traffic counts. Traffic counts were conducted in April 2024.

### 1.2.2 OPENING YEAR CUMULATIVE (2027) CONDITIONS

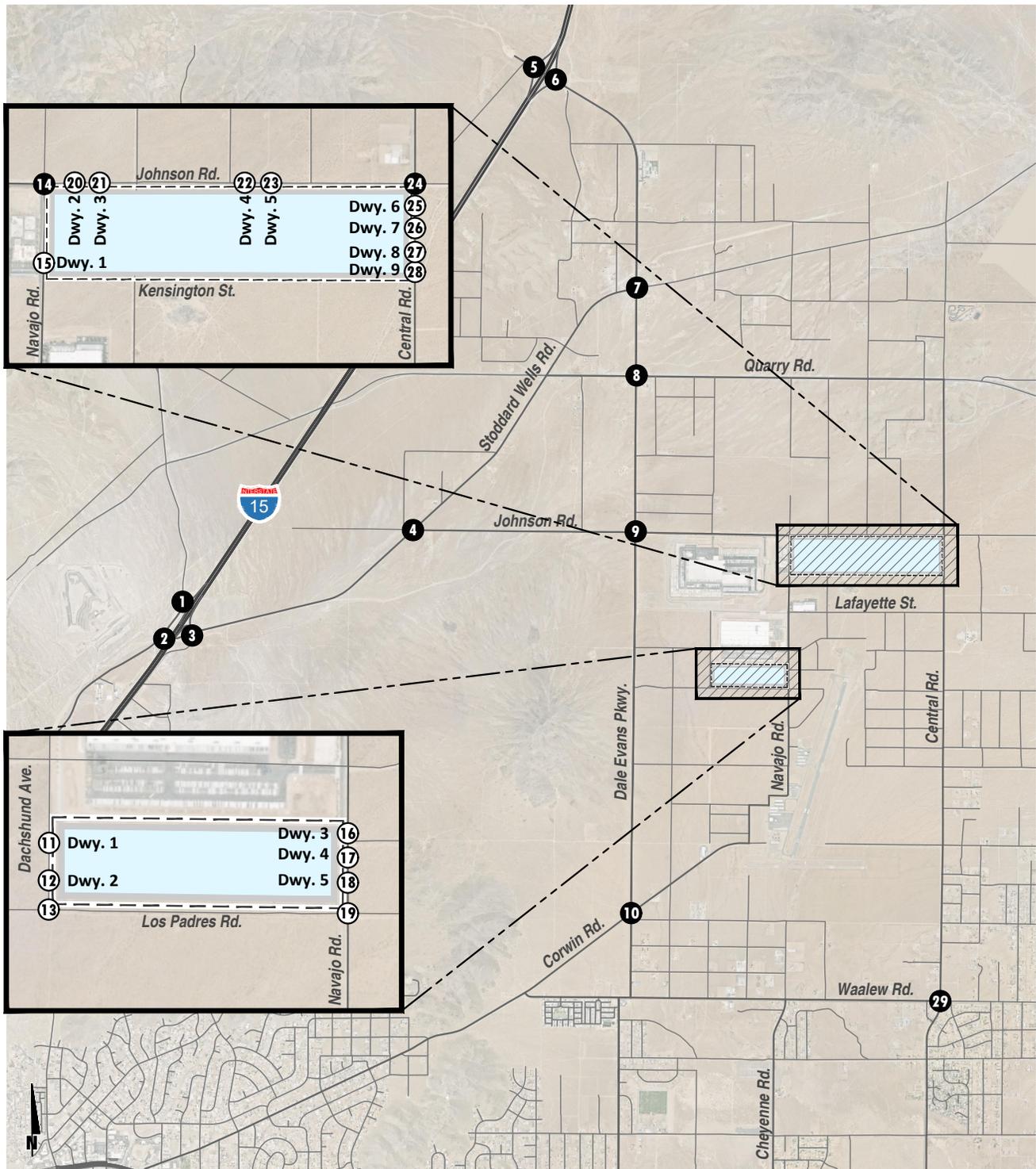
Consistent with County Guidelines, Opening Year Cumulative (2027) traffic conditions analysis determines the potential opening year cumulative circulation system deficiencies. To account for growth in traffic between Existing (2024) traffic conditions and the Project Opening Year Cumulative (2027), a growth rate of 2 percent was assumed (2.0% per year compounded over 2 years or  $1.02^{3 \text{ years}}$  for a total of 6.12%). The roadway network is similar to Existing conditions except for new connections to be constructed by the Project. Conservatively, this TA estimates the area ambient traffic growth and then adds traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed ambient growth rates; and some of these related projects may not be implemented and operational within the 2027 Opening Year timeframe assumed for the Project. The resulting traffic growth utilized in the TA (traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic deficiencies under 2027 traffic conditions.

Consistent with County Guidelines, a list of known and reasonably foreseeable cumulative development projects has been compiled based on information provided by the Town of Apple Valley Planning Department.

## 1.3 STUDY AREA

For the purposes of this TA, a total of 29 study area intersections were selected for evaluation based on County Guidelines and consultation with Town of Apple Valley staff. The study area is shown graphically on Exhibit 1-4 and the intersections included for study are also listed in Table 1-1. At a minimum, the study area includes intersections where the Project is anticipated to contribute 50 or more peak hour trips per the County's Guidelines. The "50 peak hour trip" criterion represents a minimum number of trips at which a typical intersection would have the potential to be affected by a given development proposal. The 50 peak hour trip criterion is a traffic engineering rule of thumb that is accepted and widely used within San Bernardino County (including the Town of Apple Valley) for estimating a potential area of influence (i.e., study area).

EXHIBIT 1-4 : STUDY AREA



**LEGEND:**

- = Existing Intersection Analysis Location
- = Future Intersection Analysis Location

**TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS**

| #  | Intersection                             | #  | Intersection                           |
|----|--|----|--|
| 1  | Quarry Rd. & I-15 SB Ramps               | 16 | Navajo Rd. & West Driveway 3 (Future)  |
| 2  | Quarry Rd. & Stoddard Wells Rd.          | 17 | Navajo Rd. & West Driveway 4 (Future)  |
| 3  | I-15 NB Ramps & Stoddard Wells Rd.       | 18 | Navajo Rd. & West Driveway 5 (Future)  |
| 4  | Stoddard Wells Rd. & Johnson Rd.         | 19 | Navajo Rd. & Los Padres Rd.            |
| 5  | I-15 SB Ramps & Dale Evans Pkwy.         | 20 | East Driveway 2 & Johnson Rd. (Future) |
| 6  | I-15 NB Ramps & Dale Evans Pkwy.         | 21 | East Driveway 3 & Johnson Rd. (Future) |
| 7  | Dale Evans Pkwy. & Stoddard Wells Rd.    | 22 | East Driveway 4 & Johnson Rd. (Future) |
| 8  | Dale Evans Pkwy. & Quarry Rd.            | 23 | East Driveway 5 & Johnson Rd. (Future) |
| 9  | Dale Evans Pkwy. & Johnson Rd.           | 24 | Central Rd. & Johnson Rd.              |
| 10 | Dale Evans Pkwy. & Corwin Rd.            | 25 | Central Rd. & East Driveway 6 (Future) |
| 11 | Dachshund Av. & West Driveway 1 (Future) | 26 | Central Rd. & East Driveway 7 (Future) |
| 12 | Dachshund Av. & West Driveway 2 (Future) | 27 | Central Rd. & East Driveway 8 (Future) |
| 13 | Dachshund Av. & Los Padres Rd. (Future)  | 28 | Central Rd. & East Driveway 9 (Future) |
| 14 | Navajo Rd. & Johnson Rd.                 | 29 | Central Rd. & Waalew Rd.               |
| 15 | Navajo Rd. & East Driveway 1 (Future)    |    |  |

The intent of the County of San Bernardino Congestion Management Program (CMP) is to directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related deficiencies, and improve air quality. Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. There are no study area intersections identified as a County of San Bernardino CMP location.

## 1.4 GENERAL PLAN CONSISTENCY REQUIREMENTS FOR INTERSECTIONS

This section provides a brief overview of the intersection level of service (LOS) deficiencies identified in this report. The LOS standards used for this assessment are consistent with those identified in the Town of Apple Valley General Plan. Section 2 *Methodologies* provides a detailed explanation on the methodologies used for this assessment, while Section 3 *Area Conditions* and Section 5 *Opening Year Cumulative (2027) Traffic Conditions* include the operations analysis results for each analysis scenario. Additionally, a summary of the peak hour LOS analysis results is presented in Table 1-2.

### 1.4.1 EXISTING (2024) CONDITIONS

The assessment of existing (2024) traffic conditions is performed to establish a baseline of current LOS operations from which the effects of the Project’s future contribution of traffic can be measured. The study area intersections were found to currently operate at an acceptable LOS (i.e., at or above the Town of Apple Valley’s adopted General Plan thresholds) during the peak hours.

### 1.4.2 OPENING YEAR CUMULATIVE (2027) CONDITIONS

An assessment of opening year cumulative traffic conditions is performed to identify whether the traffic contribution associated with both the proposed Project and that of other reasonably foreseeable future development projects in the area have the potential to cause intersection LOS to fall below the Town's adopted thresholds. The Project's contribution to these forecasted LOS deficiencies is typically addressed through fee payments to an established fee program (both local and regional).

The results of the LOS assessments for cumulative traffic conditions are also summarized in Table 1-2, while Section 5 *Opening Year Cumulative (2027) Traffic Conditions* of the report provide a more detailed list of the forecast LOS deficiencies.

**TABLE 1-2: SUMMARY OF LOS**

|   | Existing 2024 |     | 2027 Without Project |     | 2027 With Project |    |
|---|---------------|-----|----------------------|-----|-------------------|----|
|   | AM            | PM  | AM                   | PM  | AM                | PM |
| 1 Quarry Rd. & I-15 SB Ramps            | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 2 Quarry Rd. & Stoddard Wells Rd.       | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 3 I-15 NB Ramps & Stoddard Wells Rd.    | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 4 Stoddard Wells Rd. & Johnson Rd.      | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 5 I-15 SB Ramps & Dale Evans Pkwy.      | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 6 I-15 NB Ramps & Dale Evans Pkwy.      | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 7 Dale Evans Pkwy. & Stoddard Wells Rd. | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 8 Dale Evans Pkwy. & Quarry Rd.         | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 9 Dale Evans Pkwy. & Johnson Rd.        | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 10 Dale Evans Pkwy. & Corwin Rd.        | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 11 Dachshund Av. & West Driveway 1      | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 12 Dachshund Av. & West Driveway 2      | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 13 Dachshund Av. & Los Padres Rd.       | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 14 Navajo Rd. & Johnson Rd.             | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 15 Navajo Rd. & East Driveway 1         | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 16 Navajo Rd. & West Driveway 3         | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 17 Navajo Rd. & West Driveway 4         | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 18 Navajo Rd. & West Driveway 5         | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 19 Navajo Rd. & Los Padres Rd.          | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 20 East Driveway 2 & Johnson Rd.        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 21 East Driveway 3 & Johnson Rd.        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 22 East Driveway 4 & Johnson Rd.        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 23 East Driveway 5 & Johnson Rd.        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 24 Central Rd. & Johnson Rd.            | ●             | ●   | ●                    | ●   | ●                 | ●  |
| 25 Central Rd. & East Driveway 6        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 26 Central Rd. & East Driveway 7        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 27 Central Rd. & East Driveway 8        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 28 Central Rd. & East Driveway 6        | N/A           | N/A | N/A                  | N/A | ●                 | ●  |
| 29 Central Rd. & Waalew Rd.             | ●             | ●   | ●                    | ●   | ●                 | ●  |

**LEGEND:**

- = A-D
- = E
- = F

## 1.5 RECOMMENDATIONS

### 1.5.1 INTERSECTION IMPROVEMENT RECOMMENDATIONS NECESSARY TO MAINTAIN GENERAL PLAN CONSISTENCY

Based on the results of this TA, intersection improvement recommendations necessary to maintain the Town of Apple Valley General Plan LOS standards are listed Table 1-3.

**TABLE 1-3: IMPROVEMENTS TO MAINTAIN GENERAL PLAN CONSISTENCY (1 OF 2)**

| # | Intersection Location                 | Jurisdiction                   | Opening Year Cumulative (2027) |              |
|---|---------------------------------------|--------------------------------|--------------------------------|--------------|
|   |                                       |                                | Without Project                | With Project |
| 1 | Quarry Rd. & I-15 SB Ramps            | County, Caltrans               | Add NB right turn lane         | Same         |
| 2 | Quarry Rd. & Stoddard Wells Rd.       | County                         | Add WB right turn lane         | Same         |
| 3 | I-15 NB Ramps & Stoddard Wells Rd.    | Town of Apple Valley, Caltrans | Install a traffic signal       | Same         |
|   |                                       |                                | Add 2nd WB through lane        | Same         |
|   |                                       |                                | Add SB left turn lane          | Same         |
|   |                                       |                                | Add EB left turn lane          | Same         |
|   |                                       |                                | Add WB left turn lane          | Same         |
| 4 | Stoddard Wells Rd. & Johnson Rd.      | Town of Apple Valley, County   | Install a traffic signal       | Same         |
|   |                                       |                                | Add NB right turn lane         | Same         |
|   |                                       |                                | Add WB left turn lane          | Same         |
| 5 | I-15 SB Ramps & Dale Evans Pkwy.      | County, Caltrans               | Install a traffic signal       | Same         |
| 7 | Dale Evans Pkwy. & Stoddard Wells Rd. | Town of Apple Valley, County   | Install a traffic signal       | Same         |
| 8 | Dale Evans Pkwy. & Quarry Rd.         | Town of Apple Valley, County   | Install a traffic signal       | Same         |
|   |                                       |                                | Add NB left turn lane          | Same         |
|   |                                       |                                | Add SB left turn lane          | Same         |
| 9 | Dale Evans Pkwy. & Johnson Rd.        | Town of Apple Valley, County   | Install a traffic signal       | Same         |
|   |                                       |                                | Add 2nd NB through lane        | Same         |
|   |                                       |                                | Add 2nd SB through lane        | Same         |
|   |                                       |                                | Add 2nd EB through lane        | Same         |
|   |                                       |                                | Add 2nd WB through lane        | Same         |
|   |                                       |                                | Add EB left turn lane          | Same         |
|   |                                       |                                | Add WB left turn lane          | Same         |

**TABLE 1-3: IMPROVEMENTS TO MAINTAIN GENERAL PLAN CONSISTENCY (2 OF 2)**

| #  | Intersection Location     | Jurisdiction         | Opening Year Cumulative (2027) |              |
|----|---------------------------|----------------------|--------------------------------|--------------|
|    |                           |                      | Without Project                | With Project |
| 14 | Navajo Rd. & Johnson Rd.  | Town of Apple Valley | Install a traffic signal       | Same         |
|    |                           |                      | Add EB through lane            | Same         |
|    |                           |                      | Add WB left turn lane          | Same         |
| 24 | Central Rd. & Johnson Rd. | Town of Apple Valley | Install a traffic signal       | Same         |
|    |                           |                      | Add NB left turn lane          | Same         |
|    |                           |                      | Add SB left turn lane          | Same         |
|    |                           |                      | Add EB left turn lane          | Same         |
|    |                           |                      | Add WB left turn lane          | Same         |
|    |                           |                      | Add 2nd NB left turn lane      | Same         |
|    |                           |                      | Add SB right turn lane         | Same         |
| 29 | Central Rd. & Waalew Rd.  | Town of Apple Valley | Install a traffic signal       | Same         |

<sup>1</sup> Improvements included in the Town of Apple Valley DIF program.

Based on the Apple Valley Transportation Impact Fee (TIF) schedule, last updated on September 3, 2024, the West Site’s and East Site’s TIF payment is \$2,071,058 and \$6,543,759, respectively. This fee is expected to cover intersection improvements within the Town’s boundaries that are consistent with the ultimate planned roadway improvements outlined in the Town’s General Plan.

Additionally, Rough order of magnitude fair share cost estimates have been calculated for the I-15 Southbound Ramps at Quarry Road (#1), I-15 Northbound Ramps at Stoddard Wells Road (#3), and I-15 Southbound Ramps at Dale Evans Parkway (#5) as these intersection are within Caltrans jurisdiction. These estimates are based on the preliminary construction costs found in Appendix G of the San Bernardino County CMP, adjusted using a cost escalation factor of 1.674 to reflect current conditions. The total estimated costs have been prepared to determine the appropriate contribution value based on each Project site’s fair share of traffic as part of the project approval process. Based on the calculated fair share percentages, the West Site’s and East Site’s contributions are estimated at \$111,584 and \$352,883, respectively, for a combined total of \$464,467. These estimates are a rough order of magnitude only as they are intended only for disclosure purposes and do not imply any legal responsibility or formula for contributions or physical construction of improvements. Additional details regarding the calculations, fair share percentages, and cost assumptions are provided in Section 6.4 *Fair Share Contribution* of this report.

### 1.5.2 ON-SITE CIRCULATION RECOMMENDATIONS

The following recommendations are based on the improvements needed to accommodate site access and maintain acceptable peak hour LOS at site access and on-site intersections are described below and shown on Exhibits 1-5 and 1-6, respectively. The site adjacent queuing analysis worksheets are provided in Appendix 1.2 for Opening Year Cumulative (2027) With Project traffic conditions. No site adjacent queues are anticipated with the proposed improvements.

#### West Site:

**Recommendation 1 – Dachshund Avenue & West Driveway 1 (#11)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the westbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound shared through-right turn lane.
- Project to construct a southbound shared through lane.
- Project to construct a southbound shared left turn lane with 100 feet of storage.

**Recommendation 2 – Dachshund Avenue & West Driveway 2 (#12)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the westbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound shared through-right turn lane.
- Project to construct a southbound shared through lane.
- Project to construct a southbound shared left turn lane with 100 feet of storage.

**Recommendation 3 – Dachshund Avenue & Los Padres Road (#13)** – The following improvements are necessary to accommodate site access:

- Project to construct a southbound left turn lane.
- Project to construct a westbound right turn lane.

**Recommendation 4 – Navajo Road & West Driveway 3 (#16)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 5 – Navajo Road & West Driveway 4 (#17)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 6 – Navajo Road & West Driveway 5 (#18)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 5 – Navajo Road & Los Padres Road (#19)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 6 – Dachshund Avenue** is a north-south oriented roadway located along the West site's western boundary. Project's West site to construct Dachshund Avenue from the West site's northern boundary to Los Padres Road at its ultimate half-section width as a Modified Collector (ultimate 66-foot right-of-way), consistent with the Town's standards. The Project will also provide an additional 12 feet of pavement width to accommodate one southbound lane from the West site's northern boundary to Los Padres Road to facilitate site access.

**Recommendation 7 – Navajo Road** is a north-south oriented roadway located along the West site's eastern boundary. Project's West site to construct Navajo Road from the West site's northern boundary to Los Padres Road at its ultimate half-section width as a Secondary Road (ultimate 88-foot right-of-way), consistent with the Town's standards.

**Recommendation 8 – Los Padres Road** is an east-west oriented roadway located along the West site's southern boundary. Project's West site to construct Los Padres Road from the Project's western boundary to Navajo Road at its ultimate half-section width as a Modified Collector (ultimate 66-foot right-of-way), consistent with the Town's standards. The Project will also provide an additional 12 feet of pavement width to accommodate one eastbound lane from the Project's western boundary to Navajo Road to facilitate site access.

#### **East Site:**

**Recommendation 1 – Navajo Road & East Driveway 1 (#15)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the westbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 3 – East Driveway 2 & Johnson Road (#20)** – The following improvement is necessary to accommodate site access:

- Project to install a stop control on the northbound approach and construct a shared left-right turn lane (Project driveway).

**Recommendation 3 – East Driveway 3 & Johson Road (#21)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the northbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a westbound left turn lane with 100 feet of storage.

**Recommendation 4 – East Driveway 4 & Johson Road (#22)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the northbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a westbound left turn lane with 100 feet of storage.

**Recommendation 5 – East Driveway 5 & Johson Road (#23)** – The following improvement is necessary to accommodate site access:

- Project to install a stop control on the northbound approach and construct a shared left-right turn lane (Project driveway).

**Recommendation 6 – Central Road & East Driveway 6 (#25)** – The following improvement is necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).

**Recommendation 7 – Central Road & East Driveway 7 (#22)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 8 – Central Road & East Driveway 8 (#27)** – The following improvement is necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).

**Recommendation 9 – Central Road & East Driveway 9 (#28)** – The following improvements are necessary to accommodate site access:

- Project to install a stop control on the eastbound approach and construct a shared left-right turn lane (Project driveway).
- Project to construct a northbound left turn lane with 100 feet of storage.

**Recommendation 10 – Navajo Road** is a north-south oriented roadway located along the East site's western boundary. Project's East site to construct Navajo Road from Johnson Road to the East site's southern boundary at its ultimate half-section width as a Secondary Road (ultimate 88-foot right-of-way), consistent with the Town's standards.

**Recommendation 11 – Johnson Road** is an east-west oriented roadway located along the East site's northern boundary. Project's East site to construct Johnson Road from Navajo Road to Central Road at its ultimate half-section width as a Major Road (ultimate 104-foot right-of-way), consistent with the Town's standards.

**Recommendation 15 – Central Road** is a north-south oriented roadway located on the East site's eastern boundary. Project's East site to construct Central Road at its ultimate half-section width as a Major Divided Arterial (128-foot right-of-way) along the Project's frontage from Johnson Road to the East site's southern boundary, consistent with the Town's standards. As part of the Project's frontage improvements along Central Road, a 2<sup>nd</sup> and 3<sup>rd</sup> southbound through lane could be accommodated in the future with the construction of receiving lanes to the south of the Project's southern boundary. Until widening to the south occurs, the pavement along the Project's frontage on Stoddard Wells Road can be cross-hatched.

On-site traffic signing and striping should be implemented agreeable with the provisions of the California Manual on Uniform Traffic Control Devices (CA MUTCD) and in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard California Department of Transportation (Caltrans) and Town of Apple Valley sight distance standards at the time of preparation of final grading, landscape, and street improvement plans.

EXHIBIT 1-5 : SITE ACCESS RECOMMENDATIONS (WEST SITE)

**LEGEND:**

- 0** = Existing Intersection Analysis Location
- = Future Intersection Analysis Location
- S** = Existing All Way Stop
- = Existing Stop Sign
- = Stop Sign Improvement
- = Existing Lane
- = Existing Free Right Turn
- = Lane Improvement

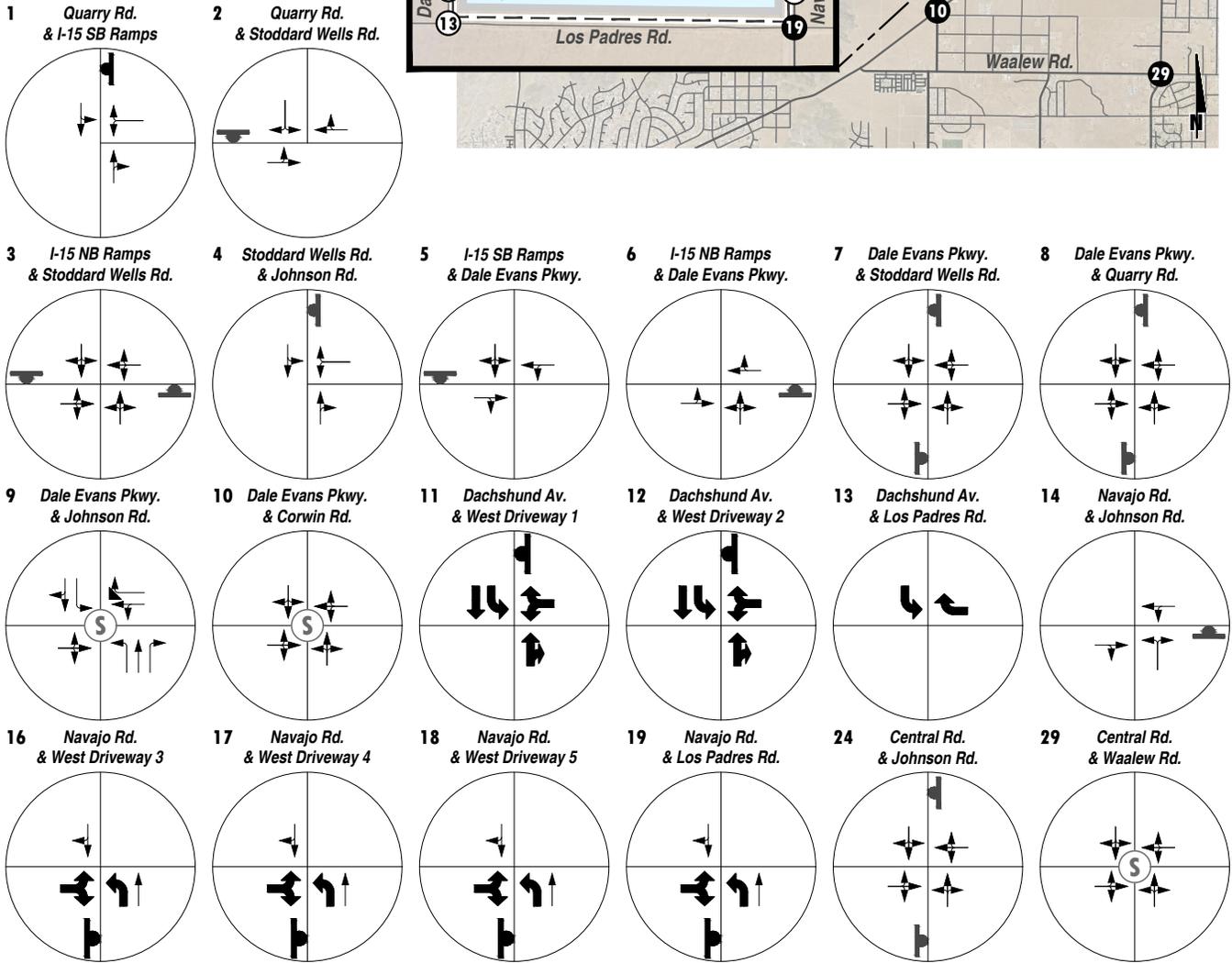
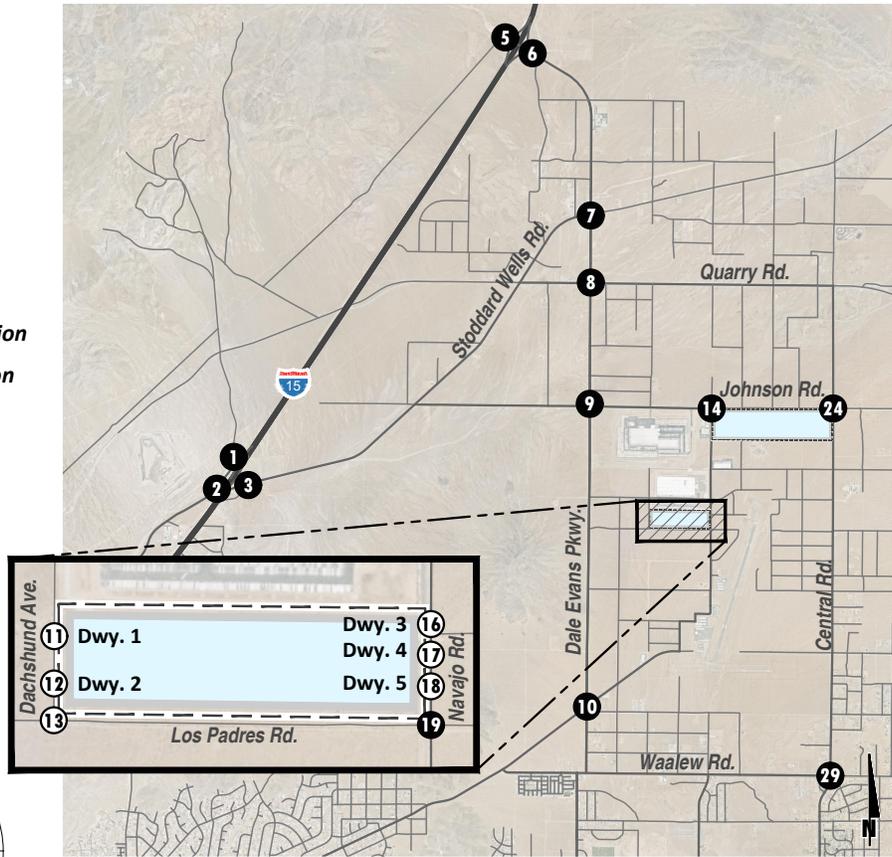
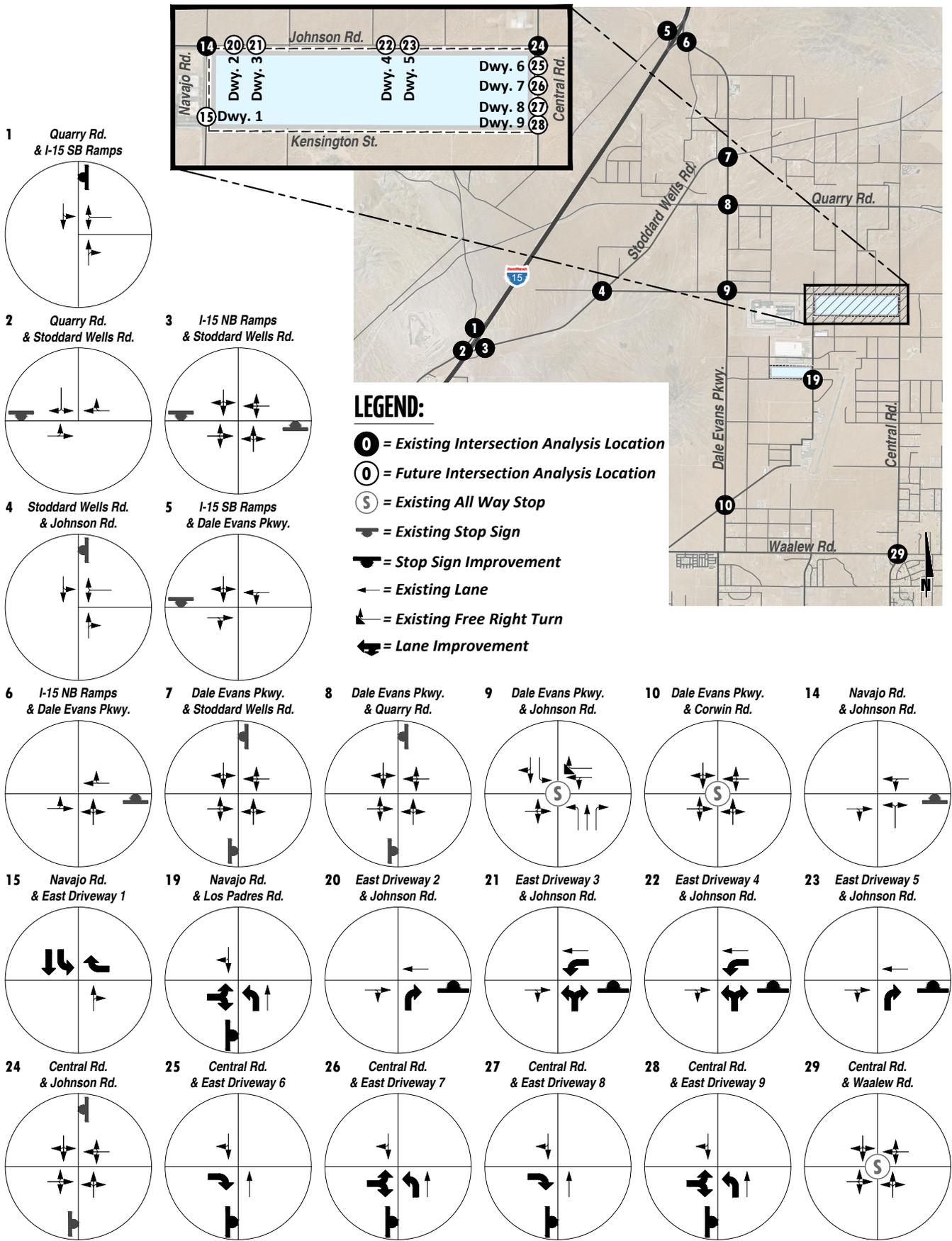


EXHIBIT 1-6 : SITE ACCESS RECOMMENDATIONS (EAST SITE)



## 1.6 QUEUING ANALYSIS

The traffic modeling and signal timing optimization software package SimTraffic has been utilized to assess the queues, for both on-site roadways (Project design features) and off-site interchange off-ramp queues. SimTraffic is designed to model networks of signalized and unsignalized intersections, with the primary purpose of checking and fine-tuning signal operations. SimTraffic uses the input parameters from Synchro to generate random simulations. These random simulations generated by SimTraffic have been utilized to determine the 95<sup>th</sup> percentile queue lengths observed for each applicable turn lane. A SimTraffic simulation has been recorded up to 5 times, during the weekday AM and weekday PM peak hours, and has been seeded for 30-minute periods with 60-minute recording intervals.

### 1.6.1 OFF-SITE QUEUING

#### *Existing (2024) Conditions*

Although not required by County Guidelines, a review of freeway off-ramp queues has also been included at the request of Caltrans. Based on the results of this analysis, there are currently no freeway off-ramp movements found to exceed available off-ramp storage capacity during the weekday AM or PM peak 95<sup>th</sup> percentile traffic flows.

#### *Cumulative Traffic Conditions*

The following movements are anticipated to exceed available off-ramp storage capacity during the weekday AM or PM peak 95<sup>th</sup> percentile traffic flows under Opening Year Cumulative (2027) Without Project traffic conditions:

- I-15 Northbound Ramps & Stoddard Wells Road (#3) – Southbound shared left-through-right – AM and PM peak hours

The addition of Project traffic is anticipated to result in the following additional off-ramp queuing issue during the weekday AM or weekday PM peak 95<sup>th</sup> percentile traffic flows under Opening Year Cumulative (2027) With Project traffic conditions:

- I-15 Northbound Ramps & Dale Evans Parkway (#6) – Southbound shared left-through-right – AM peak hour only

### 1.6.2 ON-SITE QUEUING

The results of the queuing analysis worksheets for the weekday AM and PM peak hours are provided in Appendix 1.2 of this report for Opening Year Cumulative (2027) With Project traffic conditions and have been used to verify the recommended pocket lengths for each of the future intersections anticipated to be completed as part of the Project, as discussed in Section 1.5 *Recommendations*. Exhibits 1-5 and 1-6 provide the necessary turn pocket lengths, based on the results of the on-site queuing analysis.

## 2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with Town of Apple Valley's Traffic Study Guidelines.

### 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 a 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 7<sup>th</sup> Edition Highway Capacity Manual (HCM) 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 Town of Apple Valley requires signalized intersection operations analysis based on the methodology described in the HCM. (4) 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 related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1. The saturation flow rates utilized are consistent with the rates identified in the San Bernardino County CMP.

The traffic modeling and signal timing optimization software package Synchro (Version 11) is utilized to analyze signalized intersections within the study area. 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.

**TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS**

| Description   | Average Control Delay<br>(Seconds), V/C ≤ 1.0 | Level of Service,<br>V/C ≤ 1.0 <sup>1</sup> |
|---|---|---|
| Operations with very low delay occurring with favorable progression and/or short cycle length.  | 0 to 10.00                                    | A   |
| Operations with low delay occurring with good progression and/or short cycle lengths.   | 10.01 to 20.00                                | B   |
| 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   |
| 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   |
| 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   |
| Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.  | 80.01 and up                                  | F   |

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Customary 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.,  $PHF = \frac{[Hourly Volume]}{[4 \times Peak\ 15\text{-minute\ Flow\ Rate}]}$ ). 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 Town of Apple Valley requires the operations of unsignalized intersections to be evaluated using the methodology described in the HCM. (4) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2). 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. Delay for the intersection is reported for the worst individual movement at a two-way stop-controlled intersection. For all-way stop-controlled intersections, LOS is computed for the intersection as a whole (average delay).

**TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS**

| Description   | Average Control Delay<br>(Seconds), $V/C \leq 1.0$ | Level of Service,<br>$V/C \leq 1.0^1$ |
|---|--|---------------------------------------|
| Little or no delays.  | 0 to 10.00   | A                                     |
| Short traffic delays.                                       | 10.01 to 15.00                                     | B                                     |
| Average traffic delays.                                     | 15.01 to 25.00                                     | C                                     |
| Long traffic delays.  | 25.01 to 35.00                                     | D                                     |
| Very long traffic delays.                                   | 35.01 to 50.00                                     | E                                     |
| Extreme traffic delays with intersection capacity exceeded. | > 50.00  | F                                     |

### 2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term “signal warrants” refers to the list of established criteria used by 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 TA uses the signal warrant criteria presented in the latest edition of the California Department of Transportation (Caltrans) California Manual on Uniform Traffic Control Devices (CA MUTCD) for all study area intersections. (6)

The signal warrant criteria for Existing conditions are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (6) Specifically, this TA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing study area intersections for all analysis scenarios. Warrant 3 is appropriate to use for this TA because it provides specialized warrant criteria for intersections with urban characteristics (e.g., adjacent major streets operating at or below 40 miles per hour) or rural characteristics (e.g., 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 intersections that do not currently 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.

The traffic signal warrant analysis for Existing (2024) conditions are presented in Section 3 *Area Conditions*. The traffic signal warrant analyses for future conditions are presented in Section 5 *Opening Year Cumulative (2027) Traffic Conditions*.

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 OFF-RAMP QUEUING ANALYSIS

Consistent with Caltrans requirements, the 95th percentile queuing of vehicles has been assessed at the off-ramps to determine potential queuing deficiencies at the freeway ramp intersections at the I-15 Freeway at the Quarry Road, Stoddard Wells Road, and Dale Evans Parkway interchanges. Specifically, the off-ramp queuing analysis is utilized to identify any potential queuing and “spill back” onto the I-15 Freeway mainline from the off-ramps.

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 at the ramps have been based upon the 95th percentile queue resulting from the Synchro progression analysis. The footnote from the Synchro output sheets indicates if the 95th percentile cycle exceeds capacity. Traffic is simulated for two complete cycles of the 95th percentile traffic in Synchro in order to account for the effects of spillover between cycles. In practice, the 95th percentile queue shown will rarely be exceeded and the queues shown with the footnote are acceptable for the design of storage bays. 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.

## 2.5 MINIMUM ACCEPTABLE LEVELS OF SERVICE (LOS)

According to the Town of Apple Valley's General Plan, LOS C or better is preferable, but LOS D is the minimum acceptable condition that should be maintained during the peak commute hours, where feasible. Therefore, for the purposes of this traffic analysis, LOS D has also been considered the acceptable threshold for all study area intersections.

## 2.6 DEFICIENCY CRITERIA

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies. Per the County's Traffic Study Guidelines, at intersections where the LOS falls below, or is expected to fall below an acceptable threshold with or without the addition of the Project, feasible measures shall be identified to mitigate the Project's impacts for all Project scenario conditions. The TA calculates the Project's fair share towards each improvement required to serve cumulative conditions with or without the Project.

## 2.7 PROJECT FAIR SHARE CALCULATION METHODOLOGY

In cases where this TA identifies that the Project would contribute additional traffic volumes to traffic deficiencies, Project fair share costs of improvements necessary to address deficiencies have been identified. The Project's fair share cost of improvements is determined based on the following equation, which is the ratio of Project traffic to new future traffic, and new future traffic is Project traffic plus future development traffic:

$$\text{Project Fair Share \%} = \frac{\text{Project AM/PM Traffic}}{(2027 \text{ With Project AM/PM Total Traffic} - \text{Existing AM/PM Traffic})}$$

The Project fair share percentage has been calculated for both the AM peak hour and PM peak hour and the higher of the two has been selected. The Project fair share contribution calculations are presented in Section 6 *Local and Regional Funding Mechanisms* of this TA.

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### 3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the Town of Apple Valley General Plan Circulation Network, and a review of existing peak hour intersection operations, traffic signal warrant, and freeway off-ramp queuing analyses.

#### 3.1 EXISTING CIRCULATION NETWORK

Pursuant to the agreement with Town of Apple Valley staff (Appendix 1.1), the study area includes a total of 29 existing and future intersections as shown previously on Exhibit 1-4. 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 TOWN OF APPLE VALLEY GENERAL PLAN CIRCULATION ELEMENT

The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on the Town of Apple Valley General Plan Circulation Element, are described subsequently. Exhibit 3-2 shows the Town of Apple Valley General Plan Circulation Element.

**Major Divided Parkways** are designed to accommodate six travel lanes with a 20-foot center median and 15-foot parkways on each side of the roadway, within a 142-foot right-of-way. The following study area roadway within the Town of Apple Valley is classified as a Major Divided Parkway:

- Dale Evans Parkway

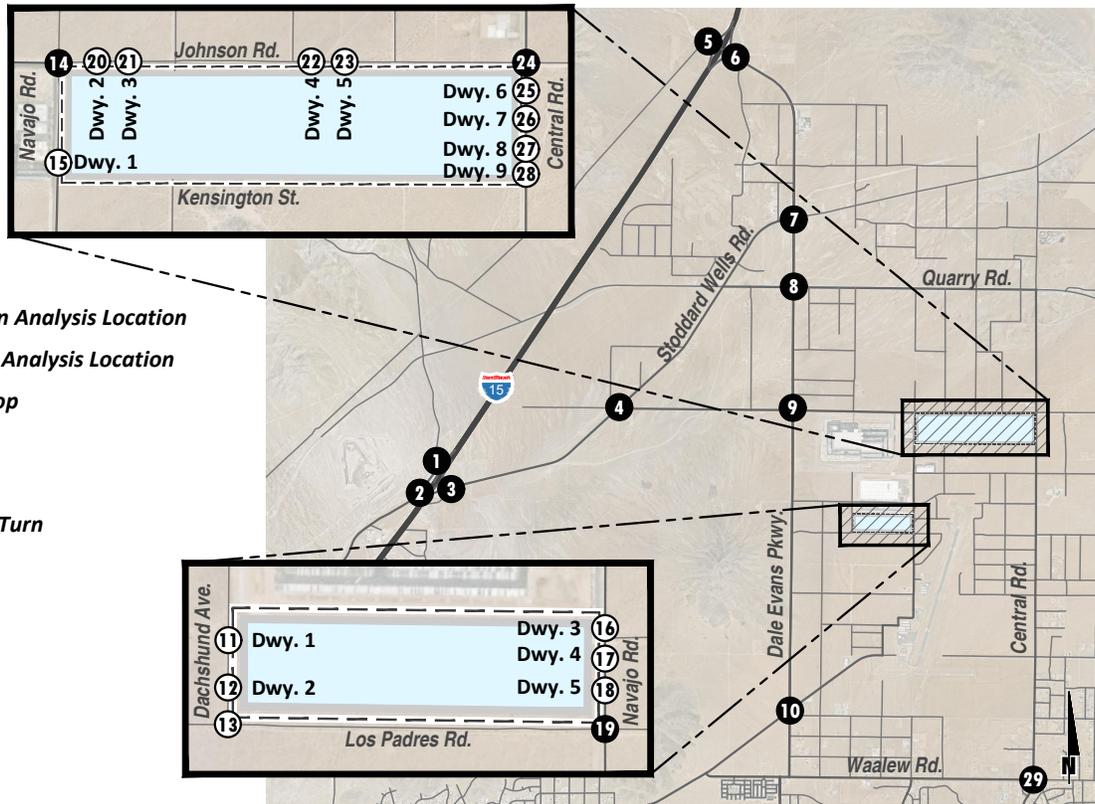
**Major Divided Arterials** are designed to accommodate six travel lanes with a 12-foot center turn lane or median and 10-foot bike or parking lanes on each side of the roadway, within a 128-foot right-of-way. The following study area roadways within the Town of Apple Valley are classified as Major Divided Arterials:

- Quarry Road, west of Stoddard Wells Road
- Stoddard Wells Road, south of Johnson Road
- Central Road, between Johnson Road and Waalew Road

**Major Roads** are designed to accommodate four travel lanes with a 12-foot center turn lane or median and two bike or parking lanes, within a 104-foot right-of-way. The following study area roadways within the Town of Apple Valley are classified as Major Roads:

- Stoddard Wells Road, north of Johnson Road
- Central Road, north of Johnson Road
- Quarry Road, between Stoddard Wells Road and Dale Evans Parkway
- Johnson Road
- Waalew Road
- Corwin Road

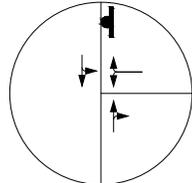
EXHIBIT 3-1 : EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



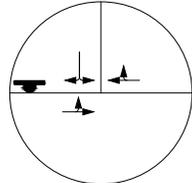
LEGEND:

- 0** = Existing Intersection Analysis Location
- = Future Intersection Analysis Location
- S** = Existing All Way Stop
- ⬇** = Existing Stop Sign
- ←** = Existing Lane
- ↗** = Existing Free Right Turn

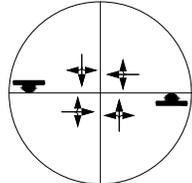
1 Quarry Rd. & I-15 SB Ramps



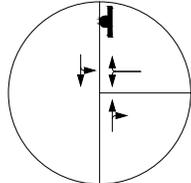
2 Quarry Rd. & Stoddard Wells Rd.



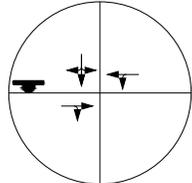
3 I-15 NB Ramps & Stoddard Wells Rd.



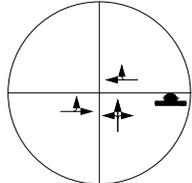
4 Stoddard Wells Rd. & Johnson Rd.



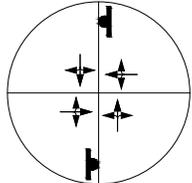
5 I-15 SB Ramps & Dale Evans Pkwy.



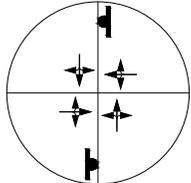
6 I-15 NB Ramps & Dale Evans Pkwy.



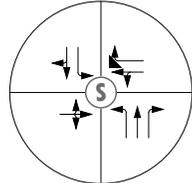
7 Dale Evans Pkwy. & Stoddard Wells Rd.



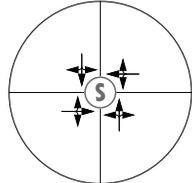
8 Dale Evans Pkwy. & Quarry Rd.



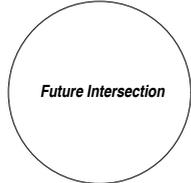
9 Dale Evans Pkwy. & Johnson Rd.



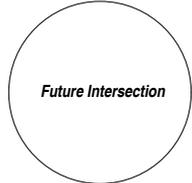
10 Dale Evans Pkwy. & Corwin Rd.



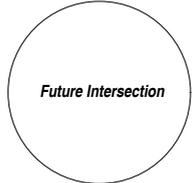
11 Dachshund Av. & West Driveway 1



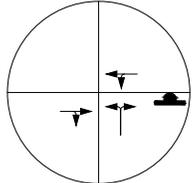
12 Dachshund Av. & West Driveway 2



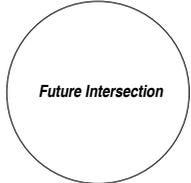
13 Dachshund Av. & Los Padres Rd.



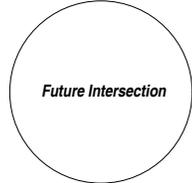
14 Navajo Rd. & Johnson Rd.



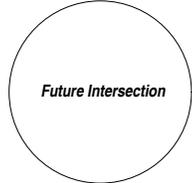
15 Navajo Rd. & East Driveway 1



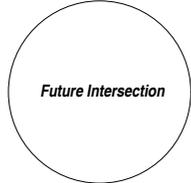
16 Navajo Rd. & West Driveway 3



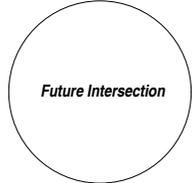
17 Navajo Rd. & West Driveway 4



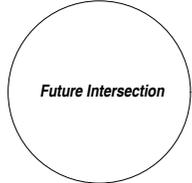
18 Navajo Rd. & West Driveway 5



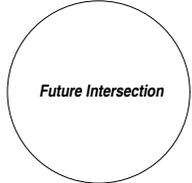
19 Navajo Rd. & Los Padres Rd.



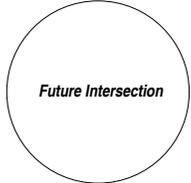
20 East Driveway 2 & Johnson Rd.



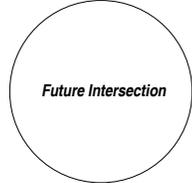
21 East Driveway 3 & Johnson Rd.



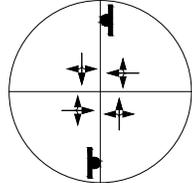
22 East Driveway 4 & Johnson Rd.



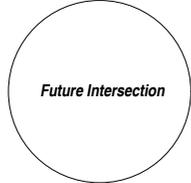
23 East Driveway 5 & Johnson Rd.



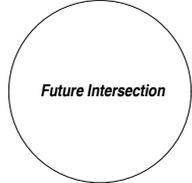
24 Central Rd. & Johnson Rd.



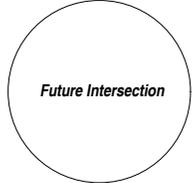
25 Central Rd. & East Driveway 6



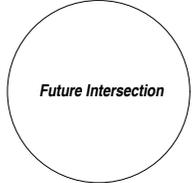
26 Central Rd. & East Driveway 7



27 Central Rd. & East Driveway 8



28 Central Rd. & East Driveway 9



29 Central Rd. & Waalew Rd.

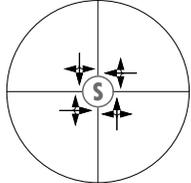
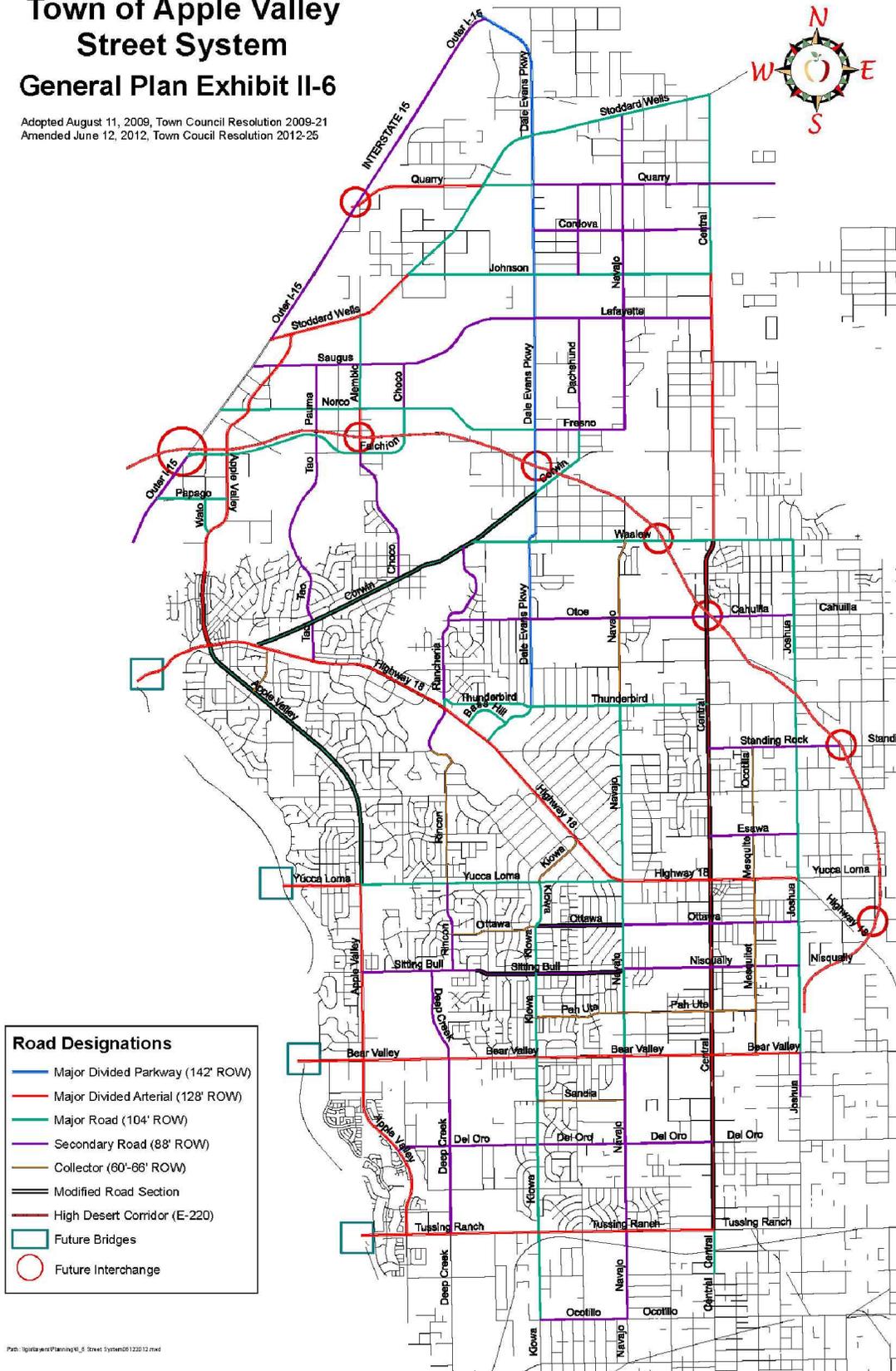


EXHIBIT 3-2 : TOWN OF APPLE VALLEY GENERAL PLAN CIRCULATION ELEMENT

Town of Apple Valley  
Street System  
General Plan Exhibit II-6

Adopted August 11, 2009, Town Council Resolution 2009-21  
Amended June 12, 2012, Town Council Resolution 2012-25



Path: \\gisdata\arc\Planning\01\_03\_Street System\01122012.mxd

**Secondary Roads** are designed to accommodate four travel lanes with a bike or parking lane, within a 88-foot right-of-way. The following study area roadway within the Town of Apple Valley is classified as a Secondary Road:

- Quarry Road, east of Dale Evans Parkway

### 3.3 BICYCLE AND PEDESTRIAN FACILITIES

Exhibit 3-3 illustrates the Town of Apple Valley bike paths. As shown at Exhibit 3-3, there are proposed Class II bike lanes on Central Road, and Class I bike paths along Stoddard Wells Road, Dale Evans Parkway, and Waalew Road. There are no pedestrian facilities in close proximity to the Project. Field observations indicate nominal pedestrian and bicycle activity within the study area.

### 3.4 TRANSIT SERVICE

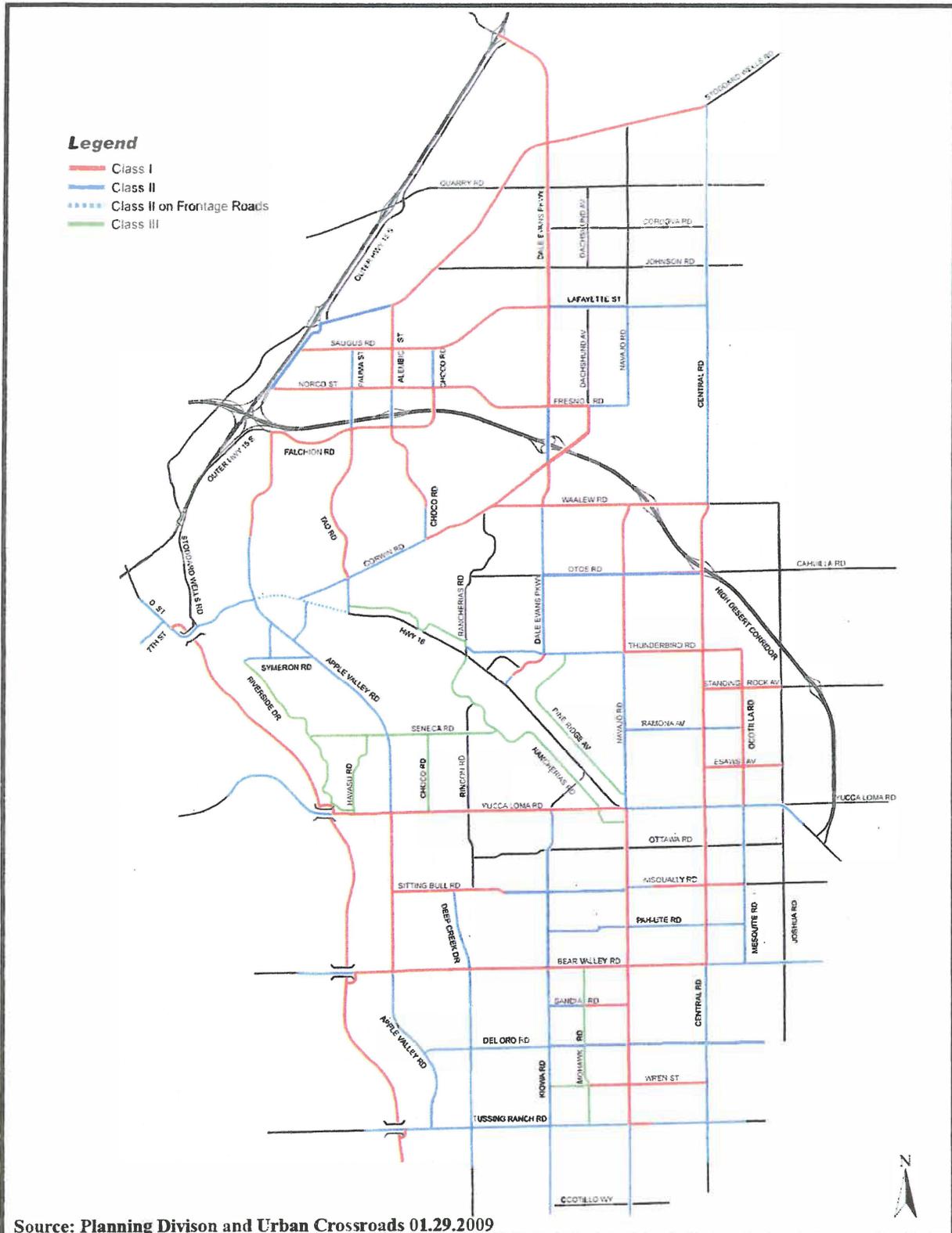
The study area is currently served by Victor Valley Transit Authority (VTA), a public transit agency serving various jurisdictions within San Bernardino County. The existing transit routes within the study area are shown on Exhibit 3-4. Route 42 currently runs along Dale Evans Parkway, Johnson Road, and Corwin Road.

Transit service is reviewed and updated by VTA 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. As such, it is recommended that the applicant work in conjunction with VTA to potentially provide bus service to the site.

### 3.5 TRUCK ROUTES

The Town of Apple Valley truck routes are shown on Exhibit 3-5. Through truck routes are included on Central Road, Waalew Road, Dale Evans Parkway and Johnson Road between Dale Evans Parkway and Central Road, in the study area. Local Truck Routes are also shown on Stoddard Wells Road and Johnson Road west of Dale Evans Parkway. These designated truck routes have been utilized for both the proposed Project and future cumulative development projects for the purposes of this TA.

EXHIBIT 3-3 : TOWN OF APPLE VALLEY EXISTING AND PLANNED BICYCLE FACILITIES



Apple Valley General Plan  
Town of Apple Valley Bike Paths  
Apple Valley, California

Exhibit  
**II-10**

EXHIBIT 3-4 : EXISTING TRANSIT ROUTES

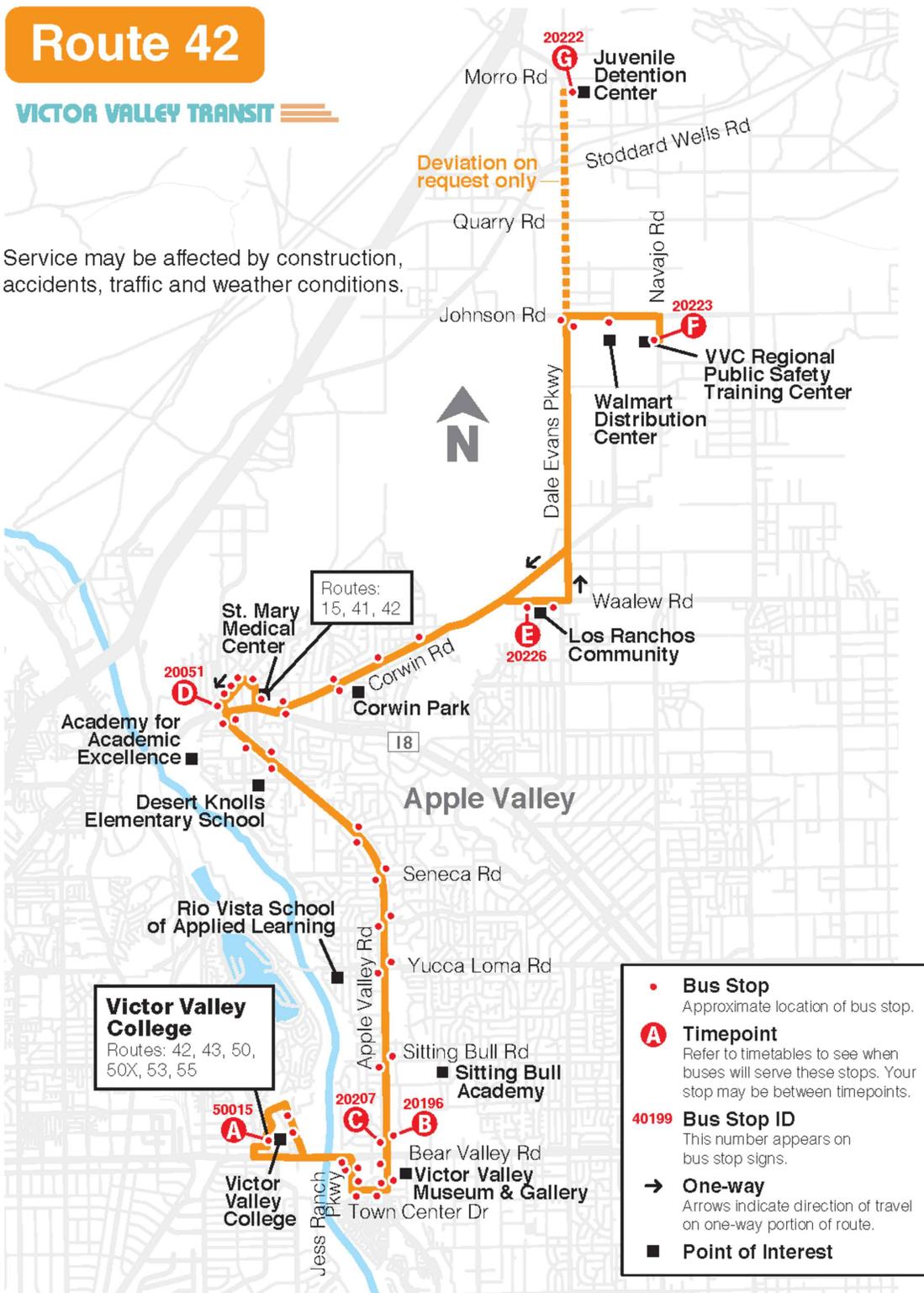
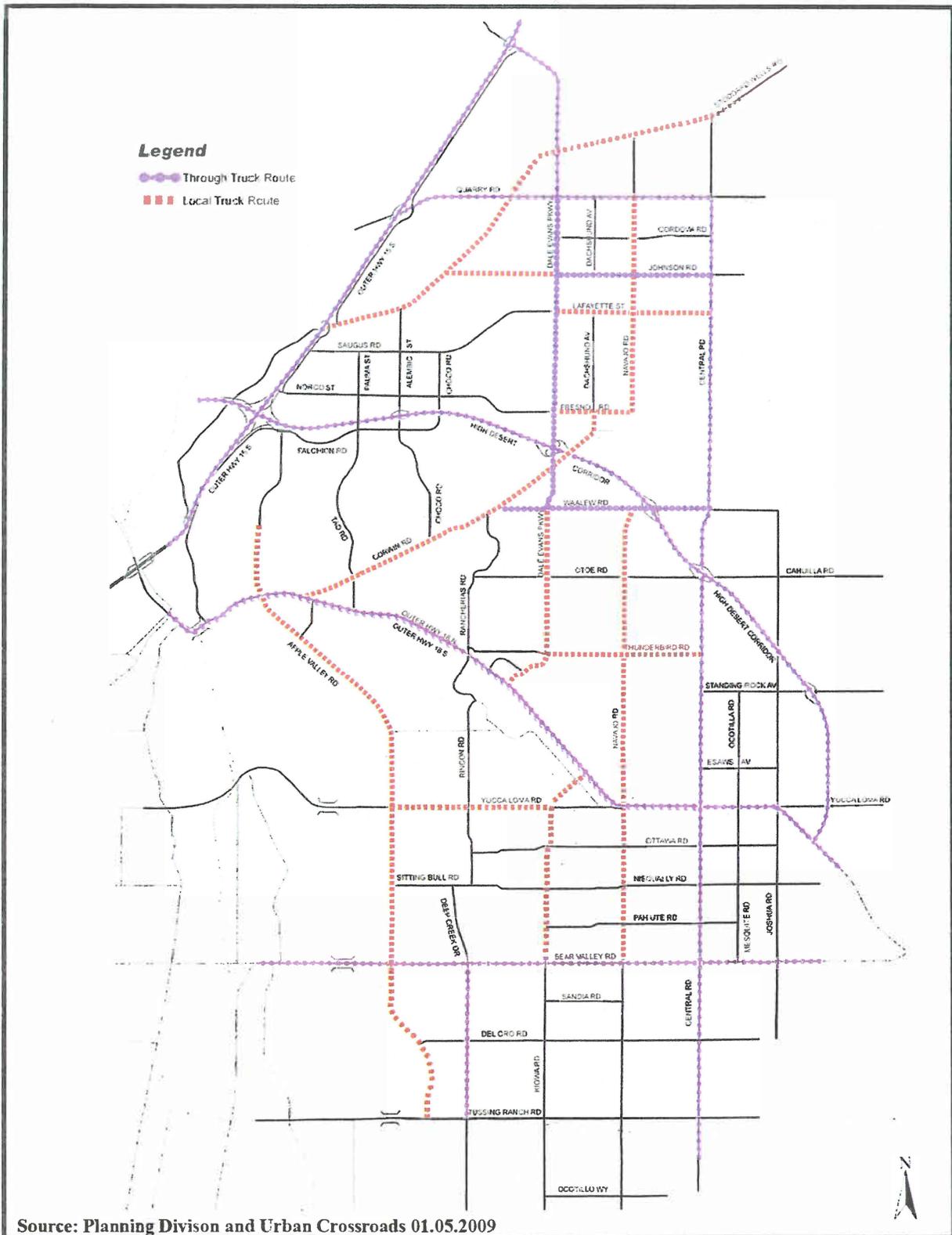


EXHIBIT 3-5 : TOWN OF APPLE VALLEY TRUCK ROUTES



Apple Valley General Plan  
Town of Apple Valley Truck Routes at Build Out  
Apple Valley, California

Exhibit  
**II-8**

### 3.6 EXISTING (2024) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in April 2024. 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)

The 2024 weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. Existing weekday AM and weekday PM peak hour intersection volumes are also shown on Exhibit 3-6. Existing weekday ADT volumes are shown on Exhibit 3-7. Where actual 24-hour tube count data was not available, Existing ADT volumes were based upon factored intersection peak hour counts collected using the following formula for each intersection leg:

$$\text{Weekday PM Peak Hour (Approach Volume + Exit Volume)} \times 9.66 = \text{Leg Volume}$$

A comparison of the PM peak hour and daily traffic volumes of various roadway segments within the study area indicate that the peak-to-daily relationship is approximately 10.35 percent. As such, the above equation utilizing a factor of 9.66 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 10.35 percent (i.e.,  $1/0.1035 = 9.66$ ) and was assumed to sufficiently estimate ADT volumes for planning-level analyses.

### 3.7 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 all the study area intersections are currently operating at an acceptable LOS during the peak hours. The intersection operations analysis worksheets are included in Appendix 3.2 of this TA.

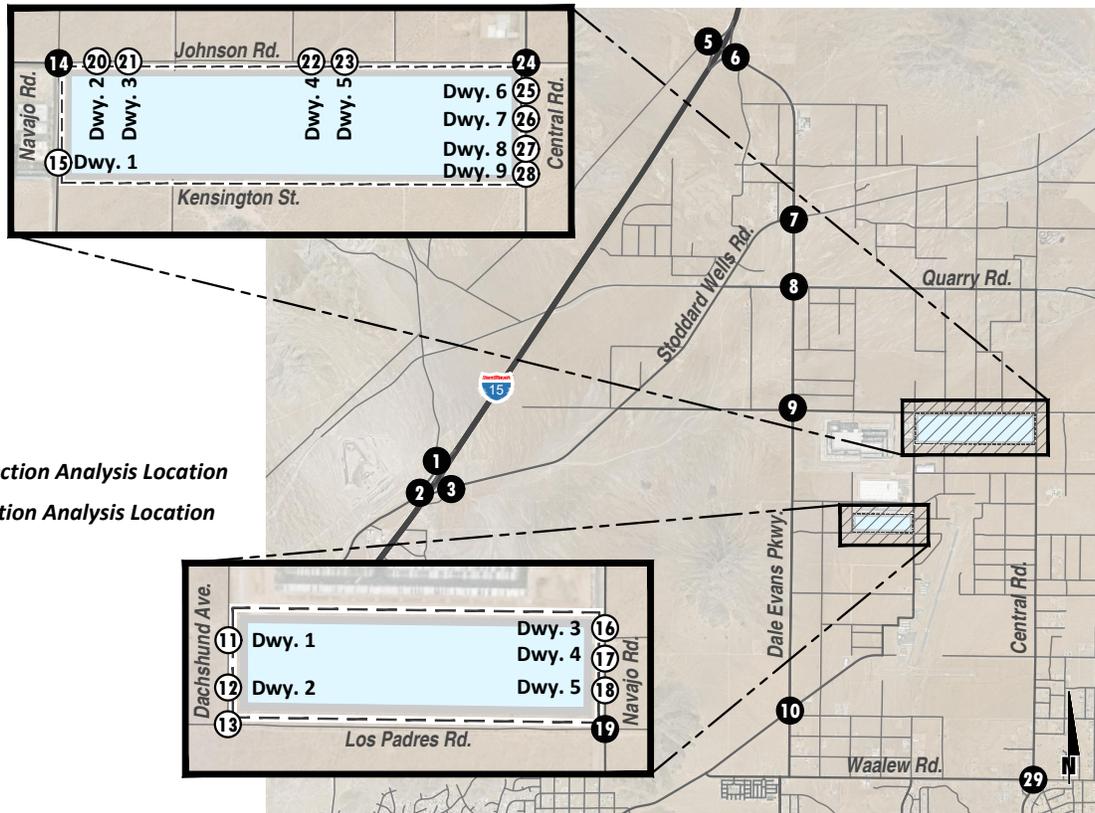
### 3.8 TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. The following unsignalized study area intersection currently warrants a traffic signal for Existing traffic conditions:

- Dale Evans Parkway & Johnson Road (#9)

Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

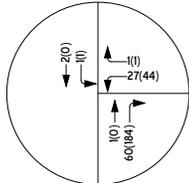
EXHIBIT 3-6 : EXISTING (2024) PEAK HOUR INTERSECTION VOLUMES



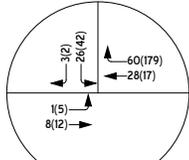
LEGEND:

- 1 = Existing Intersection Analysis Location
- 0 = Future Intersection Analysis Location

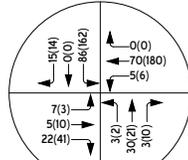
1 Quarry Rd. & I-15 SB Ramps



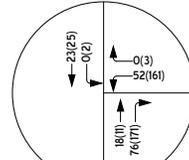
2 Quarry Rd. & Stoddard Wells Rd.



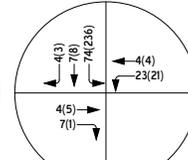
3 I-15 NB Ramps & Stoddard Wells Rd.



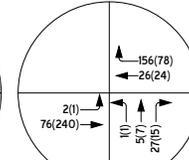
4 Stoddard Wells Rd. & Johnson Rd.



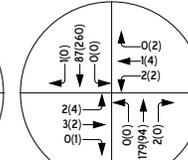
5 I-15 SB Ramps & Dale Evans Pkwy.



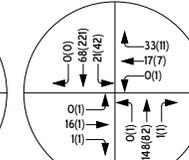
6 I-15 NB Ramps & Dale Evans Pkwy.



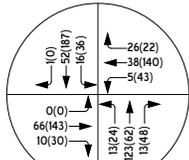
7 Dale Evans Pkwy. & Stoddard Wells Rd.



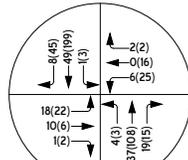
8 Dale Evans Pkwy. & Quarry Rd.



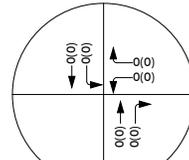
9 Dale Evans Pkwy. & Johnson Rd.



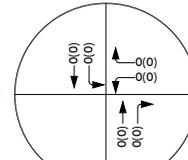
10 Dale Evans Pkwy. & Corwin Rd.



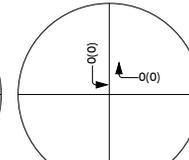
11 Dachshund Av. & West Driveway 1



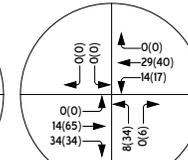
12 Dachshund Av. & West Driveway 2



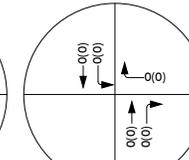
13 Dachshund Av. & Los Padres Rd.



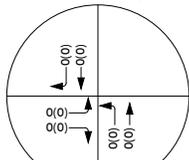
14 Navajo Rd. & Johnson Rd.



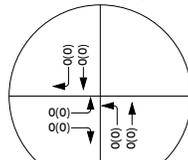
15 Navajo Rd. & East Driveway 1



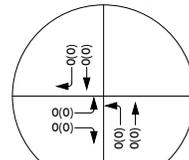
16 Navajo Rd. & West Driveway 3



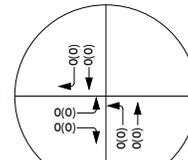
17 Navajo Rd. & West Driveway 4



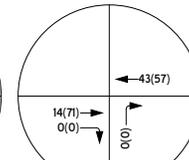
18 Navajo Rd. & West Driveway 5



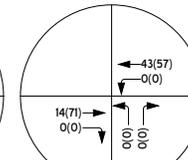
19 Navajo Rd. & Los Padres Rd.



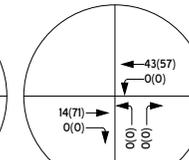
20 East Driveway 2 & Johnson Rd.



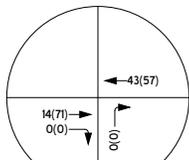
21 East Driveway 3 & Johnson Rd.



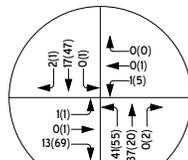
22 East Driveway 4 & Johnson Rd.



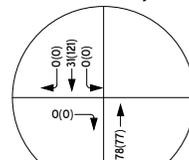
23 East Driveway 5 & Johnson Rd.



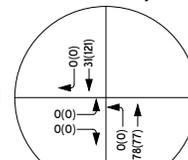
24 Central Rd. & Johnson Rd.



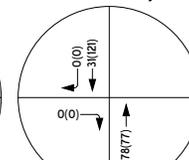
25 Central Rd. & East Driveway 6



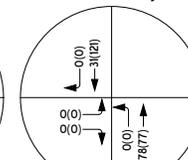
26 Central Rd. & East Driveway 7



27 Central Rd. & East Driveway 8



28 Central Rd. & East Driveway 9



29 Central Rd. & Waalew Rd.

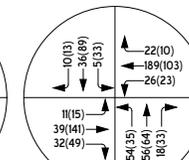
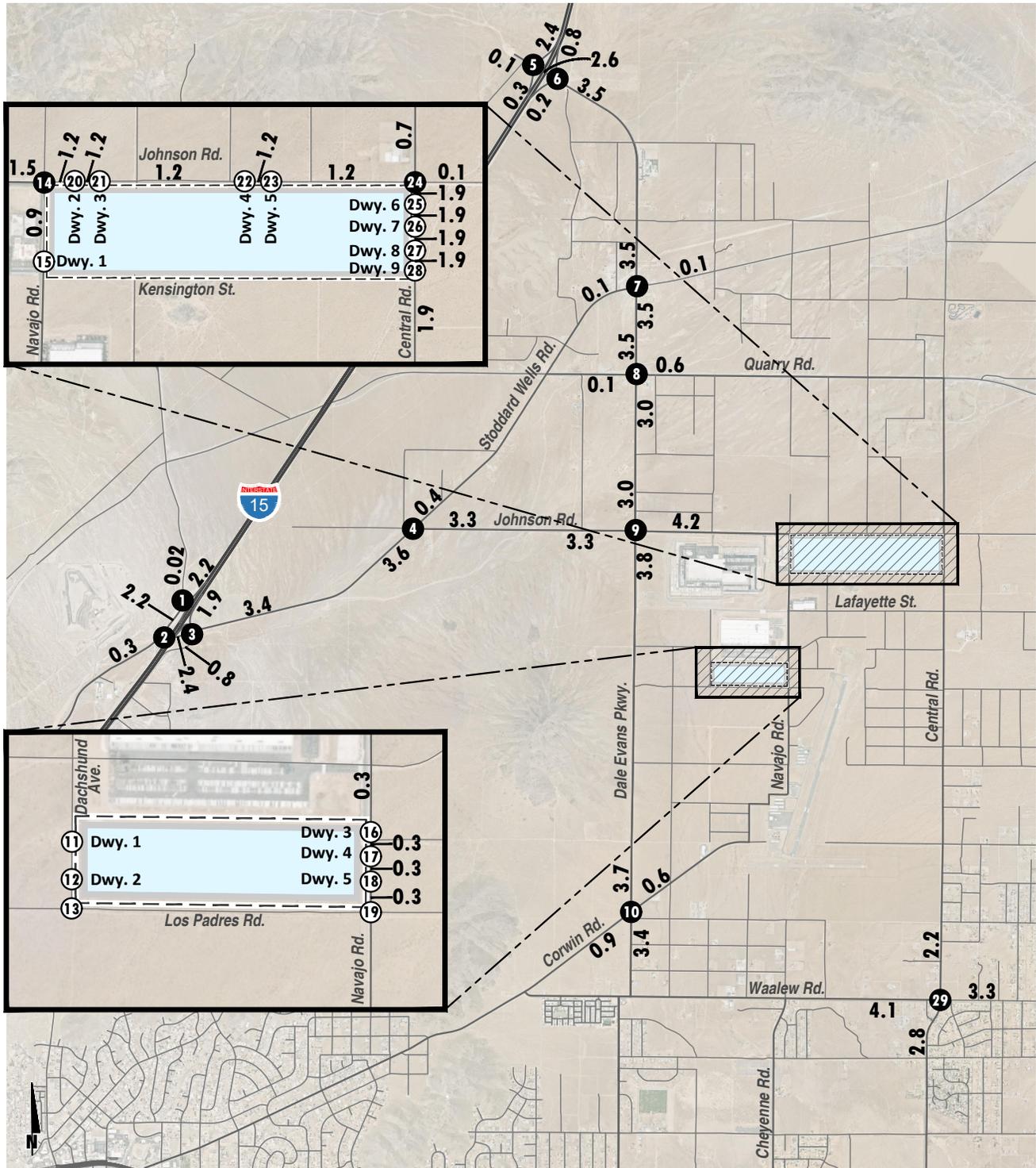


EXHIBIT 3-7 : EXISTING (2024) AVERAGE DAILY TRAFFIC (ADT)



**LEGEND:**

- ⊙ = Existing Intersection Analysis Location
- = Future Intersection Analysis Location
- 10 = ADT (In Thousands)

**TABLE 3-1: INTERSECTION ANALYSIS FOR EXISTING (2024) CONDITIONS**

| #  | Intersection                             | Traffic Control <sup>1</sup> | Delay <sup>2</sup><br>(secs.) |      | Level of Service |    |
|----|--|------------------------------|-------------------------------|------|------------------|----|
|    |  |                              | AM                            | PM   | AM               | PM |
| 1  | Quarry Rd. & I-15 SB Ramps               | CSS                          | 9.1                           | 10.0 | A                | A  |
| 2  | Quarry Rd. & Stoddard Wells Rd.          | CSS                          | 9.4                           | 10.7 | A                | B  |
| 3  | I-15 NB Ramps & Stoddard Wells Rd.       | CSS                          | 11.1                          | 21.6 | B                | C  |
| 4  | Stoddard Wells Rd. & Johnson Rd.         | CSS                          | 9.9                           | 12.5 | A                | B  |
| 5  | I-15 SB Ramps & Dale Evans Pkwy.         | CSS                          | 10.2                          | 11.1 | B                | B  |
| 6  | I-15 NB Ramps & Dale Evans Pkwy.         | CSS                          | 9.2                           | 10.3 | A                | B  |
| 7  | Dale Evans Pkwy. & Stoddard Wells Rd.    | CSS                          | 11.8                          | 12.3 | B                | B  |
| 8  | Dale Evans Pkwy. & Quarry Rd.            | CSS                          | 11.9                          | 11.8 | B                | B  |
| 9  | Dale Evans Pkwy. & Johnson Rd.           | AWS                          | 9.7                           | 16.4 | A                | C  |
| 10 | Dale Evans Pkwy. & Corwin Rd.            | AWS                          | 7.9                           | 8.7  | A                | A  |
| 11 | Dachshund Av. & West Driveway 1 (Future) |                              | Future Intersection           |      |                  |    |
| 12 | Dachshund Av. & West Driveway 2 (Future) |                              | Future Intersection           |      |                  |    |
| 13 | Dachshund Av. & Los Padres Rd. (Future)  |                              | Future Intersection           |      |                  |    |
| 14 | Navajo Rd. & Johnson Rd.                 | CSS                          | 9.4                           | 10.0 | A                | B  |
| 15 | Navajo Rd. & East Driveway 1 (Future)    |                              | Future Intersection           |      |                  |    |
| 16 | Navajo Rd. & West Driveway 3 (Future)    |                              | Future Intersection           |      |                  |    |
| 17 | Navajo Rd. & West Driveway 4 (Future)    |                              | Future Intersection           |      |                  |    |
| 18 | Navajo Rd. & West Driveway 5 (Future)    |                              | Future Intersection           |      |                  |    |
| 19 | Navajo Rd. & Los Padres Rd.              |                              | Future Intersection           |      |                  |    |
| 20 | East Driveway 2 & Johnson Rd. (Future)   |                              | Future Intersection           |      |                  |    |
| 21 | East Driveway 3 & Johnson Rd. (Future)   |                              | Future Intersection           |      |                  |    |
| 22 | East Driveway 4 & Johnson Rd. (Future)   |                              | Future Intersection           |      |                  |    |
| 23 | East Driveway 5 & Johnson Rd. (Future)   |                              | Future Intersection           |      |                  |    |
| 24 | Central Rd. & Johnson Rd.                | CSS                          | 9.8                           | 10.9 | A                | B  |
| 25 | Central Rd. & East Driveway 6 (Future)   |                              | Future Intersection           |      |                  |    |
| 26 | Central Rd. & East Driveway 7 (Future)   |                              | Future Intersection           |      |                  |    |
| 27 | Central Rd. & East Driveway 8 (Future)   |                              | Future Intersection           |      |                  |    |
| 28 | Central Rd. & East Driveway 9 (Future)   |                              | Future Intersection           |      |                  |    |
| 29 | Central Rd. & Waalew Rd.                 | AWS                          | 9.6                           | 9.8  | A                | A  |

<sup>1</sup> AWS = All-Way Stop; CSS = Cross-Street Stop

<sup>2</sup> Per the Highway Capacity Manual (7th Edition), 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.

### 3.9 QUEUING ANALYSIS

Queuing analysis findings are presented in Table 3-2. As shown in Table 3-2, there are currently no study area off-ramps experiencing queuing issues during the peak hours under Existing (2024) traffic conditions. Worksheets for Existing traffic conditions queuing analysis are provided in Appendix 3.4.

**TABLE 3-2: PEAK HOUR QUEUING SUMMARY FOR EXISTING (2024) CONDITIONS**

| Intersection                       | Movement | Available Stacking Distance (Feet) | 95th Percentile Queue (Feet) |              | Acceptable? <sup>1</sup> |     |
|------------------------------------|----------|------------------------------------|------------------------------|--------------|--------------------------|-----|
|                                    |          |                                    | AM Peak Hour                 | PM Peak Hour | AM                       | PM  |
| Quarry Rd. & I-15 SB Ramps         | WBL/R    | 1,000                              | 5                            | 8            | Yes                      | Yes |
| I-15 NB Ramps & Stoddard Wells Rd. | SBL/T/R  | 1,000                              | 20                           | 100          | Yes                      | Yes |
| I-15 SB Ramps & Dale Evans Pkwy.   | SBL/T/R  | 1,410                              | 15                           | 40           | Yes                      | Yes |
| I-15 NB Ramps & Dale Evans Pkwy.   | NBL/T/R  | 1,280                              | 5                            | 8            | Yes                      | Yes |

<sup>1</sup> Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

## 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 Project consists of the development of three industrial warehouse and distribution buildings within two sites totaling 3,729,100 square feet. The West site consists of a single 896,500-square-foot warehouse building located on the northwest corner of Navajo Road and Los Padres Road, which is immediately south of the existing Big Lots distribution center facility. The East site consists of two buildings (Building 1 with 1,631,800 square feet and Building 2 with 1,200,800 square feet) located on the southeast corner of Navajo Road and Johnson Road. For the purposes of the TA, the Project will assume 100% high-cube fulfillment center (non-sort facility) warehousing use. Access to the West site will be accommodated via two driveways along Dachshund Avenue and three driveways on Navajo Road. All driveways for the West site are assumed to allow for full access (no turn restrictions). The East site proposes a single driveway on Navajo Road, four driveways along Johnson Road, and four driveways along Central Road. Driveways 2, 5, 6, and 8 for the East site will be restricted to right-in/right-out access only. The Project is anticipated to have an Opening Year of 2027 (for all three buildings).

### 4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to, and produced by, a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to, and produced by, the specific land uses being proposed for a given development. In order to develop the traffic characteristics of the Project, trip-generation statistics published in the ITE Trip Generation Manual (11<sup>th</sup> Edition, 2021) were used. The following ITE land use code and vehicle mix has been utilized for the Project (Table 4-1 presents the trip generation rates):

- High-Cube Fulfillment Center Warehouse (ITE Land Use Code 155) has been used to derive site-specific trip generation estimates for the proposed Project. The ITE Trip Generation Manual has trip generation rates for high-cube fulfillment center use for both non-sort and sort facilities (ITE Land Use Code 155). As defined by ITE, a high-cube warehouse is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical high-cube warehouse has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the high-cube warehouse. The ITE Trip Generation Manual has two subcategories for the High-Cube Fulfillment Center use: sort and non-sort. ITE describes a sort facility as a fulfillment center that ships out smaller items, requiring extensive sorting, typically by manual means. In comparison, a non-sort facility is a fulfillment center that ships large box items that are processed primarily with automation rather than through manual means. Some limited assembly and repackaging may occur within the facility. Given this description, a non-sort facility has been assumed for the purposes of calculating trip generation for the Project. The vehicle mix (passenger cars versus trucks) has been obtained from the ITE's Trip Generation Manual. The truck percentages were further broken down by axle type per the following the South Coast Air Quality Management District (SCAQMD) recommended truck mix: 2-Axle = 16.7%; 3-Axle = 20.7%; 4+-Axle = 62.6%.

**TABLE 4-1: PROJECT TRIP GENERATION RATES**

| Land Use <sup>1</sup>                                       | Units <sup>2</sup> | ITE LU Code | AM Peak Hour |       |       | PM Peak Hour |       |       | Daily |
|---|--------------------|-------------|--------------|-------|-------|--------------|-------|-------|-------|
|   |                    |             | In           | Out   | Total | In           | Out   | Total |       |
| <b>Actual Vehicle Trip Generation Rates</b>                 |                    |             |              |       |       |              |       |       |       |
| High-Cube Fulfillment Center (Non-Sort) <sup>3</sup>        | TSF                | 155         | 0.122        | 0.028 | 0.150 | 0.062        | 0.098 | 0.160 | 1.810 |
| Passenger Cars (AM=86.7%, PM=93.8%, Daily=87.3%)            |                    |             | 0.112        | 0.018 | 0.130 | 0.057        | 0.093 | 0.150 | 1.580 |
| 2-Axle Trucks (AM=2.2%, PM=1.0%, Daily=2.1%)                |                    |             | 0.002        | 0.001 | 0.003 | 0.001        | 0.001 | 0.002 | 0.038 |
| 3-Axle Trucks (AM=2.8%, PM=1.3%, Daily=2.6%)                |                    |             | 0.002        | 0.002 | 0.004 | 0.001        | 0.001 | 0.002 | 0.048 |
| 4+-Axle Trucks (AM=8.3%, PM=3.9%, Daily=8.0%)               |                    |             | 0.006        | 0.007 | 0.013 | 0.003        | 0.003 | 0.006 | 0.144 |
| <b>Passenger Car Equivalent (PCE) Trip Generation Rates</b> |                    |             |              |       |       |              |       |       |       |
| High-Cube Fulfillment Center (Non-Sort) <sup>3</sup>        | TSF                | 155         | 0.122        | 0.028 | 0.150 | 0.062        | 0.098 | 0.160 | 1.810 |
| Passenger Cars  |                    |             | 0.112        | 0.018 | 0.130 | 0.057        | 0.093 | 0.150 | 1.580 |
| 2-Axle Trucks (PCE = 1.5)                                   |                    |             | 0.003        | 0.002 | 0.005 | 0.002        | 0.001 | 0.003 | 0.058 |
| 3-Axle Trucks (PCE = 2.0)                                   |                    |             | 0.005        | 0.005 | 0.010 | 0.003        | 0.003 | 0.005 | 0.119 |
| 4+-Axle Trucks (PCE = 3.0)                                  |                    |             | 0.018        | 0.020 | 0.038 | 0.009        | 0.010 | 0.019 | 0.432 |

<sup>1</sup> Trip Generation & Vehicle Mix Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).

<sup>2</sup> TSF = thousand square feet

<sup>3</sup> Truck Mix: South Coast Air Quality Management District's (SCAQMD) recommended truck mix, by axle type.  
Normalized % - Without Cold Storage: 16.7% 2-Axle trucks, 20.7% 3-Axle trucks, 62.6% 4-Axle trucks.

Based on the trip generation rates shown in Table 4-1, the Project trip generation has been calculated in Table 4-2. As shown in Table 4-2, the West site is anticipated to generate 1,624 two-way vehicle trip-ends per day with 135 AM peak hour trips and 144 PM peak hour trips and the East site is anticipated to generate 5,130 two-way vehicle trip-ends per day with 425 AM peak hour trips and 453 PM peak hour trips. The Project is anticipated to generate a net total of 6,754 two-way vehicle trip-ends per day with 560 AM peak hour trips and 597 PM peak hour trips (actual vehicles).

PCE factors were applied to the trip generation rates for heavy trucks (large 2-axles, 3-axles, 4+-axles). PCEs allow the typical "real-world" mix of vehicle types to be represented as a single, standardized unit, such as the passenger car, to be used for the purposes of capacity and level of service analyses. The PCE factors are consistent with the recommended PCE factors in the County's Guidelines.

Table 4-3 shows the resulting Project trip generation summary in PCE, which shows the West site is anticipated to generate 1,964 two-way PCE vehicle trip-ends per day with 165 PCE AM peak hour trips and 157 PCE PM peak hour trips and the East site is anticipated to generate 6,202 two-way PCE vehicle trip-ends per day with 517 PCE AM peak hour trips and 500 PCE PM peak hour trips. The Project is anticipated to generate a net total of 8,166 two-way PCE vehicle trip-ends per day with 682 PCE AM peak hour trips and 657 PCE PM peak hour trips.

## 4.2 PROJECT TRIP DISTRIBUTION

The Project trip distribution represents the directional orientation of traffic to and from the Project site. 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 trip distribution represents the directional orientation of traffic to and from the Project site. The Project trip distributions are shown on Exhibit 4-1 for trucks and Exhibit 4-2 for passenger cars. The Project truck trip distribution patterns adhere to the Town's approved truck routes and were part of the TA scoping process (see Appendix 1.1). The trip distributions are based on existing travel patterns (verified via StreetLight data).

**TABLE 4-2: PROJECT TRIP GENERATION SUMMARY (ACTUAL VEHICLES)**

| Land Use   | Quantity Units <sup>1</sup> | AM Peak Hour |            |            | PM Peak Hour |            |            | Daily        |
|--|-----------------------------|--------------|------------|------------|--------------|------------|------------|--------------|
|  |                             | In           | Out        | Total      | In           | Out        | Total      |              |
| <b>Actual Vehicles:</b>                                  |                             |              |            |            |              |            |            |              |
| West Site: High-Cube Fulfillment (Non-Sort)              | 896.500 TSF                 |              |            |            |              |            |            |              |
| Passenger Cars:  |                             | 100          | 16         | 117        | 51           | 83         | 134        | 1,416        |
| 2-axle Trucks:   |                             | 2            | 1          | 3          | 1            | 1          | 1          | 34           |
| 3-axle Trucks:   |                             | 2            | 2          | 4          | 1            | 1          | 2          | 44           |
| 4+-axle Trucks:  |                             | 5            | 6          | 11         | 3            | 3          | 6          | 130          |
| Total Truck Trips (Actual Vehicles):                     |                             | 9            | 9          | 18         | 5            | 5          | 10         | 208          |
| West Site Total Trips (Actual Vehicles) <sup>2</sup>     |                             | 109          | 25         | 135        | 56           | 88         | 144        | 1,624        |
| East Site: High-Cube Fulfillment (Non-Sort)              | 2,832.600 TSF               |              |            |            |              |            |            |              |
| Passenger Cars:  |                             | 317          | 51         | 368        | 161          | 263        | 425        | 4,476        |
| 2-axle Trucks:   |                             | 6            | 4          | 9          | 3            | 2          | 5          | 110          |
| 3-axle Trucks:   |                             | 6            | 6          | 12         | 3            | 3          | 6          | 136          |
| 4+-axle Trucks:  |                             | 17           | 18         | 35         | 8            | 9          | 18         | 408          |
| Total Truck Trips (Actual Vehicles):                     |                             | 29           | 28         | 57         | 14           | 14         | 28         | 654          |
| East Site Total Trips (Actual Vehicles) <sup>2</sup>     |                             | 346          | 79         | 425        | 175          | 277        | 453        | 5,130        |
| Passenger Cars:  |                             | 417          | 67         | 485        | 212          | 346        | 559        | 5,892        |
| Total Truck Trips (Actual Vehicles):                     |                             | 38           | 37         | 75         | 19           | 19         | 38         | 862          |
| <b>Project Total Trips (Actual Vehicles)<sup>2</sup></b> |                             | <b>455</b>   | <b>104</b> | <b>560</b> | <b>231</b>   | <b>365</b> | <b>597</b> | <b>6,754</b> |

<sup>1</sup> TSF = thousand square feet

<sup>2</sup> Total Trips = Passenger Cars + Truck Trips.

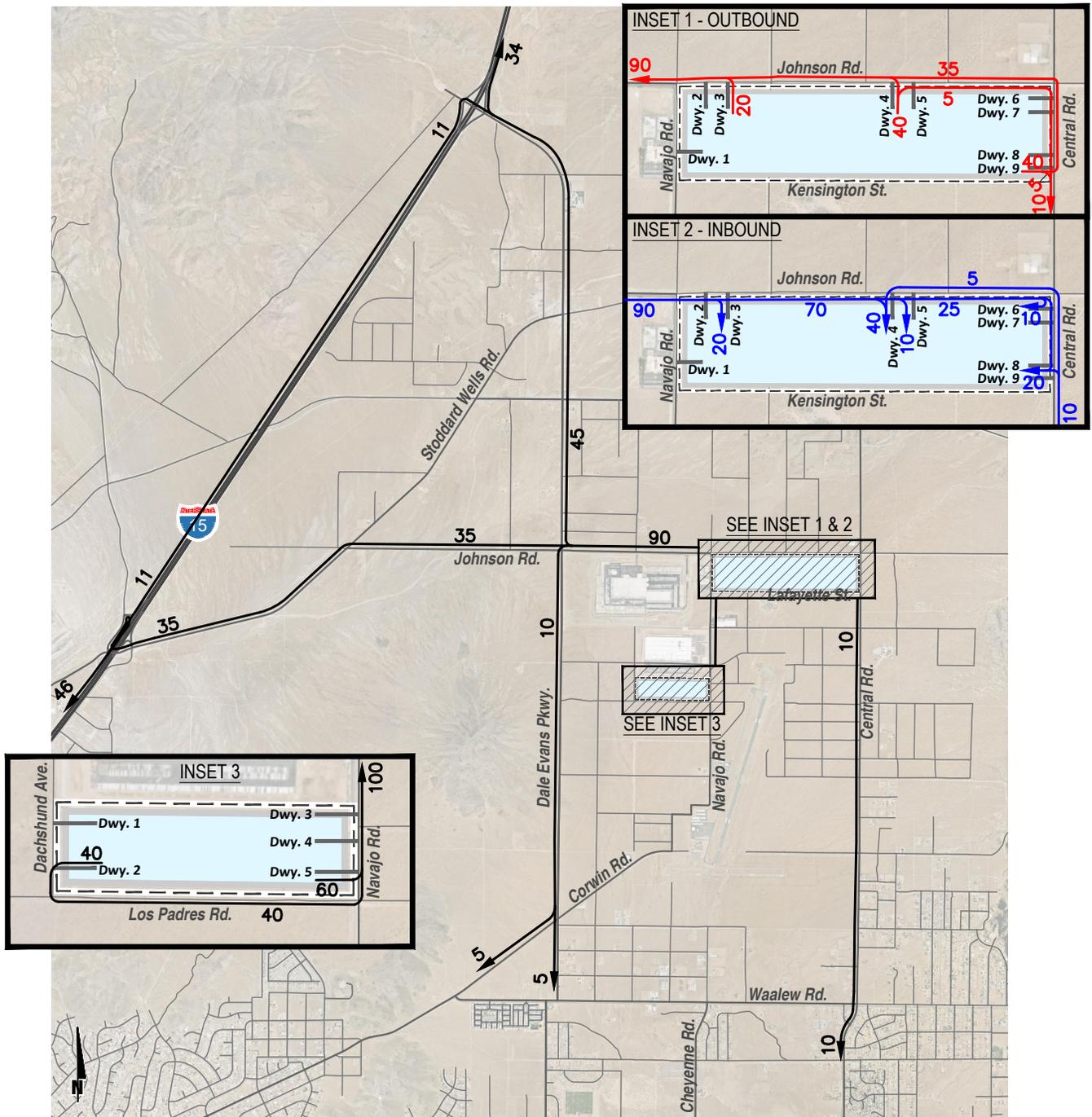
**TABLE 4-3: PROJECT TRIP GENERATION SUMMARY (PCE)**

| Land Use                                     | Quantity Units <sup>1</sup> | AM Peak Hour |            |            | PM Peak Hour |            |            | Daily        |
|--|-----------------------------|--------------|------------|------------|--------------|------------|------------|--------------|
|  |                             | In           | Out        | Total      | In           | Out        | Total      |              |
| <b>Passenger Car Equivalent (PCE):</b>       |                             |              |            |            |              |            |            |              |
| West Site: High-Cube Fulfillment (Non-Sort)  | 896.500 TSF                 |              |            |            |              |            |            |              |
| Passenger Cars:                              |                             | 100          | 16         | 117        | 51           | 83         | 134        | 1,416        |
| 2-axle Trucks:                               |                             | 3            | 2          | 4          | 1            | 1          | 2          | 52           |
| 3-axle Trucks:                               |                             | 4            | 5          | 9          | 2            | 2          | 5          | 108          |
| 4+-axle Trucks:                              |                             | 16           | 18         | 34         | 8            | 9          | 17         | 388          |
| Total Truck Trips (PCE):                     |                             | 23           | 25         | 48         | 11           | 12         | 23         | 548          |
| West Site Total Trips (PCE) <sup>2</sup>     |                             | 123          | 41         | 165        | 62           | 95         | 157        | 1,964        |
| East Site: High-Cube Fulfillment (Non-Sort)  | 2,832.600 TSF               |              |            |            |              |            |            |              |
| Passenger Cars:                              |                             | 317          | 51         | 368        | 161          | 263        | 425        | 4,476        |
| 2-axle Trucks:                               |                             | 8            | 6          | 14         | 4            | 3          | 7          | 164          |
| 3-axle Trucks:                               |                             | 14           | 15         | 29         | 7            | 8          | 15         | 338          |
| 4+-axle Trucks:                              |                             | 51           | 55         | 106        | 25           | 28         | 53         | 1,224        |
| Total Truck Trips (PCE):                     |                             | 73           | 76         | 149        | 36           | 39         | 75         | 1,726        |
| East Site Total Trips (PCE) <sup>2</sup>     |                             | 390          | 127        | 517        | 197          | 302        | 500        | 6,202        |
| Passenger Cars:                              |                             | 417          | 67         | 485        | 212          | 346        | 559        | 5,892        |
| Total Truck Trips (PCE):                     |                             | 96           | 101        | 197        | 47           | 51         | 98         | 2,274        |
| <b>Project Total Trips (PCE)<sup>2</sup></b> |                             | <b>513</b>   | <b>168</b> | <b>682</b> | <b>259</b>   | <b>397</b> | <b>657</b> | <b>8,166</b> |

<sup>1</sup> TSF = thousand square feet

<sup>2</sup> Total Trips = Passenger Cars + Truck Trips.

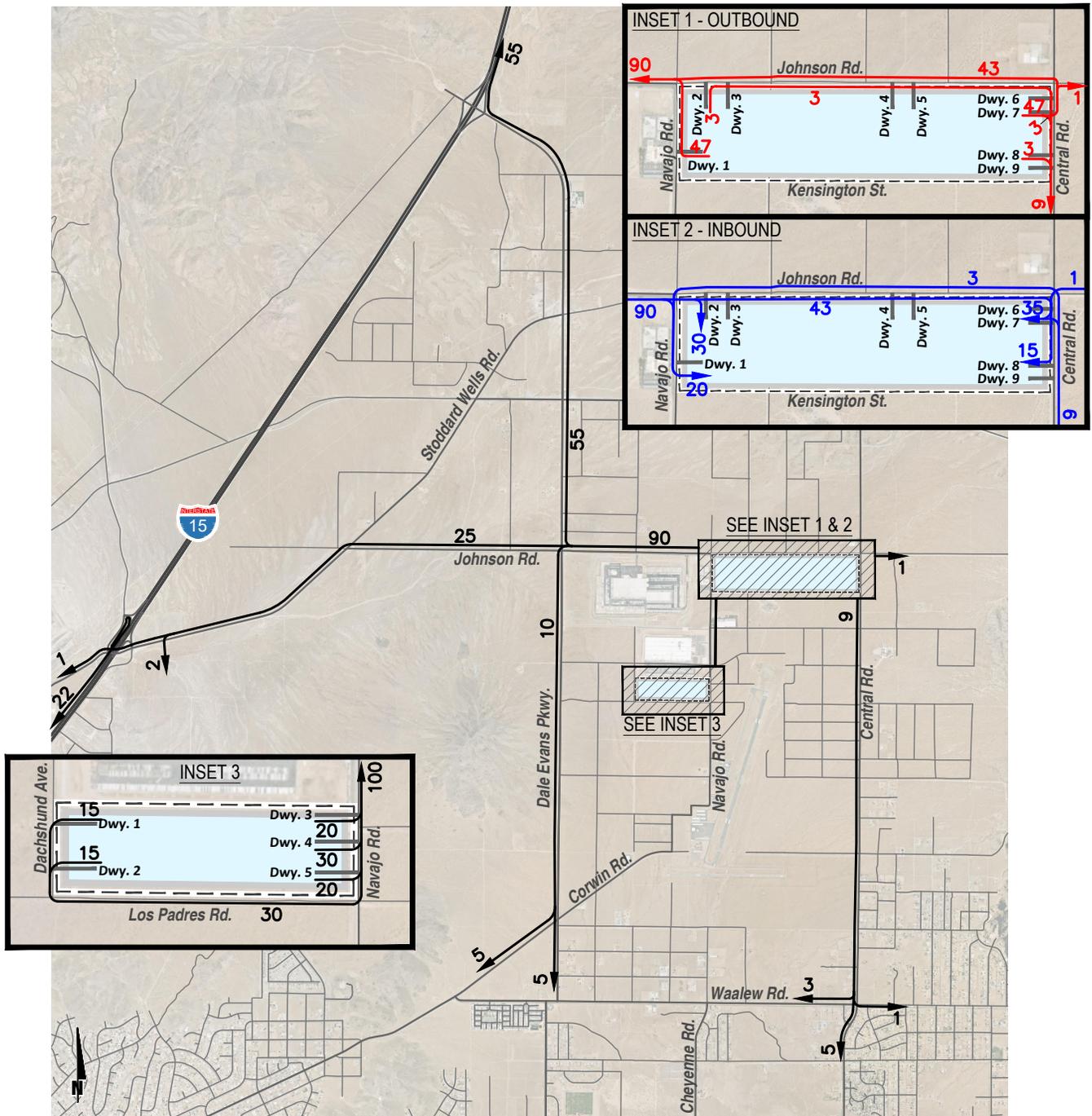
EXHIBIT 4-1 : PROJECT (TRUCKS) TRIP DISTRIBUTION



**LEGEND:**

- 10 = Truck Percent To/From Project
- = Outbound Trip Distribution
- ← = Inbound Trip Distribution

EXHIBIT 4-2 : PROJECT (PASSENGER CAR) TRIP DISTRIBUTION



**LEGEND:**

- 10 = Passenger Car Percent To/From Project
- = Outbound Trip Distribution
- ← = Inbound Trip Distribution

### 4.3 MODAL SPLIT

The potential for Project trips to be reduced by the use of public transit, walking, or bicycling have not been included as part of the Project's estimated trip generation. Essentially, the Project's traffic projections are "conservative" in that these alternative travel modes would reduce the forecasted traffic volumes.

### 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. Based on the identified Project traffic generation and trip distribution patterns, Project weekday peak hour intersection turn movement volumes and ADT, in actual vehicles, are shown on Exhibits 4-3 and 4-4, respectively.

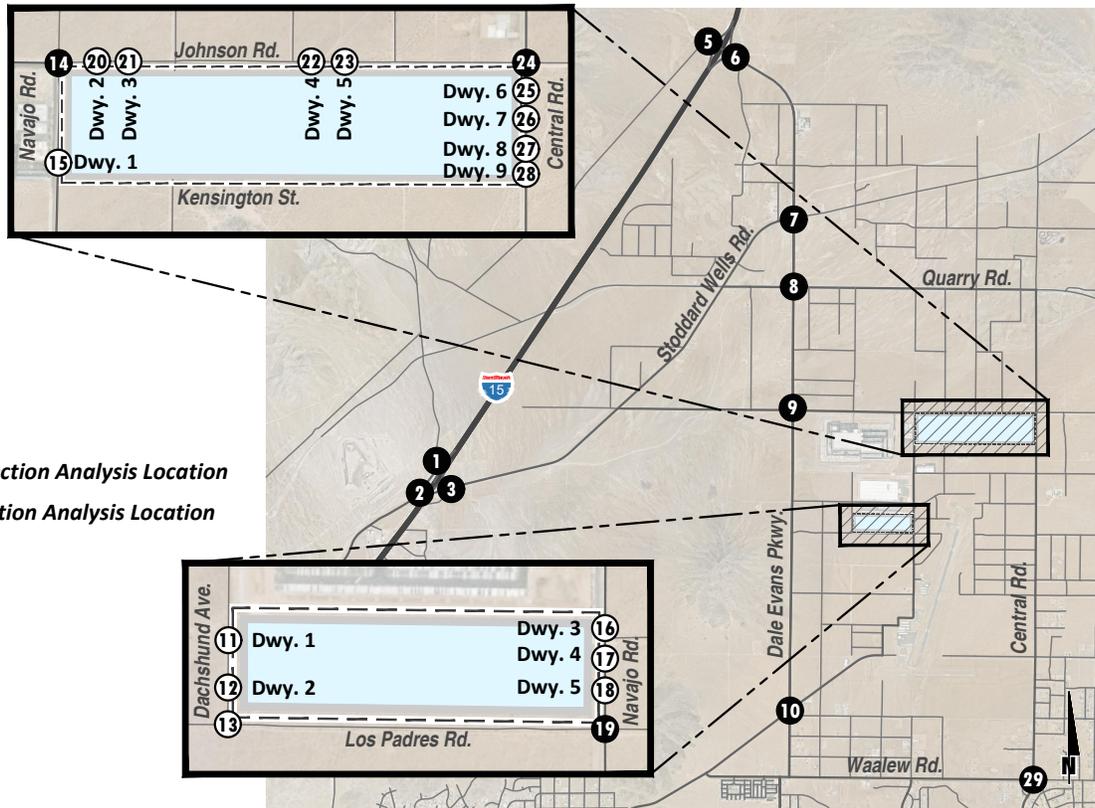
### 4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 2.0% per year, compounded annually. The total ambient growth is 6.12% for 2027 traffic. The ambient growth factor is intended to approximate regional traffic growth. This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies. The traffic generated by the proposed Project is manually added to the base volume to determine Opening Year Cumulative forecasts.

The traffic analysis includes the following traffic conditions, with the various traffic components:

- Opening Year Cumulative (2027) Without Project
  - Existing 2024 volumes
  - Ambient growth traffic (6.12%)
  - Cumulative Development traffic
- Opening Year Cumulative (2027) With Project
  - Existing 2024 volumes
  - Ambient growth traffic (6.12%)
  - Cumulative Development traffic
  - Project Traffic

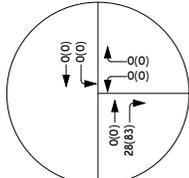
EXHIBIT 4-3 : PROJECT ONLY PEAK HOUR INTERSECTION VOLUMES



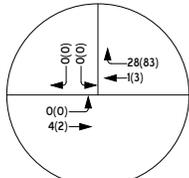
LEGEND:

- ① = Existing Intersection Analysis Location
- ② = Future Intersection Analysis Location

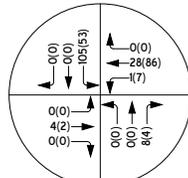
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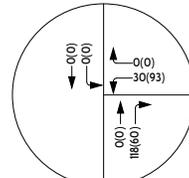
2 Quarry Rd. & Stoddard Wells Rd.



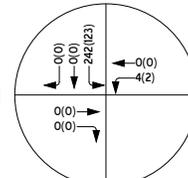
3 I-15 NB Ramps & Stoddard Wells Rd.



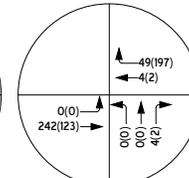
4 Stoddard Wells Rd. & Johnson Rd.



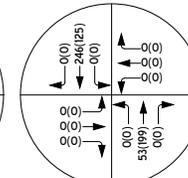
5 I-15 SB Ramps & Dale Evans Pkwy.



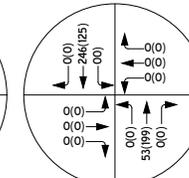
6 I-15 NB Ramps & Dale Evans Pkwy.



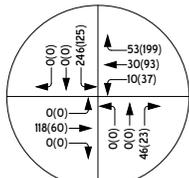
7 Dale Evans Pkwy. & Stoddard Wells Rd.



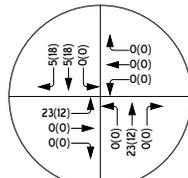
8 Dale Evans Pkwy. & Quarry Rd.



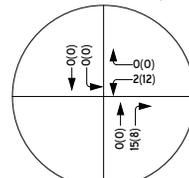
9 Dale Evans Pkwy. & Johnson Rd.



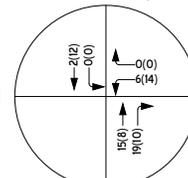
10 Dale Evans Pkwy. & Corwin Rd.



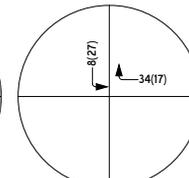
11 Dachshund Av. & West Driveway 1



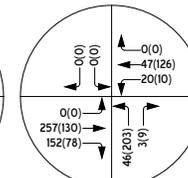
12 Dachshund Av. & West Driveway 2



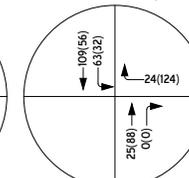
13 Dachshund Av. & Los Padres Rd.



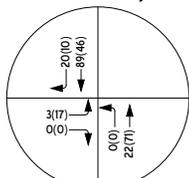
14 Navajo Rd. & Johnson Rd.



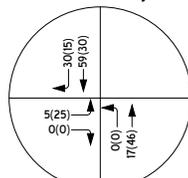
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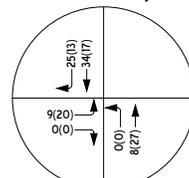
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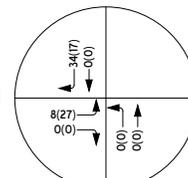
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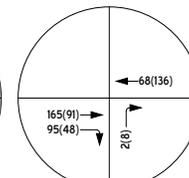
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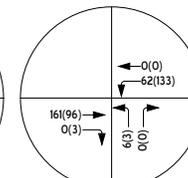
19 Navajo Rd. & Los Padres Rd.



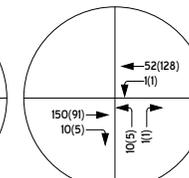
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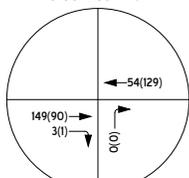
21 East Driveway 3 & Johnson Rd.



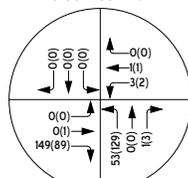
22 East Driveway 4 & Johnson Rd.



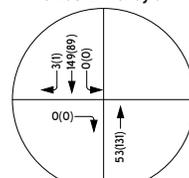
23 East Driveway 5 & Johnson Rd.



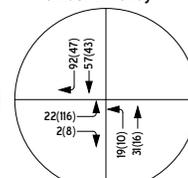
24 Central Rd. & Johnson Rd.



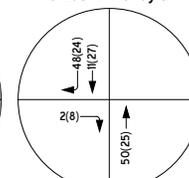
25 Central Rd. & East Driveway 6



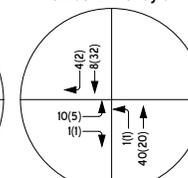
26 Central Rd. & East Driveway 7



27 Central Rd. & East Driveway 8



28 Central Rd. & East Driveway 9



29 Central Rd. & Waalew Rd.

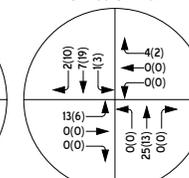
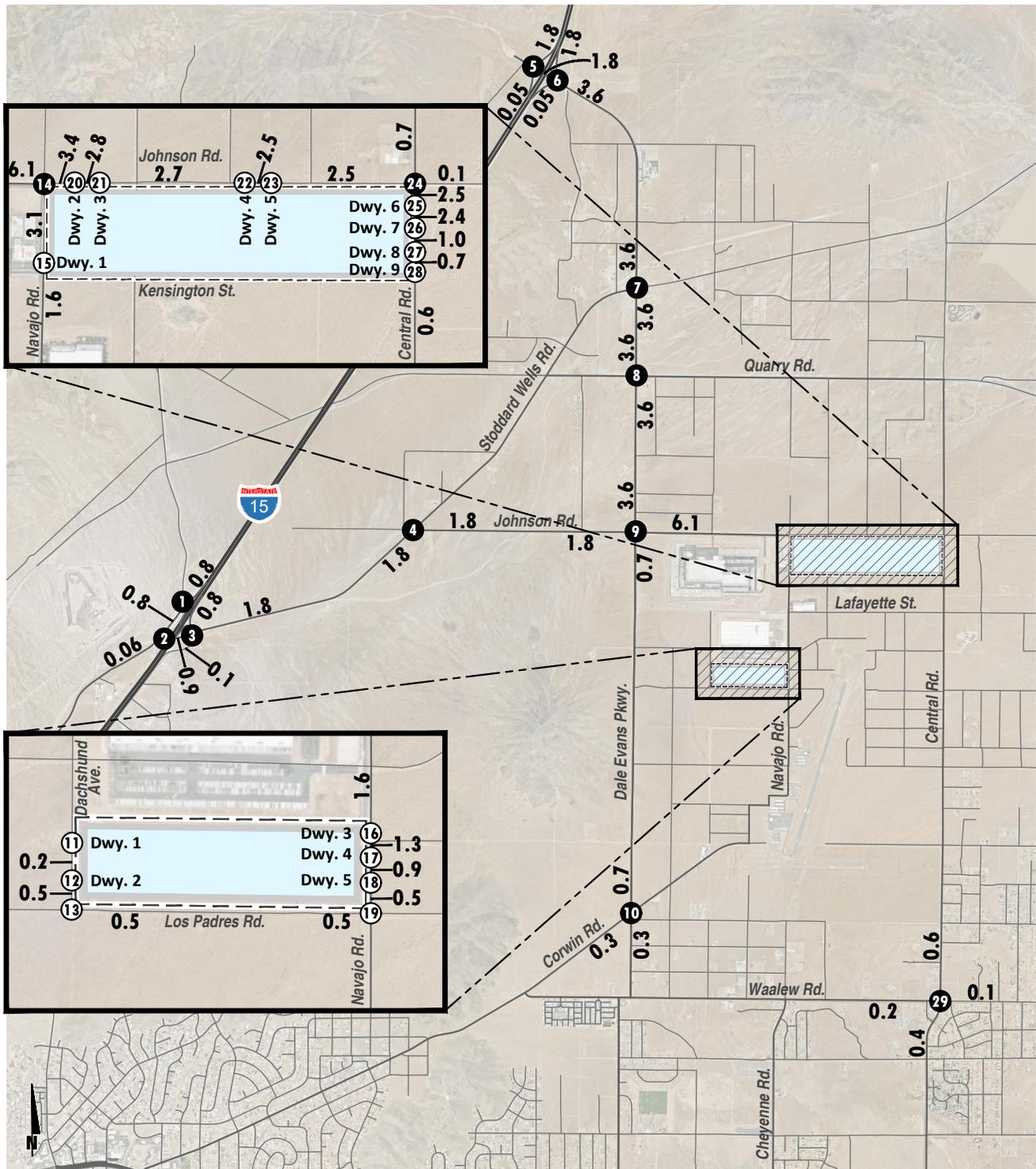


EXHIBIT 4-4 : PROJECT ONLY AVERAGE DAILY TRAFFIC (ADT)



**LEGEND:**

- ⊙ = Existing Intersection Analysis Location
- = Future Intersection Analysis Location
- 10 = ADT (In Thousands)

## 4.6 CUMULATIVE DEVELOPMENT TRAFFIC

A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the Town of Apple Valley. The cumulative projects listed are those that would generate traffic and would contribute traffic to study area intersections. Exhibit 4-5 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown in Table 4-4. If applicable, the traffic generated by individual cumulative projects was manually added to the Opening Year Cumulative (2027) forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-3 is reflected as part of the background traffic. In an effort to conduct a conservative analysis, the cumulative projects are added in conjunction with the ambient growth identified in Section 4.5 *Background Traffic*. Cumulative peak hour intersection turning movement volumes and ADT are shown on Exhibits 4-6 and 4-7, respectively.

**TABLE 4-4: CUMULATIVE DEVELOPMENT LAND USE SUMMARY**

| ID | Project Name   | Land Use                           | Quantity  | Units <sup>1</sup> |
|----|--|------------------------------------|-----------|--------------------|
| 1  | Apple Valley 143 (Covington)                             | High-Cube Fulfillment Center       | 2,518.500 | TSF                |
| 2  | Lafayette Street Logistics Facility (Redwood Industrial) | High-Cube Fulfillment Center       | 1,026.412 | TSF                |
|    |  | High-Cube Cold Storage             | 181.132   | TSF                |
| 3  | Love's Travel Center                                     | Travel Center                      | 25        | VFP                |
|    |  | Recreational Vehicle Stop          | 80        | Spaces             |
| 4  | Inland Empire Logistics Center                           | High-Cube Fulfillment Center       | 2,600.000 | TSF                |
| 5  | Quarry Pawnee Complex                                    | High-Cube Fulfillment Center       | 1,460.000 | TSF                |
| 6  | Cordova Complex  | High-Cube Fulfillment Center       | 1,560.000 | TSF                |
| 7  | Green Trucking Solutions Cold Storage                    | High-Cube Cold Storage             | 385.004   | TSF                |
| 8  | TTM No. 20306  | Single Family Detached Residential | 160       | DU                 |
| 9  | 1M Warehouse   | High-Cube Fulfillment Center       | 1,080.000 | TSF                |
| 10 | Lake Creek Logistics Center                              | General Light Industrial           | 348.074   | TSF                |
|    |  | High-Cube Fulfillment Center       | 2,784.588 | TSF                |
|    |  | High-Cube Cold Storage             | 348.074   | TSF                |
| 11 | Cordova Road Logistics Facility (Redwood West Cordova)   | High-Cube Fulfillment Center       | 1,144.330 | TSF                |
|    |  | High-Cube Cold Storage             | 201.940   | TSF                |
| 12 | Central Business Center (AV 3PL Site 1)                  | Warehousing                        | 2134.000  | TSF                |
| 13 | AV 3PL Site 2  | Warehousing                        | 2,134.000 | TSF                |
| 14 | North Apple Valley Industrial Park                       | Warehousing                        | 5,821.709 | TSF                |

<sup>1</sup> DU = Dwelling Units; TSF = Thousand Square Feet; VFP = Vehicle Fueling Positions

EXHIBIT 4-5 : CUMULATIVE DEVELOPMENT LOCATION MAP

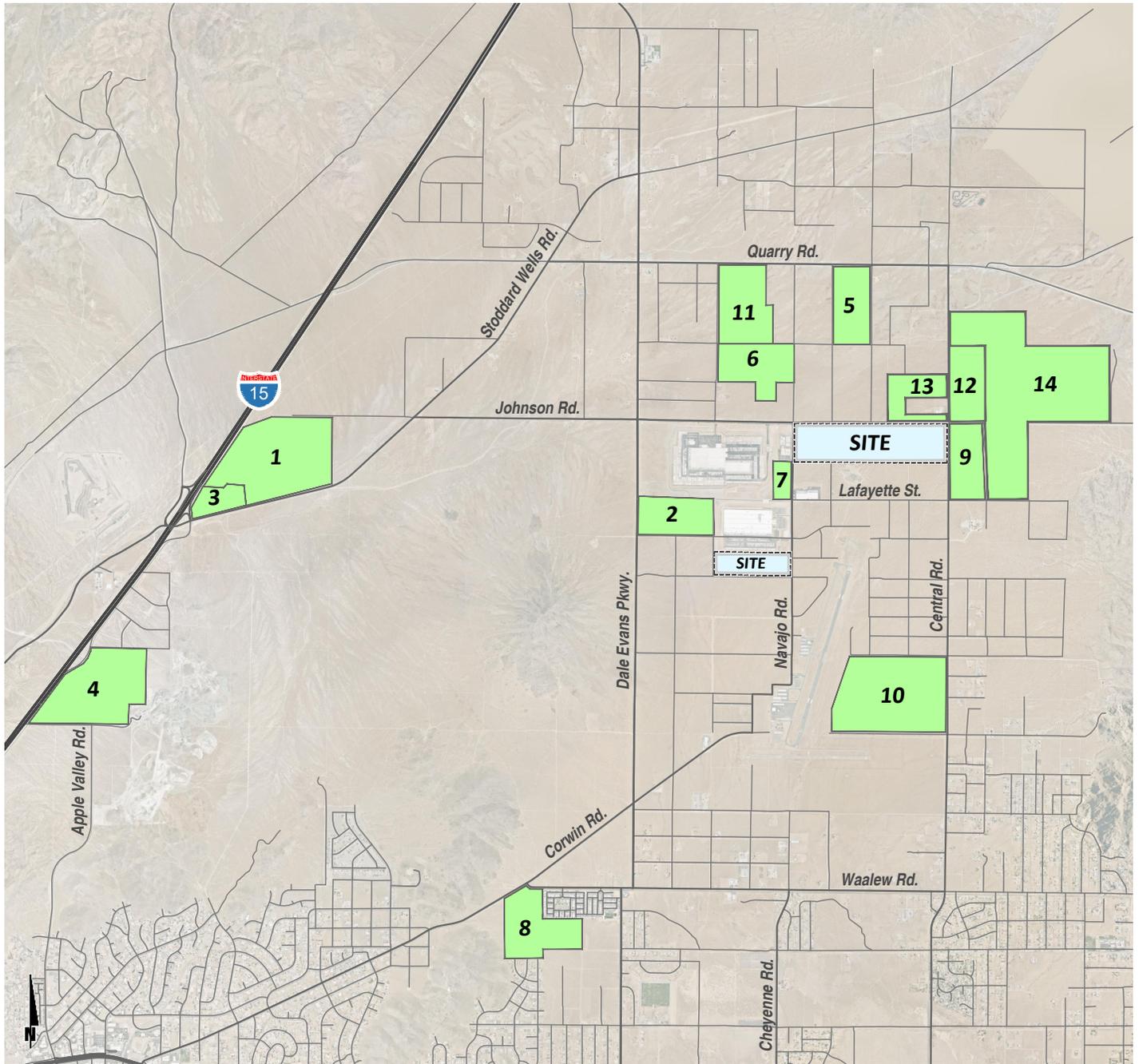
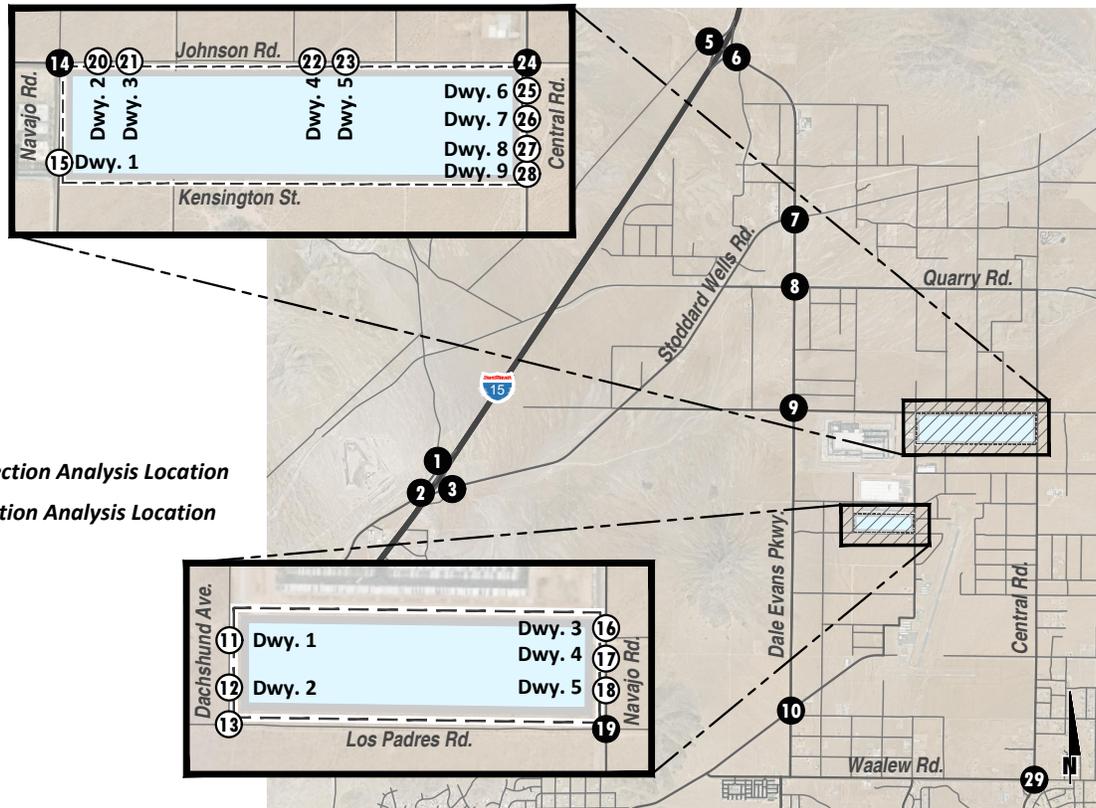


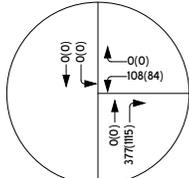
EXHIBIT 4-6 : CUMULATIVE ONLY PEAK HOUR INTERSECTION VOLUMES



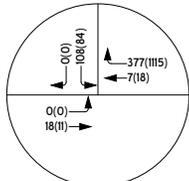
LEGEND:

- = Existing Intersection Analysis Location
- = Future Intersection Analysis Location

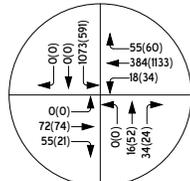
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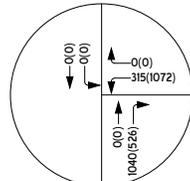
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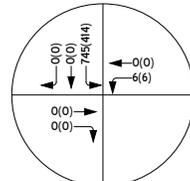
3 I-15 NB Ramps & Stoddard Wells Rd.



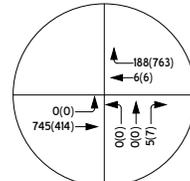
4 Stoddard Wells Rd. & Johnson Rd.



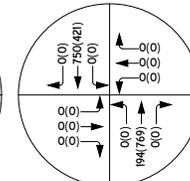
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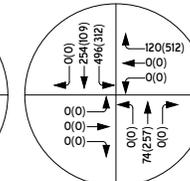
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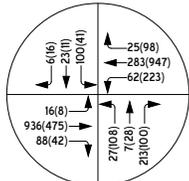
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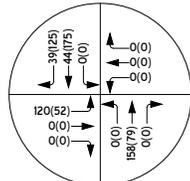
8 Dale Evans Pkwy. & Quarry Rd.



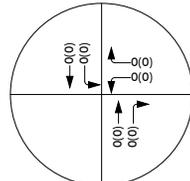
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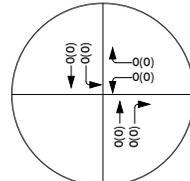
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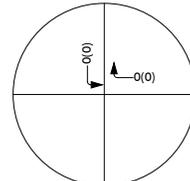
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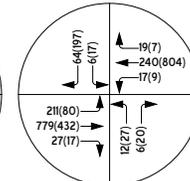
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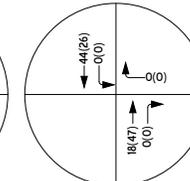
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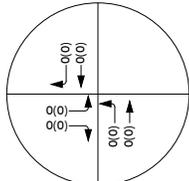
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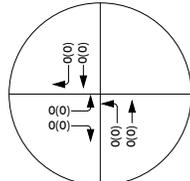
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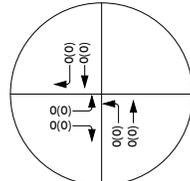
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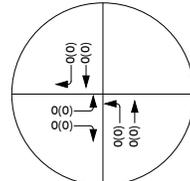
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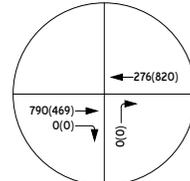
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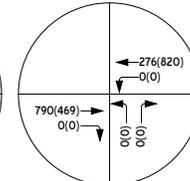
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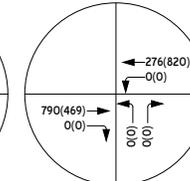
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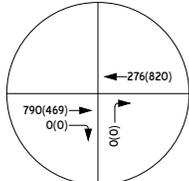
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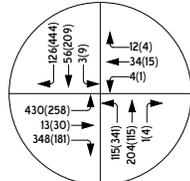
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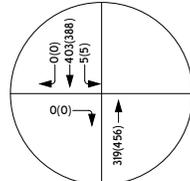
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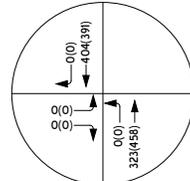
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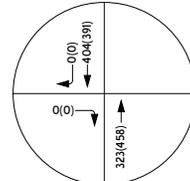
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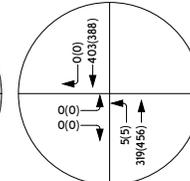
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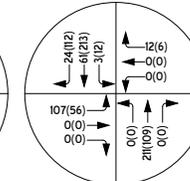
27 Central Rd. & East Driveway 8



28 Central Rd. & East Driveway 9



29 Central Rd. & Waalew Rd.





## 5 OPENING YEAR CUMULATIVE (2027) TRAFFIC CONDITIONS

This section discusses the methods used to develop Opening Year Cumulative (2027) Without and With Project traffic forecasts, and the resulting intersection operations, traffic signal warrant, and freeway off-ramp queuing analyses.

### 5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2027) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- 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).
- If applicable, driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative conditions only.

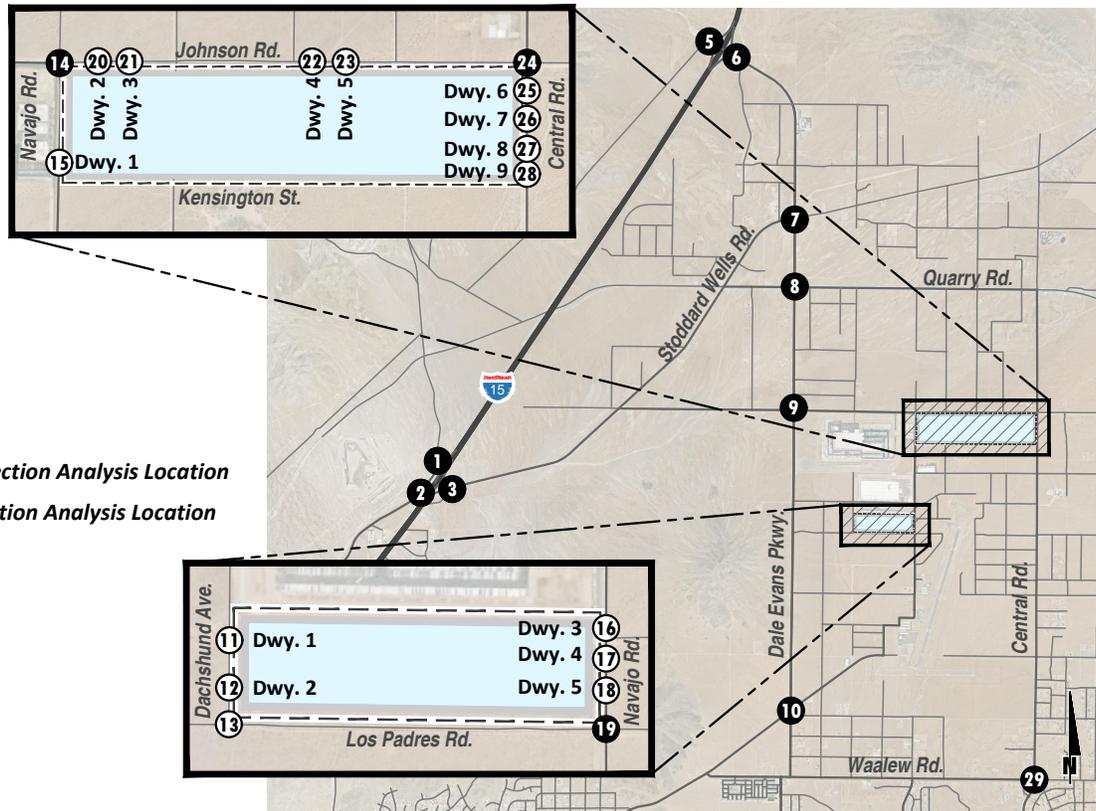
### 5.2 WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes, plus an ambient growth rate of 6.12%, plus traffic from pending and approved but not yet constructed known development projects in the area. The weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2027) Without Project traffic conditions are shown on Exhibit 5-1. The weekday ADT which can be expected for Opening Year Cumulative (2027) Without Project traffic conditions are shown on Exhibit 5-2.

### 5.3 WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Opening Year Cumulative (2027) Without Project traffic in conjunction with the addition of Project traffic. The weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2027) With Project traffic conditions are shown on Exhibit 5-3. The weekday ADT which can be expected for Opening Year Cumulative (2027) With Project traffic conditions are shown on Exhibit 5-4.

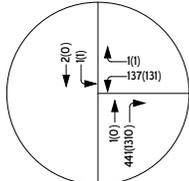
EXHIBIT 5-1 : OPENING YEAR CUMULATIVE (2027) WITHOUT PROJECT PEAK HOUR INTERSECTION VOLUMES



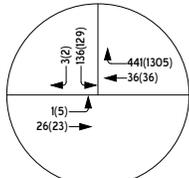
LEGEND:

- ① = Existing Intersection Analysis Location
- ② = Future Intersection Analysis Location

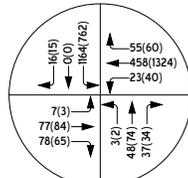
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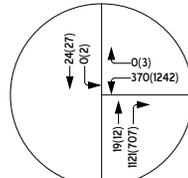
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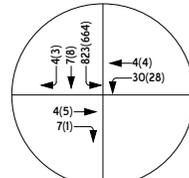
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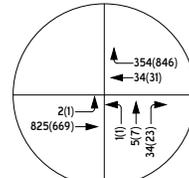
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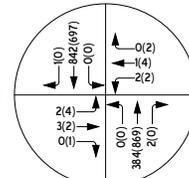
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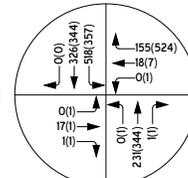
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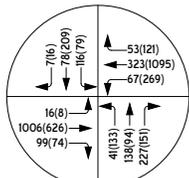
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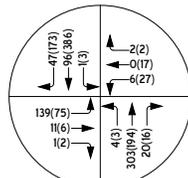
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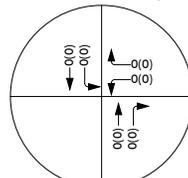
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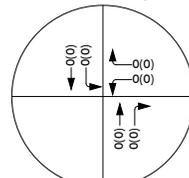
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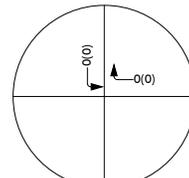
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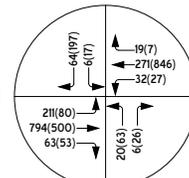
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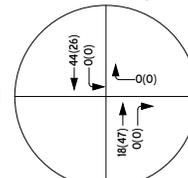
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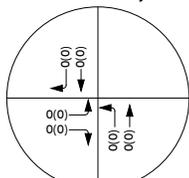
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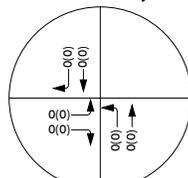
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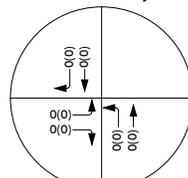
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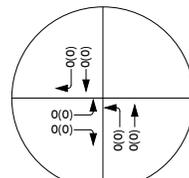
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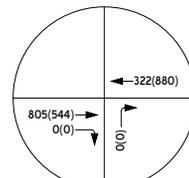
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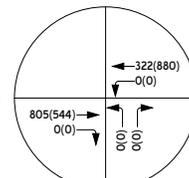
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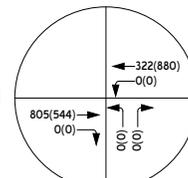
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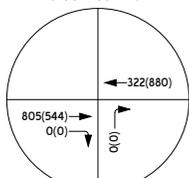
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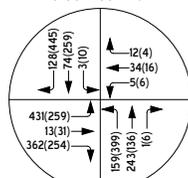
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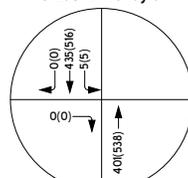
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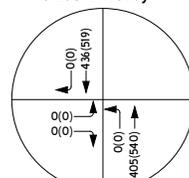
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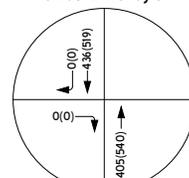
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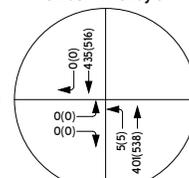
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27 Central Rd. & East Driveway 8



28 Central Rd. & East Driveway 9



29 Central Rd. & Waalew Rd.

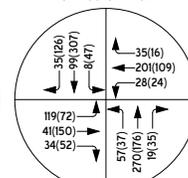
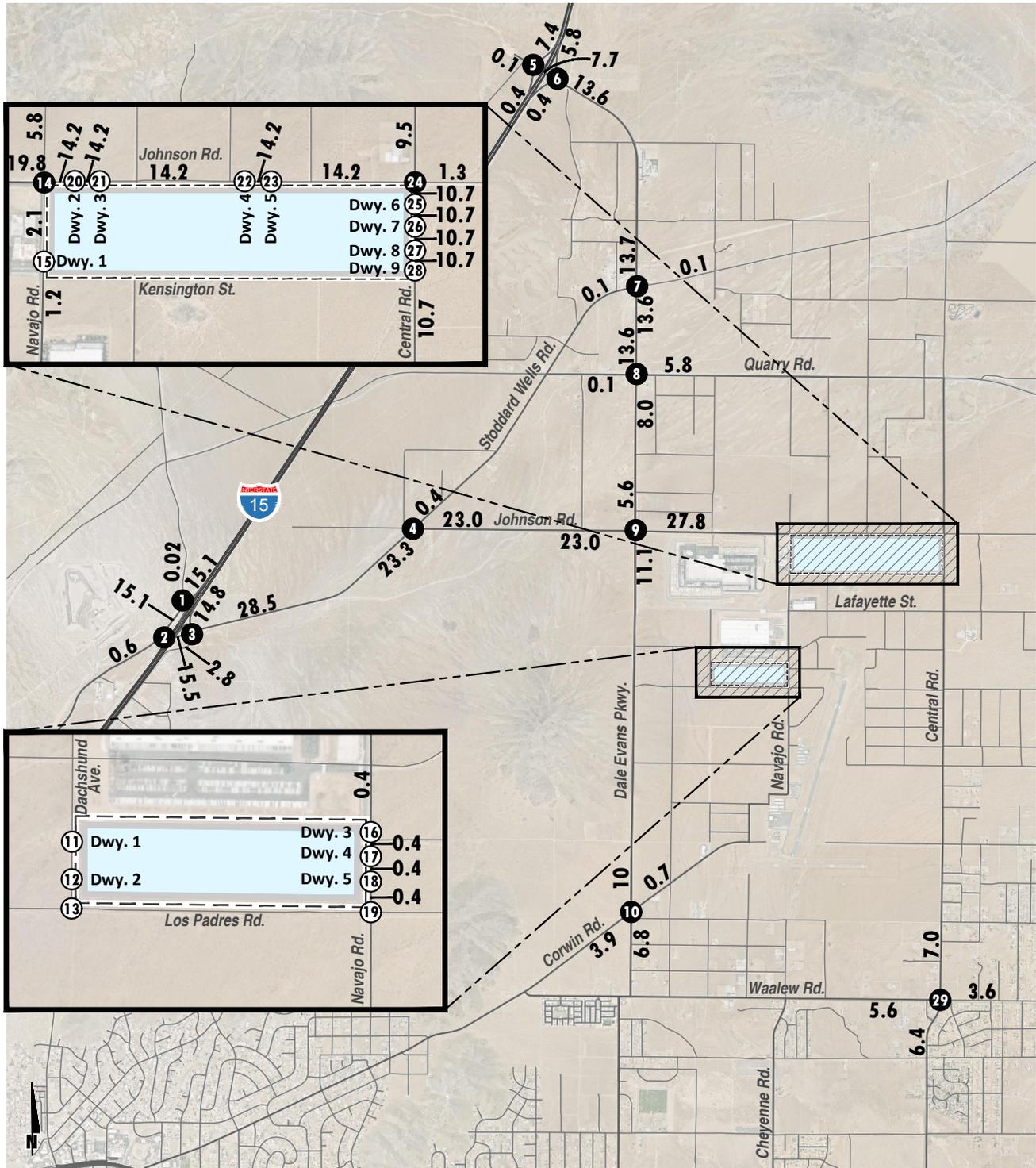


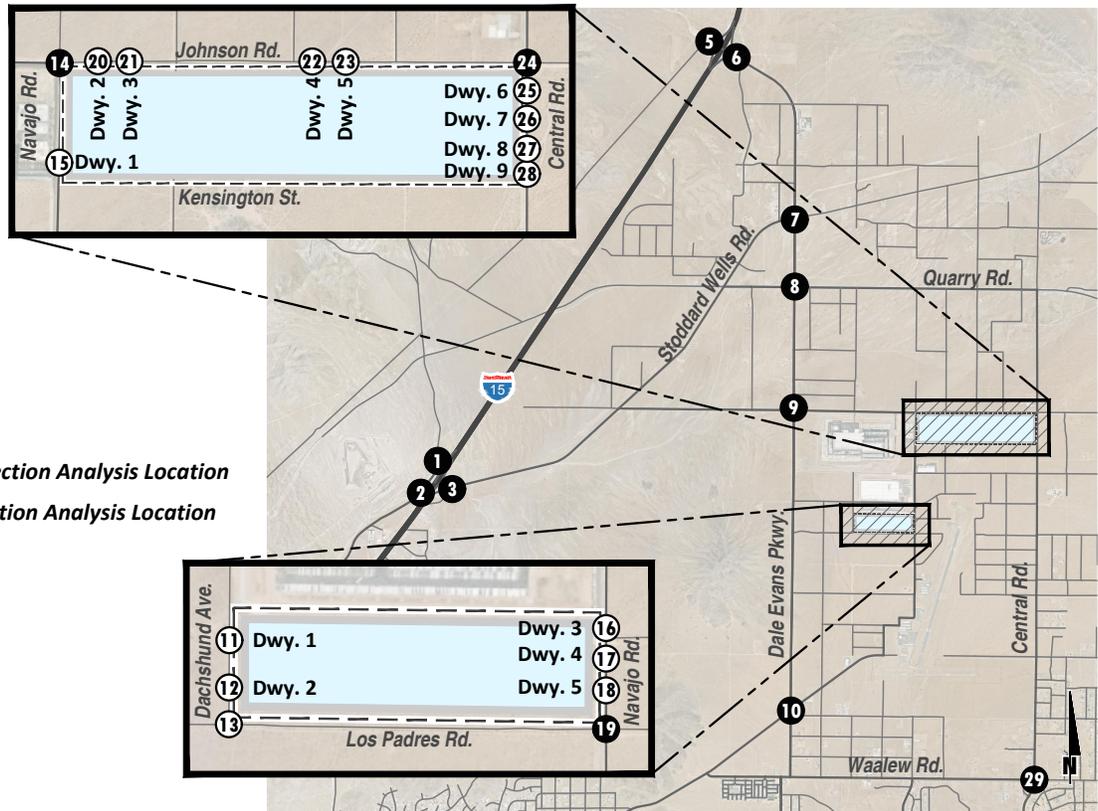
EXHIBIT 5-2 : OPENING YEAR CUMULATIVE (2027) WITHOUT PROJECT AVERAGE DAILY TRAFFIC (ADT)



**LEGEND:**

- = Existing Intersection Analysis Location
- = Future Intersection Analysis Location
- 10** = ADT (In Thousands)

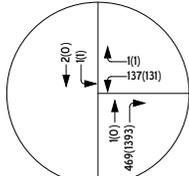
EXHIBIT 5-3 : OPENING YEAR CUMULATIVE (2027) WITH PROJECT PEAK HOUR INTERSECTION VOLUMES



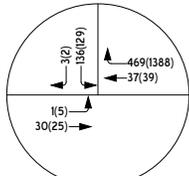
LEGEND:

- ① = Existing Intersection Analysis Location
- ② = Future Intersection Analysis Location

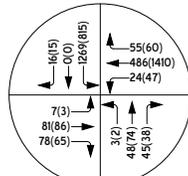
1 Quarry Rd. & I-15 SB Ramps



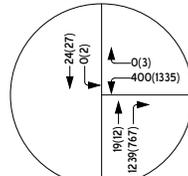
2 Quarry Rd. & Stoddard Wells Rd.



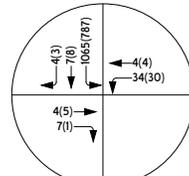
3 I-15 NB Ramps & Stoddard Wells Rd.



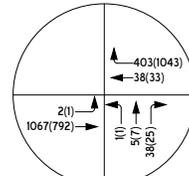
4 Stoddard Wells Rd. & Johnson Rd.



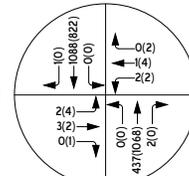
5 I-15 SB Ramps & Dale Evans Pkwy.



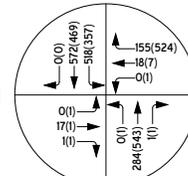
6 I-15 NB Ramps & Dale Evans Pkwy.



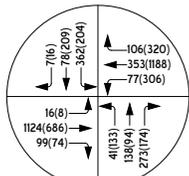
7 Dale Evans Pkwy. & Stoddard Wells Rd.



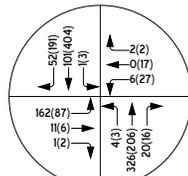
8 Dale Evans Pkwy. & Quarry Rd.



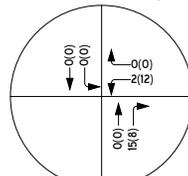
9 Dale Evans Pkwy. & Johnson Rd.



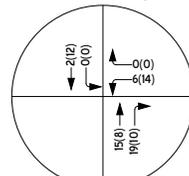
10 Dale Evans Pkwy. & Corwin Rd.



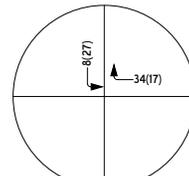
11 Dachshund Av. & West Driveway 1



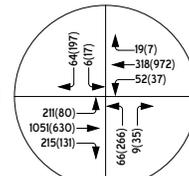
12 Dachshund Av. & West Driveway 2



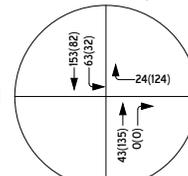
13 Dachshund Av. & Los Padres Rd.



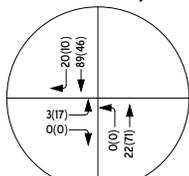
14 Navajo Rd. & Johnson Rd.



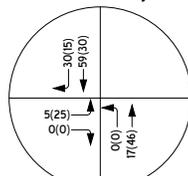
15 Navajo Rd. & East Driveway 1



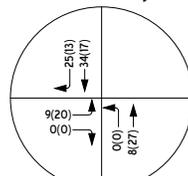
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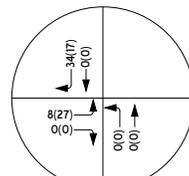
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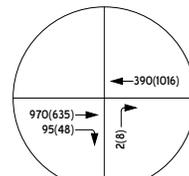
18 Navajo Rd. & West Driveway 5



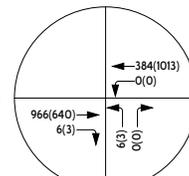
19 Navajo Rd. & Los Padres Rd.



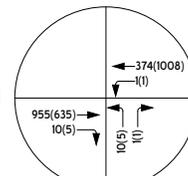
20 East Driveway 2 & Johnson Rd.



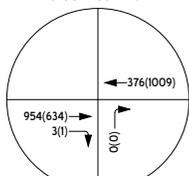
21 East Driveway 3 & Johnson Rd.



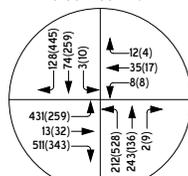
22 East Driveway 4 & Johnson Rd.



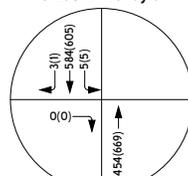
23 East Driveway 5 & Johnson Rd.



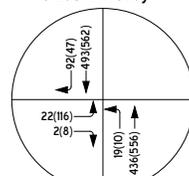
24 Central Rd. & Johnson Rd.



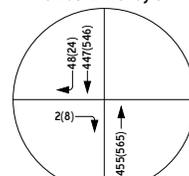
25 Central Rd. & East Driveway 6



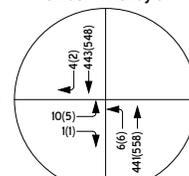
26 Central Rd. & East Driveway 7



27 Central Rd. & East Driveway 8



28 Central Rd. & East Driveway 9



29 Central Rd. & Waalew Rd.

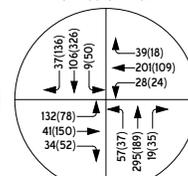
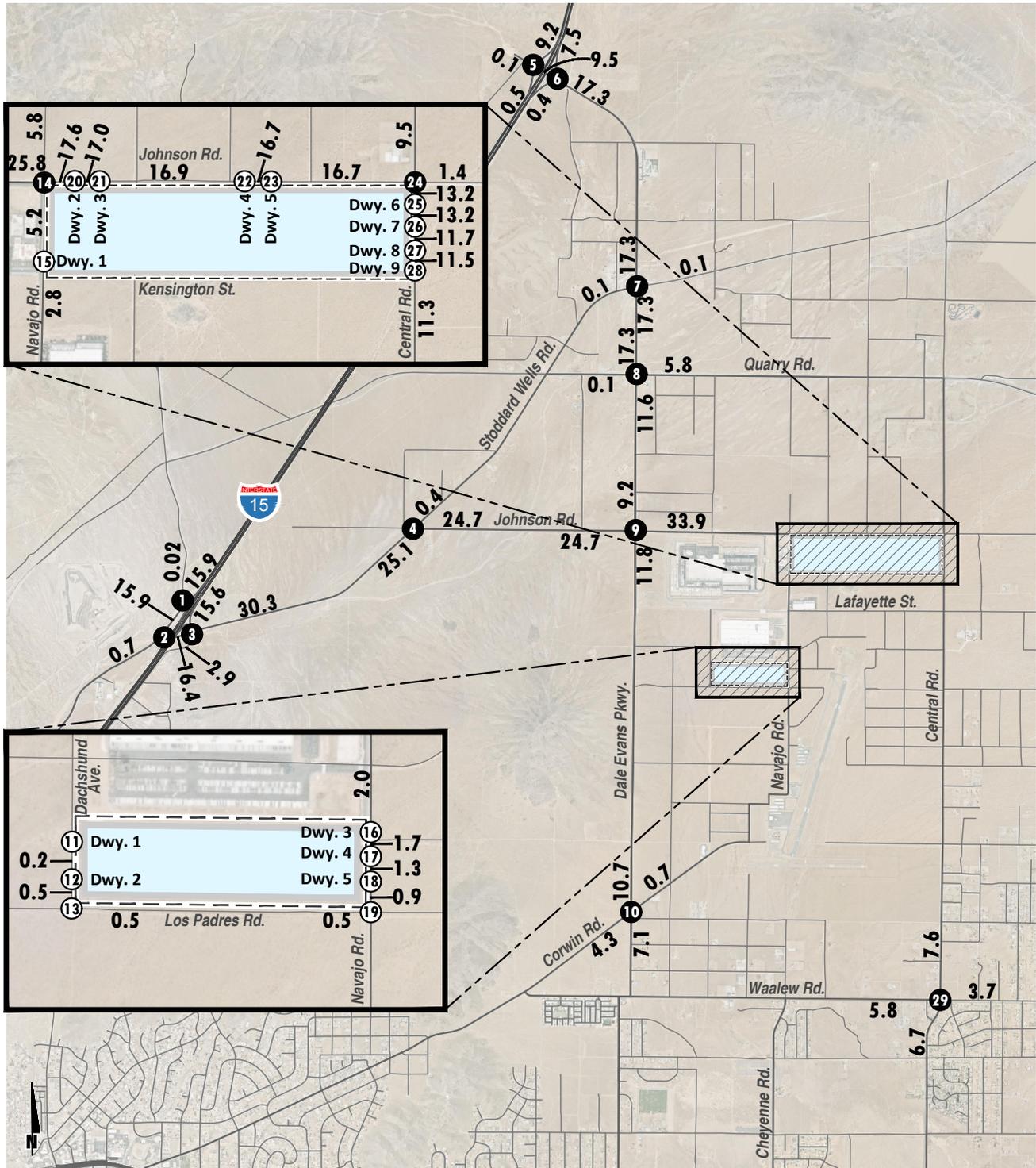


EXHIBIT 5-4 : OPENING YEAR CUMULATIVE (2027) WITH PROJECT AVERAGE DAILY TRAFFIC (ADT)



**LEGEND:**

- ⊙ = Existing Intersection Analysis Location
- ⊕ = Future Intersection Analysis Location
- 10 = ADT (In Thousands)

## 5.4 INTERSECTION OPERATIONS ANALYSIS

### 5.4.1 OPENING YEAR CUMULATIVE (2027) WITHOUT PROJECT TRAFFIC CONDITIONS

LOS calculations were conducted for the study intersections to evaluate their operations under Opening Year Cumulative (2027) Without Project conditions with roadway and intersection geometrics consistent with Section 5.1 *Roadway Improvements*. As shown in Table 5-1, the following study area intersections are anticipated to operate at an unacceptable LOS under Opening Year Cumulative (2027) Without Project traffic conditions:

- Quarry Road & I-15 Southbound Ramps (#1) – LOS F PM peak hour only
- Quarry Road & Stoddard Wells Road (#2) – LOS F PM peak hour only
- I-15 Northbound Ramps & Stoddard Wells Road (#3) – LOS F AM and PM peak hours
- Stoddard Wells Road & Johnson Road (#4) – LOS F AM and PM peak hours
- I-15 Southbound Ramps & Dale Evans Parkway (#5) – LOS F AM peak hour; LOS E PM peak hour
- Dale Evans Parkway & Stoddard Wells Road (#7) – LOS E AM peak hour; LOS F PM peak hour
- Dale Evans Parkway & Quarry Road (#8) – LOS F AM and PM peak hours
- Dale Evans Parkway & Johnson Road (#9) – LOS F AM and PM peak hours
- Navajo Road & Johnson Road (#14) – LOS F AM and PM peak hours
- Central Road & Johnson Road (#24) – LOS F AM and PM peak hours
- Central Road & Waalew Road (#29) – LOS E PM peak hour only

The intersection operations analysis worksheets for Opening Year Cumulative (2027) Without Project traffic conditions are included in Appendix 5.1 of this TA.

### 5.4.2 OPENING YEAR CUMULATIVE (2027) WITH PROJECT TRAFFIC CONDITIONS

As shown in Table 5-1, there are no additional study area intersections that are anticipated to operate at an unacceptable LOS with the addition of Project traffic under Opening Year Cumulative (2027) With Project traffic conditions. The intersection operations analysis worksheets for Opening Year Cumulative (2027) With Project traffic conditions are included in Appendix 5.2 of this TA.

**TABLE 5-1: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2027) CONDITIONS**

| # Intersection                              | Traffic Control <sup>1</sup> | 2027 Without Project       |        |                  |    | 2027 With Project          |        |                  |    |
|---|------------------------------|----------------------------|--------|------------------|----|----------------------------|--------|------------------|----|
|   |                              | Delay <sup>2</sup> (secs.) |        | Level of Service |    | Delay <sup>2</sup> (secs.) |        | Level of Service |    |
|   |                              | AM                         | PM     | AM               | PM | AM                         | PM     | AM               | PM |
| 1 Quarry Rd. & I-15 SB Ramps                | CSS                          | 12.7                       | >100.0 | B                | F  | 13.1                       | >100.0 | B                | F  |
| 2 Quarry Rd. & Stoddard Wells Rd.           | CSS                          | 13.6                       | >100.0 | B                | F  | 14.3                       | >100.0 | B                | F  |
| 3 I-15 NB Ramps & Stoddard Wells Rd.        | CSS                          | >100.0                     | >100.0 | F                | F  | >100.0                     | >100.0 | F                | F  |
| 4 Stoddard Wells Rd. & Johnson Rd.          | CSS                          | >100.0                     | >100.0 | F                | F  | >100.0                     | >100.0 | F                | F  |
| 5 I-15 SB Ramps & Dale Evans Pkwy.          | CSS                          | >100.0                     | 43.8   | F                | E  | >100.0                     | >100.0 | F                | F  |
| 6 I-15 NB Ramps & Dale Evans Pkwy.          | CSS                          | 21.7                       | 16.6   | C                | C  | 34.8                       | 20.3   | D                | C  |
| 7 Dale Evans Pkwy. & Stoddard Wells Rd.     | CSS                          | 48.3                       | 80.3   | E                | F  | 94.7                       | >100.0 | F                | F  |
| 8 Dale Evans Pkwy. & Quarry Rd.             | CSS                          | >100.0                     | >100.0 | F                | F  | >100.0                     | >100.0 | F                | F  |
| 9 Dale Evans Pkwy. & Johnson Rd.            | AWS                          | >100.0                     | >100.0 | F                | F  | >100.0                     | >100.0 | F                | F  |
| 10 Dale Evans Pkwy. & Corwin Rd.            | AWS                          | 10.8                       | 16.7   | B                | C  | 11.7                       | 21.1   | B                | C  |
| 11 Dachshund Av. & West Driveway 1 (Future) | CSS                          | Future Intersection        |        |                  |    | 8.9                        | 8.9    | A                | A  |
| 12 Dachshund Av. & West Driveway 2 (Future) | CSS                          | Future Intersection        |        |                  |    | 9.0                        | 9.0    | A                | A  |
| 13 Dachshund Av. & Los Padres Rd. (Future)  | CSS                          | Future Intersection        |        |                  |    | 0.0                        | 0.0    | A                | A  |
| 14 Navajo Rd. & Johnson Rd.                 | CSS                          | 60.6                       | >100.0 | F                | F  | >100.0                     | >100.0 | F                | F  |
| 15 Navajo Rd. & East Driveway 1 (Future)    | CSS                          | Future Intersection        |        |                  |    | 8.7                        | 9.7    | A                | A  |
| 16 Navajo Rd. & West Driveway 3 (Future)    | CSS                          | Future Intersection        |        |                  |    | 9.5                        | 9.5    | A                | A  |
| 17 Navajo Rd. & West Driveway 4 (Future)    | CSS                          | Future Intersection        |        |                  |    | 9.4                        | 9.4    | A                | A  |
| 18 Navajo Rd. & West Driveway 5 (Future)    | CSS                          | Future Intersection        |        |                  |    | 9.2                        | 9.2    | A                | A  |
| 19 Navajo Rd. & Los Padres Rd.              | CSS                          | Future Intersection        |        |                  |    | 9.0                        | 9.0    | A                | A  |
| 20 East Driveway 2 & Johnson Rd. (Future)   | CSS                          | Future Intersection        |        |                  |    | 20.7                       | 14.3   | C                | B  |
| 21 East Driveway 3 & Johnson Rd. (Future)   | CSS                          | Future Intersection        |        |                  |    | 21.0                       | 23.9   | C                | C  |
| 22 East Driveway 4 & Johnson Rd. (Future)   | CSS                          | Future Intersection        |        |                  |    | 22.3                       | 23.2   | C                | C  |
| 23 East Driveway 5 & Johnson Rd. (Future)   | CSS                          | Future Intersection        |        |                  |    | 0.0                        | 0.0    | A                | A  |
| 24 Central Rd. & Johnson Rd.                | CSS                          | >100.0                     | >100.0 | F                | F  | >100.0                     | >100.0 | F                | F  |
| 25 Central Rd. & East Driveway 6 (Future)   | CSS                          | Future Intersection        |        |                  |    | 0.0                        | 0.0    | A                | A  |
| 26 Central Rd. & East Driveway 7 (Future)   | CSS                          | Future Intersection        |        |                  |    | 16.2                       | 24.9   | C                | C  |
| 27 Central Rd. & East Driveway 8 (Future)   | CSS                          | Future Intersection        |        |                  |    | 11.8                       | 12.7   | B                | B  |
| 28 Central Rd. & East Driveway 9 (Future)   | CSS                          | Future Intersection        |        |                  |    | 14.9                       | 16.4   | B                | C  |
| 29 Central Rd. & Waalew Rd.                 | CSS                          | 20.4                       | 45.7   | C                | E  | 27.6                       | 58.0   | D                | F  |

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

<sup>1</sup> AWS = All-Way Stop; CSS = Cross-Street Stop; CSS = Improvement

<sup>2</sup> Per the Highway Capacity Manual (7th Edition), 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.

## 5.5 TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic signal warrants have been performed for Opening Year Cumulative (2027) traffic conditions based on peak hour intersection turning movements volumes or planning level (ADT) volumes. The following study area intersections are anticipated to meet a traffic signal warrant under Opening Year Cumulative (2027) Without Project traffic conditions:

- I-15 Northbound Ramps & Stoddard Wells Road (#3)
- Stoddard Wells Road & Johnson Road (#4)
- Dale Evans Parkway & Quarry Road (#8)
- Navajo Road & Johnson Road (#14)
- Central Road & Johnson Road (#24)
- Central Road & Waalew Road (#29)

With the addition of Project traffic, the following additional study area intersections are anticipated to meet a traffic signal warrant under Opening Year Cumulative (2027) With Project traffic conditions:

- I-15 Southbound Ramps & Dale Evans Parkway (#5)
- I-15 Northbound Ramps & Dale Evans Parkway (#6)
- Central Road & East Driveway 7 (#26)

The Opening Year Cumulative (2027) Without Project and With Project traffic conditions traffic signal warrant analysis worksheets are provided in Appendices 5.3 and 5.4, respectively.

## 5.6 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings for Opening Year Cumulative (2027) Without Project are presented in Table 5-2. As shown in Table 5-2, the following movement is anticipated to experience queuing issues during the weekday AM or weekday PM peak 95<sup>th</sup> percentile traffic flows under Opening Year Cumulative (2027) Without Project traffic conditions:

- I-15 Northbound Ramps & Stoddard Wells Road (#3) – Southbound shared left-through-right – AM and PM peak hours

The addition of Project traffic is anticipated to result in the following additional off-ramp queuing issue during the weekday AM or weekday PM peak 95<sup>th</sup> percentile traffic flows under Opening Year Cumulative (2027) With Project traffic conditions:

- I-15 Southbound Ramps & Dale Evans Parkway (#5) – Southbound shared left-through-right – AM peak hour only

Worksheets for Opening Year Cumulative (2027) Without Project and With Project traffic conditions queuing analysis are provided in Appendices 5.5 and 5.6, respectively.

**TABLE 5-2: PEAK HOUR QUEUING SUMMARY FOR OPENING YEAR CUMULATIVE (2027) CONDITIONS**

| Intersection                       | Movement | Available Stacking Distance (Feet) | 2027 Without Project         |              |                          |           | 2027 With Project            |              |                          |           |
|------------------------------------|----------|------------------------------------|------------------------------|--------------|--------------------------|-----------|------------------------------|--------------|--------------------------|-----------|
|                                    |          |                                    | 95th Percentile Queue (Feet) |              | Acceptable? <sup>1</sup> |           | 95th Percentile Queue (Feet) |              | Acceptable? <sup>1</sup> |           |
|                                    |          |                                    | AM Peak                      | PM Peak      | AM                       | PM        | AM Peak                      | PM Peak      | AM                       | PM        |
| Quarry Rd. & I-15 SB Ramps         | WBL/R    | 1,000                              | 30                           | 305          | Yes                      | Yes       | 30                           | 350          | Yes                      | Yes       |
| I-15 NB Ramps & Stoddard Wells Rd. | SBL/T/R  | 1,000                              | <b>3,418</b>                 | <b>3,898</b> | <b>No</b>                | <b>No</b> | <b>3,905</b>                 | <b>4,203</b> | <b>No</b>                | <b>No</b> |
| I-15 SB Ramps & Dale Evans Pkwy.   | SBL/T/R  | 1,410                              | 1,075                        | 390          | Yes                      | Yes       | <b>2,055</b>                 | 728          | <b>No</b>                | Yes       |
| I-15 NB Ramps & Dale Evans Pkwy.   | NBL/T/R  | 1,280                              | 25                           | 20           | Yes                      | Yes       | 50                           | 28           | Yes                      | Yes       |

**BOLD** = 95th percentile queue exceeds the available storage.

<sup>1</sup> Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

## 5.7 PROJECT DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at study area intersections and off-ramps that have been identified as deficient under Opening Year Cumulative (2027) traffic conditions.

### 5.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

The effectiveness of the recommended improvement strategies to address Opening Year Cumulative (2027) traffic deficiencies are presented in Table 5-3 to achieve pre-project delay or better. Worksheets for Opening Year Cumulative (2027) With Project conditions, with improvements, HCM calculation worksheets are provided in Appendix 5.7.

### 5.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES FOR OFF-RAMP QUEUES

The effectiveness of the recommended improvement strategies to address Opening Year Cumulative (2027) off-ramp deficiencies are presented in Table 5-4. The improvements are consistent with the intersection improvements identified in Table 5-3. Worksheets for Opening Year Cumulative (2027) With Project conditions, with improvements, off-ramp queueing analysis worksheets are provided in Appendix 5.8.

**TABLE 5-3: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2027) CONDITIONS WITH IMPROVEMENTS**

| # Intersection                          | Traffic Control <sup>3</sup> | Intersection Approach Lanes <sup>1</sup> |          |          |            |   |          |           |          |   |           |          |          | Delay <sup>2</sup> (secs.) |             | Level of Service |    |  |
|---|------------------------------|--|----------|----------|------------|---|----------|-----------|----------|---|-----------|----------|----------|----------------------------|-------------|------------------|----|--|
|   |                              | Northbound                               |          |          | Southbound |   |          | Eastbound |          |   | Westbound |          |          | AM                         | PM          | AM               | PM |  |
|   |                              | L  | T        | R        | L          | T | R        | L         | T        | R | L         | T        | R        |                            |             |                  |    |  |
| 1 Quarry Rd. & I-15 SB Ramps            |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 0        | 0 | 0         | 1        | 0        | 13.1                       | >100.0      | B                | F  |  |
| - With Improvements                     | CSS                          | 0  | 1        | <b>1</b> | 0          | 1 | 0        | 0         | 0        | 0 | 0         | 1        | 0        | 9.3                        | 23.0        | A                | C  |  |
| 2 Quarry Rd. & Stoddard Wells Rd.       |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 0        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 14.3                       | >100.0      | B                | F  |  |
| - With Improvements                     | CSS                          | 0  | 0        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | <b>1</b> | 10.0                       | 24.4        | B                | C  |  |
| 3 I-15 NB Ramps & Stoddard Wells Rd.    |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | 0  | 1        | 0        | <b>1</b>   | 1 | 0        | <b>1</b>  | 1        | 0 | <b>1</b>  | <b>2</b> | 0        | 23.6                       | 31.4        | C                | C  |  |
| 4 Stoddard Wells Rd. & Johnson Rd.      |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 0        | 0 | 0         | 1        | 0        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | 0  | 1        | <b>1</b> | 0          | 1 | 0        | 0         | 0        | 0 | <b>1</b>  | 1        | 0        | 15.6                       | 11.8        | B                | B  |  |
| 5 I-15 SB Ramps & Dale Evans Pkwy.      |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 0        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | 0  | 0        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 27.4                       | 10.2        | C                | B  |  |
| 7 Dale Evans Pkwy. & Stoddard Wells Rd. |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 94.7                       | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 7.0                        | 6.3         | A                | A  |  |
| 8 Dale Evans Pkwy. & Quarry Rd.         |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | <b>1</b>                                 | 1        | 0        | <b>1</b>   | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 26.9                       | 38.0        | C                | D  |  |
| 9 Dale Evans Pkwy. & Johnson Rd.        |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | AWS                          | 1  | 1        | 1        | 1          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 1        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | 1  | <b>2</b> | 1        | <b>2</b>   | 1 | 0        | <b>1</b>  | <b>2</b> | 0 | <b>1</b>  | <b>2</b> | 1        | 29.4                       | 29.8        | C                | C  |  |
| 14 Navajo Rd. & Johnson Rd.             |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 0 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | 0  | 1        | 0        | 0          | 0 | 0        | 0         | <b>2</b> | 0 | <b>1</b>  | 1        | 0        | 6.2                        | 49.7        | A                | D  |  |
| 24 Central Rd. & Johnson Rd.            |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | CSS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | >100.0                     | >100.0      | F                | F  |  |
| - With Improvements                     | TS                           | <b>2</b>                                 | 1        | 0        | <b>1</b>   | 1 | <b>1</b> | <b>1</b>  | 1        | 0 | <b>1</b>  | 1        | 0        | 23.7                       | 39.9        | C                | D  |  |
| 29 Central Rd. & Waalew Rd.             |                              |  |          |          |            |   |          |           |          |   |           |          |          |                            |             |                  |    |  |
| - Without Improvements                  | AWS                          | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 27.6                       | <b>58.0</b> | D                | F  |  |
| - With Improvements                     | TS                           | 0  | 1        | 0        | 0          | 1 | 0        | 0         | 1        | 0 | 0         | 1        | 0        | 10.9                       | 12.1        | B                | B  |  |

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

<sup>1</sup> 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** = Improvement

<sup>2</sup> Per the Highway Capacity Manual 6th Edition, 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.

<sup>3</sup> AWS = All-Way Stop; CSS = Cross-Street Stop; TS = Traffic Signal

**TABLE 5-4: PEAK HOUR QUEUING SUMMARY FOR OPENING YEAR CUMULATIVE (2027)  
CONDITIONS WITH IMPROVEMENTS**

| Intersection                       | Movement   | Available Stacking Distance (Feet) | 2027 With Project            |                  |                          |     |
|------------------------------------|------------|------------------------------------|------------------------------|------------------|--------------------------|-----|
|                                    |            |                                    | 95th Percentile Queue (Feet) |                  | Acceptable? <sup>1</sup> |     |
|                                    |            |                                    | AM Peak                      | PM Peak          | AM                       | PM  |
| I-15 NB Ramps & Stoddard Wells Rd. | <u>SBL</u> | 1,000                              | 713 <sup>2</sup>             | 560 <sup>2</sup> | Yes                      | Yes |
|                                    | SBL/T/R    | 1,000                              | 549                          | 407 <sup>2</sup> | Yes                      | Yes |
| I-15 SB Ramps & Dale Evans Pkwy.   | SBL/T/R    | 1,410                              | 1,244 <sup>2</sup>           | 469              | Yes                      | Yes |

Underline = Improvement

<sup>1</sup> Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided.

<sup>2</sup> 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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## 6 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the Town of Apple Valley are funded through a combination of direct project mitigation, development impact fee programs or fair share contributions, such as the Town of Apple Valley Development Impact Fee (DIF) program. Identification and timing of needed improvements is generally determined through local jurisdictions based upon a variety of factors.

### 6.1 TOWN OF APPLE VALLEY DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The Town of Apple Valley has implemented a DIF program. This program collects fees from new single-family residential, multi-family residential, commercial, office use, and industrial developments. These fees serve to fund compliant facilities such as law enforcement, storm drainage, sanitary sewer, and general government fees. Fees are also allocated to finance parks and Apple Valley fire. Under the Town’s DIF program, the Town may grant developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

### 6.2 TOWN OF APPLE VALLEY TRANSPORTATION IMPACT FEES (TIF)

Based on the Apple Valley Transportation Impact Fee (TIF) schedule, last updated on September 3, 2024, each Project Site’s TIF payment is provided in Table 6-1. This fee is expected to cover intersection improvements within the Town’s boundaries that are consistent with the ultimate planned roadway improvements outlined in the Town’s General Plan.

**TABLE 6-1: TIF PAYMENT ESTIMATE**

|                                    | Project            |                    |
|------------------------------------|--------------------|--------------------|
|                                    | West Site          | East Site          |
| <b>TIFF FEE (\$2.31016 per SF)</b> | <b>\$2,071,058</b> | <b>\$6,543,759</b> |

### 6.3 MEASURE “I” FUNDS

In 2004, the voters of San Bernardino County approved the 30-year extension of Measure “I”, a one-half of one percent sales tax on retail transactions, through the year 2040, for transportation projects including, but not limited to, infrastructure improvements, commuter rail, public transit, and other identified improvements. The Measure “I” extension requires that a regional traffic impact fee be created to ensure development is paying its fair share. A regional Nexus study was prepared by San Bernardino County Transportation Authority (SBCTA) and concluded that each jurisdiction should include a regional fee component in their local programs to meet the Measure “I” requirement. The regional component assigns specific facilities and cost sharing formulas to each jurisdiction and was most recently updated in September 2017. Revenues collected through these programs are used in tandem with Measure “I” funds to deliver projects identified in the Nexus Study.

While Measure “I” is a self-executing sales tax administered by SBCTA, it bears discussion here because the funds raised through Measure “I” have funded, and will continue to fund, new transportation facilities in San Bernardino County, including within the Town of Apple Valley.

## 6.4 FAIR SHARE CONTRIBUTION

Project improvements may include a combination of fee payments to established programs, construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the Town’s discretion).

When off-site improvements are identified with a minor share of responsibility assigned to proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements. Detailed fair share calculations, for each Project site and peak hour, have been provided in Table 6-2 for the applicable deficient study area intersections.

**TABLE 6-2: PROJECT FAIR SHARE CALCULATIONS**

| #  | Intersection                          | Existing (2024) | Project (West) | Project (East) | 2027 With Project | Total New Traffic | Project (West) Fair Share | Project (East) Fair Share | Total Project Fair Share |              |
|----|---------------------------------------|-----------------|----------------|----------------|-------------------|-------------------|---------------------------|---------------------------|--------------------------|--------------|
| 1  | Quarry Rd. & I-15 SB Ramps            | AM:             | 164            | 12             | 38                | 737               | 573                       | <b>2.1%</b>               | <b>6.6%</b>              | <b>8.7%</b>  |
|    |                                       | PM:             | 257            | 22             | 72                | 1,594             | 1,337                     | 1.6%                      | 5.4%                     | 7.0%         |
| 2  | Quarry Rd. & Stoddard Wells Rd.       | AM:             | 221            | 13             | 42                | 827               | 606                       | <b>2.1%</b>               | <b>6.9%</b>              | <b>9.1%</b>  |
|    |                                       | PM:             | 308            | 24             | 77                | 1,680             | 1,372                     | 1.7%                      | 5.6%                     | 7.4%         |
| 3  | I-15 NB Ramps & Stoddard Wells Rd.    | AM:             | 379            | 45             | 143               | 2,349             | 1,970                     | <b>2.3%</b>               | <b>7.3%</b>              | <b>9.5%</b>  |
|    |                                       | PM:             | 541            | 42             | 132               | 2,788             | 2,247                     | 1.9%                      | 5.9%                     | 7.7%         |
| 4  | Stoddard Wells Rd. & Johnson Rd.      | AM:             | 283            | 46             | 144               | 1,896             | 1,613                     | <b>2.9%</b>               | <b>8.9%</b>              | <b>11.8%</b> |
|    |                                       | PM:             | 449            | 42             | 132               | 2,300             | 1,851                     | 2.3%                      | 7.1%                     | 9.4%         |
| 5  | I-15 SB Ramps & Dale Evans Pkwy.      | AM:             | 213            | 66             | 207               | 1,274             | 1,061                     | <b>6.2%</b>               | <b>19.5%</b>             | <b>25.7%</b> |
|    |                                       | PM:             | 333            | 33             | 105               | 940               | 607                       | 5.4%                      | 17.3%                    | 22.7%        |
| 7  | Dale Evans Pkwy. & Stoddard Wells Rd. | AM:             | 358            | 85             | 269               | 1,729             | 1,371                     | <b>6.2%</b>               | <b>19.6%</b>             | <b>25.8%</b> |
|    |                                       | PM:             | 452            | 84             | 267               | 2,077             | 1,625                     | 5.2%                      | 16.4%                    | 21.6%        |
| 8  | Dale Evans Pkwy. & Quarry Rd.         | AM:             | 409            | 85             | 269               | 1,784             | 1,375                     | <b>6.2%</b>               | <b>19.6%</b>             | <b>25.7%</b> |
|    |                                       | PM:             | 449            | 84             | 267               | 2,074             | 1,625                     | 5.2%                      | 16.4%                    | 21.6%        |
| 9  | Dale Evans Pkwy. & Johnson Rd.        | AM:             | 504            | 147            | 465               | 3,001             | 2,497                     | <b>5.9%</b>               | <b>18.6%</b>             | <b>24.5%</b> |
|    |                                       | PM:             | 883            | 142            | 449               | 3,693             | 2,810                     | 5.1%                      | 16.0%                    | 21.0%        |
| 14 | Navajo Rd. & Johnson Rd.              | AM:             | 129            | 164            | 475               | 2,213             | 2,084                     | <b>7.9%</b>               | <b>22.8%</b>             | <b>30.7%</b> |
|    |                                       | PM:             | 227            | 157            | 454               | 2,521             | 2,294                     | 6.8%                      | 19.8%                    | 26.6%        |
| 24 | Central Rd. & Johnson Rd.             | AM:             | 129            | 16             | 226               | 1,801             | 1,672                     | <b>1.0%</b>               | <b>13.5%</b>             | <b>14.5%</b> |
|    |                                       | PM:             | 219            | 17             | 226               | 2,166             | 1,947                     | 0.9%                      | 11.6%                    | 12.5%        |
| 29 | Central Rd. & Waalew Rd.              | AM:             | 517            | 14             | 49                | 1,048             | 531                       | <b>2.6%</b>               | <b>9.2%</b>              | <b>11.9%</b> |
|    |                                       | PM:             | 620            | 15             | 47                | 1,240             | 620                       | 2.4%                      | 7.6%                     | 10.0%        |

**BOLD** = Denotes highest fair share percentage.

Based on the fair share percentages in Table 6-2, the rough order of magnitude cost estimates for the I-15 Southbound Ramps at Quarry Road (#1), I-15 Northbound Ramps at Stoddard Wells Road (#3), and I-15 Southbound Ramps at Dale Evans Parkway (#5) are provided in Table 6-3. Table 6-3 summarizes the applicable cost associated with each of the recommended improvements summarized below based on the preliminary construction cost estimates found in Appendix G of the San Bernardino County CMP in conjunction with a cost escalation factor of 1.674 to reflect current costs. A rough order of magnitude cost has been prepared to determine the appropriate contribution value based upon each Project site's fair share of traffic as part of the project approval process. Based on each Project site's fair share percentages, the West Site's and East Site's fair share costs are estimated at \$111,584 and \$352,883, respectively (total estimated cost of \$464,467). These estimates are a rough order of magnitude only as they are intended only for disclosure purposes and do not imply any legal responsibility or formula for contributions or physical construction of improvements.

**TABLE 6-3: ROUGH ORDER OF MAGNITUDE FAIR SHARE COST ESTIMATE**

| # | Intersection                       | Cost               | Project (West) |                  | Project (East) |                  |
|---|------------------------------------|--------------------|----------------|------------------|----------------|------------------|
|   |                                    |                    | Fair Share %   | Fair Share Fee   | Fair Share %   | Fair Share Fee   |
| 1 | Quarry Rd. & I-15 SB Ramps         |                    |                |                  |                |                  |
|   | - NB right turn alne               | \$682,155          | 2.1%           | \$14,286         | 6.6%           | \$45,239         |
|   | <b>TOTAL</b>                       | <b>\$682,155</b>   |                | <b>\$14,286</b>  |                | <b>\$45,239</b>  |
| 3 | I-15 NB Ramps & Stoddard Wells Rd. |                    |                |                  |                |                  |
|   | - Install a traffic signal         | \$600,000          | 2.3%           | \$13,706         | 7.3%           | \$43,553         |
|   | - SB left turn lane                | \$669,600          |                | \$15,295         |                | \$48,605         |
|   | - 2nd SB through lane              | \$301,320          |                | \$6,883          |                | \$21,872         |
|   | - EB left turn lane                | \$669,600          |                | \$15,295         |                | \$48,605         |
|   | - WB left turn lane                | \$83,700           |                | \$1,912          |                | \$6,076          |
|   | - 2nd WB through lane              | \$301,320          |                | \$6,883          |                | \$21,872         |
|   | <b>TOTAL</b>                       | <b>\$2,625,540</b> |                | <b>\$59,974</b>  |                | <b>\$190,585</b> |
| 5 | I-15 SB Ramps & Dale Evans Pkwy.   |                    |                |                  |                |                  |
|   | - Install a traffic signal         | \$600,000          | 6.2%           | \$37,323         | 19.5%          | \$117,059        |
|   | <b>TOTAL</b>                       | <b>\$600,000</b>   |                | <b>\$37,323</b>  |                | <b>\$117,059</b> |
|   | <b>GRAND TOTAL</b>                 | <b>\$3,907,695</b> |                | <b>\$111,584</b> |                | <b>\$352,883</b> |

## 7 REFERENCES

1. **County of San Bernardino.** *County of San Bernardino Transportation Impact Study Guidelines.* County of San Bernardino : s.n., July 2019.
2. **San Bernardino Associated Governments.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated June 2016.
3. **Institute of Transportation Engineers.** *Trip Generation Manual.* 11th Edition. 2021.
4. **Transportation Research Board.** *Highway Capacity Manual (HCM).* 7th Edition. s.l. : National Academy of Sciences, 2022.
5. **Caltrans.** California Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2017.

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