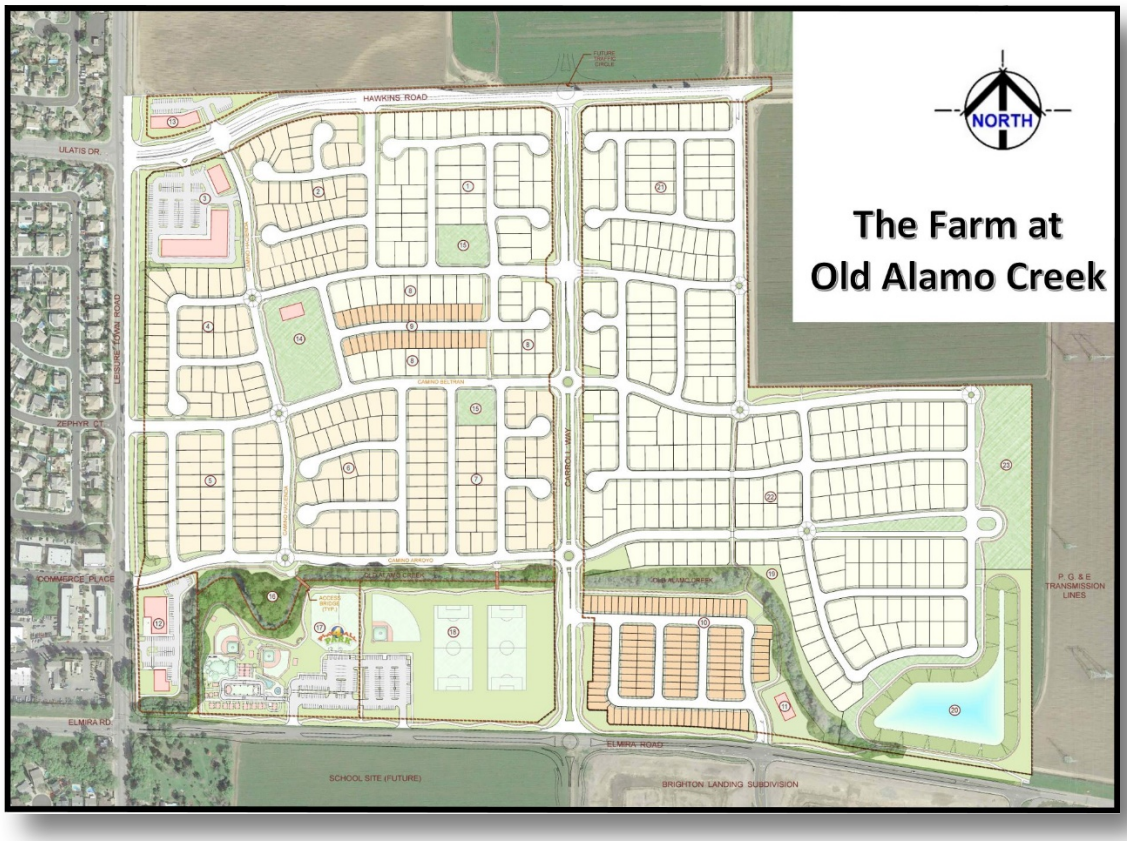
Transportation Impact Analysis, Draft Report

for The Farm at Alamo Place



in the City of Vacaville, CA

October 20, 2017

Prepared in accordance of study guidelines set forth by City of Vacaville

Prepared by:

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Introduction

This report has been prepared to provide documentation pertaining to the transportation impact analysis of the proposed the farm at Alamo place specific plan project (proposed project) in the City of Vacaville, California sphere of influence. This introduction includes the project description, location, existing uses, land-use program etc. and subsequent sections in this report describe the following:

- SECTION 2: ENVIRONMENTAL SETTING
- SECTION 3: REGULATORY SETTING
- SECTION 4: PROJECT IMPACTS
- SECTION 5: CUMULATIVE IMPACTS
- SECTION 6: SITE CIRCULATION
- SECTION 7: REFERENCES

Project description

Project information was provided to PRISM Engineering by the City of Vacaville, and utilized in this report for the purposes of roadway location and connections in the traffic model, as well as specific quantities of various land uses in order to calculate trip generation for the project. *Figure 1, Project Site Plan*, shows the project site specific plan, as well as the roadway system that will serve the project. The project site borders with the PGandE power transmission lines on the east, and includes some of the City's Urban Reserve area on the east.

Figure 1. Project Site Plan

The Farm at Alamo Creek project includes open space, parks, trail amenities, etc., summarized as follows:

- 768 single-family attached and detached (584 detached and 184 attached),
- five parks,
- 13.4 acres of open space,
- the agricultural buffer,
- 7.4 acres of neighborhood commercial, and a
- 9.6-acre detention pond

The Farm at Alamo Creek conforms with the recent Update of the Vacaville General Plan. The eastern portion of the area has been designated on the Updated General Plan as 'Urban Reserve' and is now included as a part of the project. *Figure 2, Areas Designated as Urban Reserve*, is a figure showing the locations of the Urban Reserve areas which correspond to Lots #24 and #25 in Figure 1.

Project location

The proposed project is located generally in the southeastern region of the City of Vacaville, within northern Solano County as shown in *Figure 3, Vicinity Map and Project Site Location*. The project site is located inside the City's proposed "sphere of influence" and borders against the City's Urban Growth Boundary on the east. The Farm at Alamo Creek Specific Plan area is bounded by Leisure Town Road (Future Jepson Parkway) on the west, Hawkins Road on the north, Elmira Road on the south and the "Urban Reserve" on the east. The project site includes part of the Urban Reserve in this analysis.

Existing uses

The project site is currently used primarily for agriculture and areas east of the project site will remain in agricultural use. The area to the west of the site, across Leisure Town Road, is primarily single-family residential uses north of Atchison Drive, with approximately 1.3 mi.^{2} of various commercial and industrial uses to the south but still north of Elmira Road. Alamo creek runs through the property from Leisure Town Road just 600' north of Elmira Road.

Land use program

The project site is designated as a future Specific Plan in the City's General Plan and also designated as a growth area as part of the East of Leisure Town Road Growth Area. The project includes units consistent the permitted 2,175 dwelling units in the East of Leisure Town Growth Area taking into account all approved and pending applications including the Brighton Landing and Roberts Ranch Specific Plan projects. The project is also consistent with the general guidance on the rough distribution of units within the Growth Area. The Farm at Alamo Creek Specific Plan details a wide variety of housing including Residential Low Density (RLD), Residential Low Medium Density (RLMD), and Residential High Density (RH).

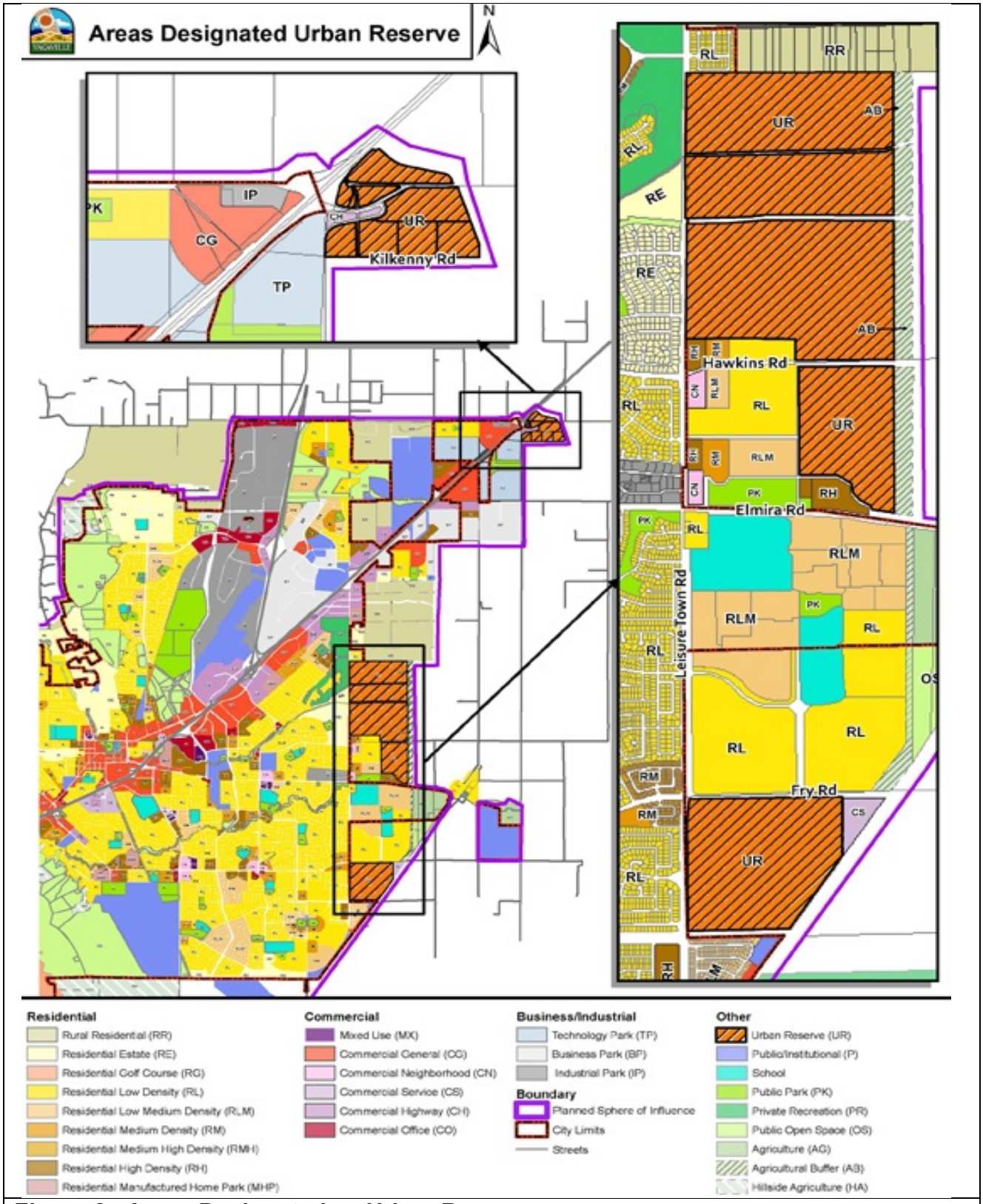


Figure 2. Areas Designated as Urban Reserve

source: City of Vacaville

Figure 3. Vicinity Map and Project Site Location

On site circulation

Roads and Roundabouts. The Farm at Alamo Place Specific Plan project contains a north-south collector road that is designed to facilitate movement of traffic parallel to the Jepson Parkway, and between residential subdivisions to the south of the project. This road is named Carroll Way, and will have four (4) modern roundabouts within the project site plan between and inclusive of Hawkins Road on the north and Elmira Road on the south. This roadway will continue southerly through the approved Brighton Landing development, and onward through the approved Roberts Ranch development, with the installation of modern roundabouts throughout. In addition to the four roundabouts proposed for Carroll Way, there are also seven additional smaller roundabouts proposed at various intersections throughout the project site. Altogether, 11 roundabouts are proposed within the project site. The project site will also have east to west roads connecting with Jepson Parkway at Zephyr Court as well as Commerce Place. The total number of connections / intersections to the surrounding roadways of Hawkins Road on the north, Jepson Parkway on the west, and Elmira Road on the south are between 12 and 13 intersections depending on the driveway configuration for the commercial corner in the southwest quadrant of the project. Hawkins Road is proposed to have five new intersection connections. Jepson Parkway is proposed to have two new roadway connections into the project, one at Zephyr Court and another at Commerce Place, with one or two additional driveways for the commercial property in the southwest corner. Elmira Road is proposed to have four new connections.

Bikes and Peds. The Farm at Alamo Creek will include a bicycle and pedestrian network that will connect to the common open space areas, (i.e. Community Garden, Detention Pond, Community Park, Community Center, etc.). The trail and bike network will include Class 1 Pathways and Class 2 and 3 bikeways, as shown on the site plan.

Transit. The Farm at Alamo Creek is required to install a bus turnout along Leisure Town Road as directed by the Director of Public Works. The Transit service in Vacaville is provided by Vacaville City Coach through fixed route and dial-a-ride services. City Coach services are coordinated with other area transit services for weekday peak hour commute service along Interstates 80 and 680 corridors. This includes services to and from the Fairfield/Suisun Transit and Vallejo Transit systems with routes that connect to BART stations in Pleasant Hill and El Cerrito.

Parks, trails, and open space

The non-motorized transportation system is shown on the project site plan found in *Figure 1, Project Site Plan*. Pedestrian and bicycle trails will follow the banks of the creeks and connect to the larger pedestrian and bicycle network. Two pedestrian crossings at Camino Arroyo will facilitate pedestrian's circulation between the residential neighborhood and the parks along Elmira Avenue. Bike trails and walking paths will be located along the three arterials Elmira, Hawkins, and Leisure Town Road framing the project site. Approximately one-third of the project proposal includes open space, park, and trail amenities that are universally accessible.

Emergency services

FIRE PROTECTION. The Farm at Alamo Creek Specific Plan area will be served by the Vacaville Fire Department upon annexation to the City of Vacaville. As mentioned above, annexation into CFD 11 will ensure adequate staffing for the area. All homes within the development shall have residential sprinkler systems as required by State Law and City Ordinance. Fire Hydrant spacing along the trails will meet the spacing requirements for hydrant spacing along City streets.

POLICE. The Farm at Alamo Creek Specific Plan area will be served by the Vacaville Police Department upon annexation to the City of Vacaville. As with fire protection, annexation into CFD 11 will ensure adequate staffing for the area.

Schools

The Farm at Alamo Creek Specific Plan area is within the Vacaville Unified School District boundaries. The District, in their latest master plan studies, has determined that there is a need for new school facilities in the Brighton Landing area which is just south of The Farm at Alamo Creek. It is anticipated that the District will need to construct facilities to house an expected student population of approximately 600-650 elementary and middle school students with full build out of Brighton Landing, The Farm at Alamo Creek, and Roberts Ranch. The facilities will either be an Elementary School and a Middle School or a combined K-8 School. That determination will take place as development occurs within the area. It is anticipated that the District will proceed with construction based on the pace of development within the area. The school(s) will be constructed using school impact fees paid by the developers as houses are constructed in the area.

Analysis scenarios

The Farm at Alamo Creek project traffic was evaluated through a process that involved vehicle trip generation, trip distribution, and assignment of the trips to the road network using the City's traffic model. PRISM Engineering received the most recent copy of the City's Cube traffic model via Public Works, which was most recently used for the Roberts Ranch Transportation Impact Analysis study. A total of six scenarios were evaluated for this study:

1. Existing Year 2017 Conditions
2. Existing plus The Farm at Alamo Creek Specific Plan Project (Existing plus Project)
3. Existing plus Approved Projects (EAP)
4. Existing plus Approved Projects plus The Farm at Alamo Creek Specific Plan Project (Existing plus Approved plus Project)
5. Cumulative Year 2035 without The Farm at Alamo Creek Specific Plan Project
6. Cumulative Year 2035 with The Farm at Alamo Creek Specific Plan Project (Cumulative with Project)

Scenarios 2, 4, and 6 assume full buildout of The Farm at Alamo Creek Specific Plan in order to evaluate the maximum potential impacts from the proposed project.

Environmental Setting

Road System

The existing road system and traffic analysis locations are shown in *Figure 4, Study Area Intersections and Roadway Segments*. This figure shows the location of the project site and the surrounding road system that will serve the project.

Regional Access

The project site traffic that is regionally based will primarily utilize Interstate 80 to travel to regions beyond the City Limits. The project traffic will connect to I-80 via Leisure Town Road and its interchange with I-80, by Ulatis Drive to the Allison Drive interchange, by Elmira Road to its interchange, and via Alamo Drive to its interchange. I-80 has four travel lanes in each direction in the study area. Interstate 80 extends southwest through Fairfield and Vallejo, and to the San Francisco-Oakland Bay Bridge terminating at Highway 101 in San Francisco. To the east of Vacaville, I-80 extends through Dixon and Davis, to Sacramento and beyond. Interstate 505 which also connects to I-80 in the City, has two travel lanes in each direction and connects north to I-5 north of Woodland.

Local Access

In addition to Interstate 80 and Interstate 505, the following road segments in the study area have been identified as regional routes and part of the Congestion Monitoring Program system in the 2005 Solano County Comprehensive Transportation Plan (CTP), and in the 2015 Congestion Monitoring Program (CMP):

- Leisure Town Road (future Jepson Parkway) between Interstate 80 and Vanden Road (CTP)
- Vanden Road from Leisure Town Road south to Peabody Road in Solano County (CTP and CMP)
- Elmira Road between Leisure Town Road and Interstate 80 (CTP)
- Elmira Road from Leisure Town Road east to A Street in the Town of Elmira City Limits (CMP)

These roads and other key arterials, collectors and local streets in the study area are described below:

Ulatis Drive

An east-west arterial street serving commercial and residential areas, with a total of 4 signalized intersections between Leisure Town Road on the east and Allison Drive on the west. It has a speed limit of 40 mph east of Nut Tree Road and 35 mph west of Nut Tree Road. This road will have direct connection (via Hawkins Road realigned) to the northern border of the project site.

Hawkins Road

An east-west rural roadway beginning at Leisure Town Road on the west to Highway 113 on the east where it terminates. It serves rural residences and intersects with various north-south rural roads. There is a signalized railroad crossing gate at the Union Pacific Railroad tracks near Lewis Road, and a four-way stop at Lewis Road. There is no posted speed limit on this road. The project will have direct access to this road via three intersections. With construction of the project, Hawkins Road will be built out to a four lane arterial between Leisure Town Road and the proposed Carroll Way, intersecting Carroll Way with a modern roundabout, and tapering back to a 2 lane arterial east of Carroll Way.

Figure 4. Study Area Intersections and Roadway Segments

Carroll Way is proposed as a two-lane arterial that will serve the project site connecting south all the way to Elmira Road and beyond into Brighton Landing.

Elmira Road

An east-west arterial that spans between "A" Street in the Town of Elmira and Interstate 80, where it continues westward as Mason Street. Elmira Road is designated as a 2 lane arterial (one travel lane in each direction) east of Leisure Town Road. West of Leisure Town Road, it is a 4 lane arterial with two travel lanes in each direction, posted at 40 mph. Elmira Road is a designated truck route. In the future, it will remain as a 4 lane arterial with a median for turn lanes, and would provide access to the project site primarily via the proposed 2 lane arterial Carroll Way via roundabout. Elmira Road will be 4 lanes from Leisure Town to the proposed Carroll Way, and 2 lanes to the east of Carroll Way. There will be one additional entrance into the project just east of Carroll Way. The specific access to the regional park portion of the project on Elmira Road between Leisure Town Road and Carroll Way is yet to be determined. Elmira Road has been identified as a regional route, part of the Congestion Monitoring Program system in the 2005 Solano County Comprehensive Transportation Plan (CTP), and in the 2015 Congestion Monitoring Program (CMP). This road will also have direct connection to the southern borders and street network of the project site.

Leisure Town Road

A north-south arterial that extends between Interstate 80 and Vanden Road. Roadway widening construction is underway from Vanden to Commerce Place. In the project vicinity, there generally is one travel lane in each direction north of Commerce Place with some widening south of Commerce Place to allow for left turn pockets and an extra southbound through lane (two total). Leisure Town Road would provide project access directly to some neighborhood commercial lot on the southwest corner of the project site. Two other collector level roadways would intersect with Leisure Town Road at Commerce Place (Camino Arroyo, full access, unsignalized), at Zephyr Court (Camino Beltran), and at Ulatis/Hawkins (new intersection with realigned Hawkins Road). Leisure Town Road is part of the proposed Jepson Parkway Project, a planned four-lane divided arterial. This road has been identified as a regional route, part of the Congestion Monitoring Program system in the 2005 Solano County Comprehensive Transportation Plan (CTP), and in the 2015 Congestion Monitoring Program (CMP).

Marshall Road

A two-lane collector street that extends between Leisure Town Road and just west of California Drive.

Nut Tree Road

A north-south arterial that connects Foxboro Parkway, across Interstate 80 and East Monte Vista Avenue, to the Nut Tree development area. Where development exists along Nut Tree Road, it has four travel lanes. As development occurs along the southern portion of Nut Tree Road, it would be widened from its current two lanes to four lanes.

Allison Drive

A north-south arterial that connects Elmira Road on its south terminus to Browns Valley Parkway at its northern end. It crosses I-80 at its midpoint and has a freeway interchange and overcrossing at I-80. There are 6 signalized intersections in its 1.3 mile length, or about a signal every quarter mile. It is posted at 35 mph from Elmira Road to E. Monte Vista Ave., and 40 mph north of E. Monte Vista Ave. There are

generally two lanes in each direction with widening at major intersections. The I-80 overcrossing bridge is six lanes total.

Peabody Road

A north-south street extending between Elmira Road in Vacaville and Air Base Parkway in Fairfield. Within Vacaville, Peabody Road is designated as a four-lane arterial. South of Vacaville within Solano County, Peabody Road operates as a two-lane rural road with paved shoulders.

Byrnes Road

A north-south two-lane collector street that extends south from Weber Road to the Town of Elmira where it continues as California Pacific Road to just south of Water Street.

Vanden Road

A two-lane collector street currently under construction for widening from Leisure Town Road to approximately 1300' south of Vanden Road. It spans from Peabody Road in Fairfield, through unincorporated Solano County, and terminates at Marshall Road in Vacaville. West of Peabody Road, it continues as Cement Hill Road. Vanden Road from south City limits to Leisure Town Road is part of Jepson Parkway Project, a planned four-lane divided arterial. This road has been identified as a regional route, part of the Congestion Monitoring Program system in the 2005 Solano County Comprehensive Transportation Plan (CTP), and in the 2015 Congestion Monitoring Program (CMP).

Cliffside Drive

A short (900 feet length) two-lane collector street that has five driveways for adjacent commercial uses. It primarily serves as a connector road to the I-80 EB on and off-ramps at this location.

Existing Conditions

This section documents the existing conditions of traffic levels and the road system that will serve the project, The Farms at Alamo Place. It also documents the data collection process as well as the organization of all data for analysis purposes. The methodology used is defined in the paragraphs that follow pertaining to specific traffic analysis methods and City policy parameters pertaining to levels of significance in traffic impacts. In addition, the specific methods or procedures used to calculate intersection vehicle delay and the corresponding levels of service are set forth.

Level of Service Methodology

This section defines Level of Service as a qualitative measure of traffic operating conditions, based on seconds of estimated average driver delay at an intersection. the Transportation Research Board's Highway Capacity Manual (HCM) is typically used to evaluate level of service for intersections and freeway mainline segments. Road segment analysis, also performed in this report, is based on the HCM and commonly-accepted default values derived by the Florida Department of Transportation. A letter grade "A" through "F" is assigned to an intersection based on this delay with A representing free flow conditions and F being severely congested. In this study, Levels of Service are calculated for all intersection control types (signalized, roundabout, stop sign on side street, and all-way stop control), and freeway ramp merge and diverge using the methods documented in the Transportation Research Board Publication *Highway Capacity Manual, Fifth Edition, 2010* (HCM 2010). Traffic studies utilize existing traffic count data collected at intersections (typically turning movement counts) and along roadway segments (hose counts) as a starting point for determining "Level of Service" (LOS). In addition to these, other information is sometimes gathered for operational parameters pertaining to signal timings, saturation flow rates, vehicle types, presence of pedestrians and bikes, etc. to further refine the vehicle count data.

Comparison of HCM 2010 and HCM 2000

The software used to analyze traffic level of service in this study was Synchro 9, a program that faithfully replicates the level of service calculation methods outlined in either the HCM 2000 procedures or the HCM 2010 procedures, or both. In some cases, the HCM 2010 procedures are not able to handle (software will not calculate) U-Turn movements, shared or exclusive lane configurations, etc., situations that are extant in the City of Vacaville. In these cases, it was necessary to use the HCM 2000 method for these certain intersections. The HCM 2010 method is used as a default, but in situations where the HCM 2010 procedures are not compatible with certain intersection configurations with non-standard NEMA signal timings, lane sharing, or U-Turns, the HCM 2000 procedure was utilized to calculate an average delay and level of service rank for the intersection.

Stand-Alone Intersection Operations versus Multi-Intersection Microsimulation

Microsimulation methods were not used in this study. All intersection levels of service (LOS) were calculated as a stand-alone operation for all control types including 1) signalized intersections, 2) all-way stop-controlled intersections (AWSC), 3) Two-Way stop controlled (TWSC) intersections, and 4) roundabout intersections. The HCM methods calculate the average delay for these types of intersections (as well as for each approach), and these delay numbers (in seconds) correspond with a scale of A-F as defined in Table 1. This traffic study focuses on a "planning level" evaluation of traffic operating conditions, which is considered sufficient for CEQA/NEPA purposes. However, in some cases where intersections are very closely spaced such as at freeway interchanges, if an intersection is congested and cannot clear all traffic, queues begin to build that sometimes exceed the

distance or spacing between intersections. This condition called queue overflow can paralyze an adjacent intersection yielding LOS F conditions in the real world, but the calculated "planning level" delay and LOS may communicate a better condition (i.e. reporting LOS C when it is actually LOS F in the field). Table 1 shows the level of service definitions for both signalized and un-signalized intersections.

Table 1. Intersection Level of Service Definitions

LEVEL OF SERVICE	DESCRIPTION	AVG. DELAY PER VEHICLE, SEC/VEH	
		Signalized	**Un-Signalized**
A	Free flow with no delays. Users are virtually unaffected by others in the traffic stream	**≤ 10**	**≤ 10**
B	Stable traffic. Traffic flows smoothly with few delays.	**> 10 – 20**	**> 10 – 15**
C	Stable flow but the operation of individual users becomes affected by other vehicles. Modest delays.	**> 20 – 35**	**> 15 – 25**
D	Approaching unstable flow. Operation of individual users becomes significantly affected by other vehicles. Delays may be more than one cycle during peak hours.	**> 35 – 55**	**> 25 – 35**
E	Unstable flow with operating conditions at or near the capacity level. Long delays and vehicle queuing.	**> 55 – 80**	**> 35 – 50**
F	Forced or breakdown flow that causes reduced capacity. Stop and go traffic conditions. Excessive long delays and vehicle queuing.	**> 80**	**> 50**

SOURCES: TRANSPORTATION RESEARCH BOARD, HIGHWAY CAPACITY MANUAL 2010, NATIONAL RESEARCH COUNCIL, 2010.

As a default, the planning level evaluation (stand-alone intersection method) was used in this study. This method incorporates using the following factors as available: 1) heavy vehicle percentage, 2) peak hour factors of traffic count data, 3) signal lost time, 4) saturation flow rates, 5) signal timing schemes including split phasing, etc., and reports the resulting intersection delays and LOS as estimated using the HCM 2010 based analysis methodologies.

The GP EIR evaluated segments based upon policy TR-P3.1, LOS C, and intersection based upon TR-P3.2 and TR-P3.3. Therefore, acceptable LOS thresholds are as follows:

- Segment LOS Threshold: LOS C
- Signal in the priority development areas LOS Threshold: LOS D (55 seconds)
- Signal outside the priority area LOS Threshold: mid-D (45 sec).
- Two way stops, outside the priority LOS Threshold: mid-E (42.5 seconds average delay) for the worst approach, and overall at LOS D (35 seconds average delay).

Freeway Mainline, Ramp Merge & Diverge Operations

In addition to the study intersections, this study evaluates freeway levels of service for each scenario, and also includes specific analysis for freeway ramp merge and diverge operations at the following locations:

Main line I 80 analysis Directional a.m. and p.m. peak hour time periods

1. I-80 east of leisure Town Road
2. I-80 east of Allison Drive
3. I-80 east of Elmira Road – Mason Street
4. I-80 W. Elmira Rd. – Mason Street

Ramp merge diverge weave analysis for a.m. and p.m. peak hour periods

1. Leisure Town Road – I 80 westbound on and off ramps
2. Leisure Town Road – I 80 east bound on and off ramps
3. Allison Drive – I 80 westbound on and off ramps
4. Allison Drive – I 80 east bound on and off ramps (two on ramps)
5. Elmira Road – I 80 east bound on and off ramps
6. Elmira Road – I 80 westbound on and off ramps

Peak hour vehicular LOS for the ramp operations were determined using the latest HCS Highway Capacity Software, ***HCS 2017, Freeways Version 7.2.1,*** *(McTrans, University of Florida*), which implements HCM 2010 methodologies. Table 2 presents the LOS thresholds for the freeway and ramp segments that were used in this study to determine level of service. The HCS software incorporates this information automatically.

Table 2: Highway & Ramp Level of Service Criteria

	Density (pc/mi/ln)				
Segment Type	**A**	**B**	**C**	**D**	**E**
Freeway	11	18	26	35	45
Merge	10	20	28	35	45
Diverge	10	20	28	35	45
Weave	10	20	28	35	45

Source: Highway Capacity Manual, Fifth Edition, Transportation Research Board, 2010.

City Level of Service Policy

The City of Vacaville General Plan, adopted in August 11, 2015 has the following policies relating to level of service and traffic congestion. These conditions vary depending on whether the intersection is in a Priority Development Area (PDA). If in a PDA, there is a more relaxed calculation of level of service based on delay. LOS D delay up to 55 seconds is permissible at a signalized intersection. For non-PDA areas, this threshold is LOS D with 45 seconds of delay at a signalized intersection.

> **Policy TR-P3.1** Strive to maintain LOS C as the LOS goal at all intersections and interchanges to facilitate the safe and efficient movement of people, goods, and services. Design improvements to provide LOS C conditions based on the City's most recent 20+ year traffic forecast. At un-signalized intersections, maintain an overall LOS C standard with the worst approach to the intersection not exceeding LOS D.

Policy TR-P3.2 At signalized and all-way stop control intersections, LOS mid-D (up to 45 seconds of delay) shall be the LOS significance threshold. At two-way stop control intersections, LOS mid-E shall be the LOS significance threshold on the worst approach (with LOS D overall).

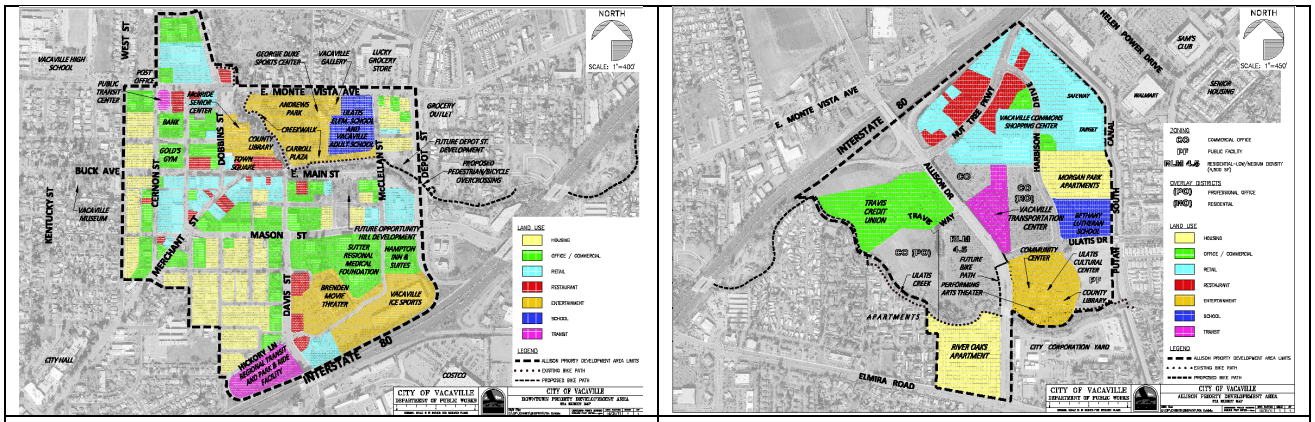
Policy TR-P3.3 To allow for infill development and higher density development at transit centers, the LOS significance threshold shall be LOS D (up to 55 seconds of delay) at signalized and all-way stop control intersections in the Downtown Urban High Density Residential Overlay District or other Priority Development Areas (PDA) designated by the City. At two-way stop controlled intersections in these areas, the overall LOS significance threshold shall be LOS mid-E with the worst approach not exceeding LOS E.

Policy TR-P3.4 The City may allow LOS above the established LOS significance thresholds for a particular location as an interim level of service where improvements are programmed by the City that will improve the service to an acceptable level.

Policy TR-P3.5 The City may allow LOS above the established LOS significance thresholds for a particular location on the basis of specific findings described in Chapter 14.13 of the Vacaville Land Use and Development Code, Traffic Impact Mitigation Ordinance.

In 2013, the City of Vacaville adopted Resolution Number 2013-23, which establishes the Highway Capacity Manual method as the standard for transportation congestion analyses and Level of Service Mid-D (<45 second delay) as the threshold of significance for the General Plan update environmental impact report. The resolution also established the initiation of an amendment to Chapter 14.13.180 of the Vacaville Land Use and Development Code, Traffic Impact Mitigation Ordinance.

Study Intersections #11, #12, #15, #16, and #20 fall within Priority Development Areas (PDA), with #20 in the Downtown PDA, and the remaining within the Allison/Ulatis PDA, as shown in *Figure 5, Priority Development Areas*. Therefore, consistent with City policies, this study will consider LOS D as the standard acceptable threshold for signalized intersections.



Priority Development Area (PDA) for Downtown | **Allison/Ulatis PDA**

Figure 5. Priority Development Areas

Significance Thresholds

Caltrans Facilities. Based on Caltrans' Guide for the Preparation of Traffic Impact Studies, the project is considered to have a significant impact under the following conditions:

- Project traffic causes the target LOS to be exceeded; or
- If the facility is operating above the target LOS, if the target LOS is exceeded.

City of Vacaville Signalized or Unsignalized Intersections. Based on City's direction and practice, the project is considered to have a significant impact if:

- Project traffic causes minimum LOS standards to be exceeded; or
- Project traffic increases the average delay ***by more than 5 seconds*** for intersections operating at an unacceptable service level without the project (>45 seconds delay for Non-PDA signalized intersections, and >55 seconds delay for PDA signalized intersections).

Road Segments

Table 3 defines the road segment capacities used in this analysis to evaluate project traffic on three different types of roadway segments. These include 6 lane divided arterial, 4 lane divided arterial, and 2 lane undivided arterial cross-section types. Road segment analyses are more broad-brush, in that this methodology does not take into consideration the congestion dynamics that take place at intersections. Still, it provides a basis for analyzing roadway cross-section sizing needs between intersections.

Table 3. Roadway Segment Capacity and Level of Service Criteria

6LDA = 6 lane divided arterial, LOS C two-way capacity=5200, LOS C directional=60% = 3120

4LDA = 4 lane divided arterial, LOS C two-way capacity=3440, LOS C directional=60% = 2064

2LUA = 2 lane undivided arterial, LOS C two-way capacity=1500, LOS C directional=60% = 900

source: City of Vacaville, Traffic Engineer

Data Collection and Analysis of Data.

New traffic counts were conducted and developed by PRISM Engineering at several locations, and these were checked with existing data obtained from the City at most study intersections. We conducted an extensive analysis with existing traffic count data to compare link segment volumes derived from intersection turning movement counts, as well as stand-alone hose counts for link segments to be analyzed as a part of this traffic study. PRISM Engineering also took a new intersection turning movement count during a.m. and p.m. peak hours on Cliffside Drive near the Park and Ride lot (at west end of Cliffside Dr. at I-80 ramps).

Through an analysis of adjacent land use trip generation via the four driveways on Cliffside Drive, it was determined that the volume differential between the new count at the west end of Cliffside was similar to the totals from the previous intersection turning movement count at Peabody Road and Cliffside Drive (nearly identical). This served to validate the existing count data with current levels of traffic. Table 3 summarizes the existing Year 2017 conditions a.m. and p.m. peak hour level of service analyses at each of the 20 study intersections. Table 4 summarizes the roadway segment Year 2017 level of service analysis for the existing a.m. and p.m. peak hours. Only one street segment was experiencing an unsatisfactory level of service for the

roadway segment analysis. This was for the street segment from Orange Drive to Sequoia White Pine which had a capacity of 900 vehicles per hour for LOS C conditions, but the one-way p.m. peak hour volume on this street segment was 1018 vehicles per hour. In the legend at the bottom of the table, the various two-way total and one-way 60% capacities are defined for different types of roadways. It can be seen from Table 4 that there are seven intersections in the p.m. peak hour, that are now at unacceptable levels of service. For example, at Leisure Town Road and Ulatis Drive, an LOS F condition is calculated for the eastbound approach. This unacceptable condition is highlighted with a tan colored shading corresponding to the color code and explanation in the legend of the table. Table 5 shows the Existing Conditions capacity analysis results for the link segment volumes shown. One location on Leisure Town (c) is unacceptable.

Table 4. Existing Conditions Intersection Capacity Analysis

	INTERSECTION LOCATION	Control	YEAR 2017 Peak Hour			
			AM Peak		PM Peak	
			LOS	Delay	LOS	Delay
1	Leisure Town Rd at I-80 EB Ramps	S	B	19.3	B	20.0
2	Leisure Town Rd at I-80 WB Ramps	S	A	5.9	A	5.8
3	Leisure Town Rd at Orange Dr	S	B	16.4	B	18.5
4	Leisure Town Rd at Sequoia Dr	S	A	8.6	B	12.0
5	Leisure Town Rd at Ulatis	*TW*	B	12.9	A	*5.5*
		EB	F	123	F	65
6	Leisure Town Rd at Elmira Rd	S	C	33.6	D	36.1
7	Leisure Town Rd at Marshall Rd	*TW*	A	6.9	A	*3.9*
		EB	F	78	F	75
8	Leisure Town Rd at Alamo Dr	S	C	24.9	D	39.8
9	Leisure Town Rd at Vanden Rd	S	A	9.2	A	9.2
10	Nut Tree Rd at Ulatis Dr	S	C	27.4	E	55.3
11	Allison Dr at Ulatis Dr	S	B	13.4	B	13.6
12	Allison Dr at Nut Tree Parkway	S	B	17.8	C	32.8
13	Allison Dr at E. Monte Vista Ave	S	C	20.6	D	35.6
14	Browns Valley Pkwy at E.Monte Vista	S	B	17.1	B	18.3
15	Nut Tree Rd at Elmira Rd	*S*	D	36.5	D	44.4
16	Allison Dr at Elmira Rd	S	B	19.5	C	33.2
17	Peabody Rd at Elmira Rd	S	C	23.3	E	57.6
18	Peabody Rd at Cliffside Dr	S	B	19.3	D	46.4
19	Park / Ride at Cliffside Dr (I-80 ramps)	*TW*	A	0.1	A	*0.1*
		SB	B	10.9	B	14.5
20	Depot St at Mason St (I-80 ramps)	S	D	54.0	E	79.9

LEGEND

Control: S=Signal, AW=All-Way Stop, TW=Stop Sign Side Street, NB=NB approach Stop

NOTE: Calculations based on HCM 2010 & 2000 methdology for intersection level of service (signal, two-way), with specific City of Vacaville GP exceptions as defined below:

#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Inside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **55** secs de*
#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Outside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **45** secs de*
#	**TWSC, LOS UNACCEPTABLE...** *Outside PDA (Priority Development Area)*	*Two-way Stop max LOS threshold = LOS mid-E @ **42.5** secs delay worst approach, **or** overall max LOS*

source: Synchro 9 HCM and PRISM Engineering

Table 5. Link Segment Capacity Analysis for Existing AM and PM Peak Hour

ROAD TYPE	SEGMENT LOCATION	YEAR 2017 PM Peak Volume 2way	YEAR 2017 PM Peak Volume 1way	YEAR 2017 PM Peak Analysis LOS C	YEAR 2017 PM Peak Analysis OK?	YEAR 2017 AM Peak Volume 2way	YEAR 2017 AM Peak Volume 1way	YEAR 2017 AM Peak Analysis LOS C	YEAR 2017 AM Peak Analysis OK?	ADT*
	LEISURE TOWN ROAD									
6LDA	a. North of I 80 east bound ramps	2827	1475	3120	yes	2198	1394	3120	yes	33924
6LDA	b. I 80 east bound ramps to Orange Drive	2219	1234	3120	yes	1704	989	3120	yes	26628
2LUA	c. Orange drive to Sequoia white Pine	1741	1018	900	NO	1507	965	900	NO	20892
2LUA	d. Ulatis/Hawkins to Sequoia White Pine	1647	842	900	yes	1418	829	900	yes	19764
2LUA	e. Elmira road to Ulatis Drive Hawkins Road	1647	845	900	yes	1424	854	900	yes	19764
2LUA	f. Alamo Drive fry Road to Elmira Dr.	1183	634	900	yes	1013	523	900	yes	14196
2LUA	g. Vanden Road to Alamo Drive	1183	634	900	yes	1013	523	900	yes	14196
2LUA	h. South of Vanden Road	1228	349	900	yes	814	568	900	yes	14736
	HAWKINS ROAD									
2LUA	a. East of north south arterial	99	64	900	yes	99	64	900	yes	1188
2LUA	b. Leisure Town Road to north south arterial	99	64	900	yes	99	64	900	yes	1188
	ULATIS DRIVE									
4LDA	a. West of nut tree Road	962	384	2064	yes	801	456	2064	yes	11544
4LDA	b. Leisure Town Road to Nut tree Road	317	180	2064	yes	328	177	2064	yes	3804
	ALLISON DRIVE									
4LDA	a. Ulatis Road to nut tree Parkway	1674	728	2064	yes	1094	602	2064	yes	20088
6LDA	b. North of nut tree Parkway	2556	1778	3120	yes	1370	950	3120	yes	30672
	ELMIRA ROAD									
4LDA	a. West of nut tree Road	1476	657	2064	yes	1533	911	2064	yes	17712
4LDA	b. Nut tree road to leisure Town Road	1259	635	2064	yes	1119	679	2064	yes	15108
2LUA	c. Leisure Town Road to north south arterial	157	61	900	yes	110	56	900	yes	1884
2LUA	d. East of north south arterial	110	56	900	yes	110	56	900	yes	1320

LEGEND for LOS Calculation

6LDA = 6 lane divided arterial, LOS C two-way capacity=5200, LOS C directional=60% = 3120

4LDA = 4 lane divided arterial, LOS C two-way capacity=3440, LOS C directional=60% = 2064

2LUA = 2 lane undivided arterial, LOS C two-way capacity=1500, LOS C directional=60% = 900

Source: *New hose counts and conservatively high intersection counts for am and pm peak hours. Example calculation for segment north of intersection: NB Link = EBL+NBT+WBR. SB Link = SBL+SBT+SBR. 2-way total = EBL+NBT+WBR+SBL+SBT+SBR.*

Note: **ADT averages approximately 12 times the peak hour two-way total.*

Figure 6 shows the a.m. peak hour turning movement volumes and lane geometry for each of the 20 study intersections as well as peak hour and factor values. These volumes and lane configurations were used in the highway capacity manual (HCM) analysis using the Synchro 9 software. Figure 7 shows the same volumes and lane geometry for the p.m. peak hour. Table 6 shows the freeway volumes and capacity analysis results for the existing and future without project scenarios on the mainline I-80 freeway in Vacaville.

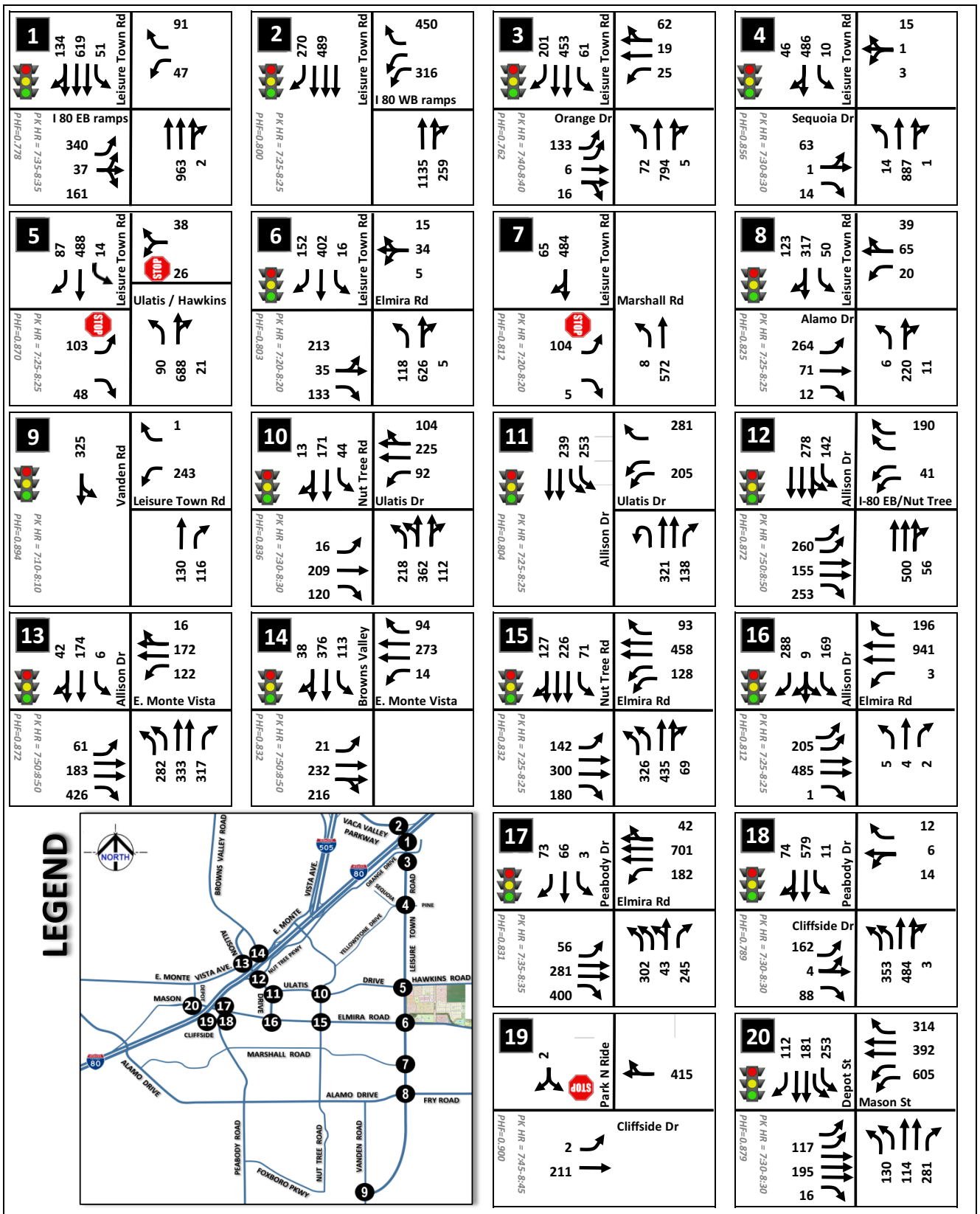


Figure 6. AM Peak Hour Turn Moves, Geometry, and Traffic Control

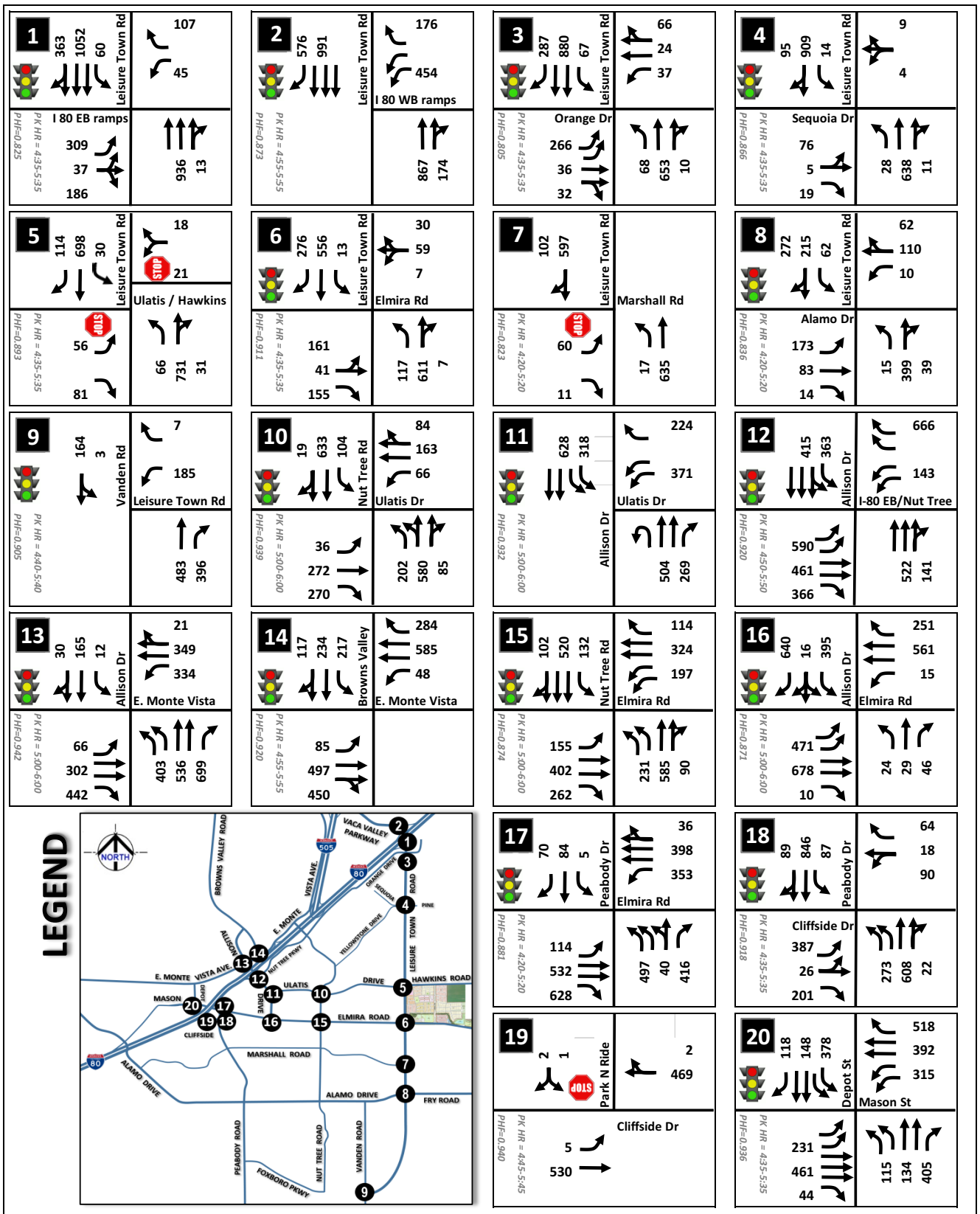


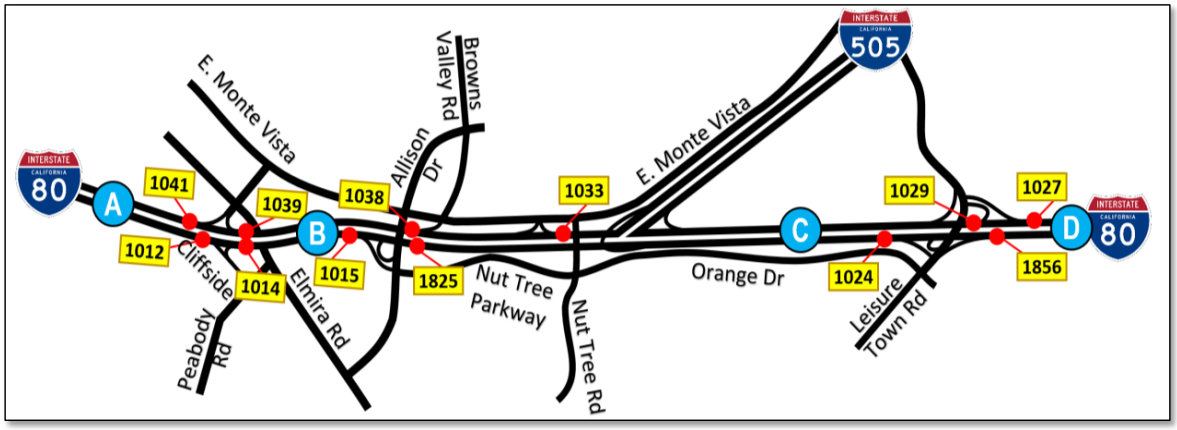
Figure 7. PM Peak Hour Turn Moves, Geometry, and Traffic Control

Table 6. Freeway Capacity Analysis

GP Model NODE	Analysis Type, Location	EAP + The Farm				Year 2035 + The FARM			
		Volume		*Density & LOS*		*Volume*		*Density & LOS*	
		AM	PM	AM	PM	AM	PM	AM	PM
A	I-80 WB Mainline w/o Elmira	5,704	6,787	21.0, C	26.5, D	5,830	6,900	23.5, C	30.1, D
	I-80 EB Mainline w/o Elmira	4,786	7,192	17.1, B	29.0, D	4,684	7,652	17.8, B	36.3, E
1041	Merge WB, I-80 at Depot	948	590	33.7	24.8	1039	685	36.9	28.8
1039	Diverge WB, I-80 at Depot	599	747	19.0	28.1	658	869	20.9	32.7
1012	Diverge EB, I-80 at Cliffside	255	662	7.3	30.8	292	755	8.3	35.1
1014	Merge EB, I-80 at Cliffside	490	550	14.7	26.9	561	631	16.8	30.9
B	I-80 WB Mainline e/o Elmira	5,009	7,170	18.0, B	28.9, D	5,523	7,257	21.9, C	32.9, D
	I-80 EB Mainline e/o Elmira	5,190	7,131	18.7, C	28.6, D	4,940	7,806	19.1, C	37.8, E
1038	Merge WB, I-80 at Allison	740	885	17.6	27.6	888	1055	21.1	32.9
1033	Diverge WB, I-80 at Nut Tree	NA	NA	NA	NA	NA	NA	NA	NA
1015	Diverge EB, I-80 at Allison	833	1802	NA	LOS F	1076	2044	NA	LOS F
1825	Merge EB, I-80 at Allison	349	174	37.3	29.4	435	164	46.4	27.7
C	I-80 WB Mainline w/o Leisure Town	3,502	5,039	16.6, B	26.2, D	4,506	5,273	17.2, B	20.6, C
	I-80 EB Mainline w/o Leisure Town	4,456	5,096	22.1, C	26.6, D	4,345	6,103	16.5, B	25.0, C
1029	Merge WB, I-80 at Leisure Town	270	576	7.9	19.6	324	686	9.4	23.4
1027	Diverge WB, I-80 at Leisure Town	768	767	17.1	20.0	1307	1041	29.1	27.1
1024	Diverge EB, I-80 at Leisure Town	700	845	17.1	29.0	834	858	20.3	29.4
1856	Merge EB, I-80 at Leisure Town	134	363	6.2	23.6	59	363	2.7	23.6
D	I-80 WB Mainline e/o Leisure Town	4,314	4,157	21.2, C	20.2, C	5,193	4,460	30.3, D	24.1, C
	I-80 EB Mainline e/o Leisure Town	3,901	4,763	18.8, C	24.2, C	3,979	6,034	20.8, C	40.2, E

Note: LOS calculated with HCS 7 Freeway HCM 2010 methodology. Density=PC/MI/LN

MAP LEGEND



Transit Service

Figure 8, Transit Service in Vacaville, shows the various bus service lines operative in Vacaville. These services are provided by Vacaville City Coach, Fairfield and Suisun Transit (FAST), and YOLOBUS.

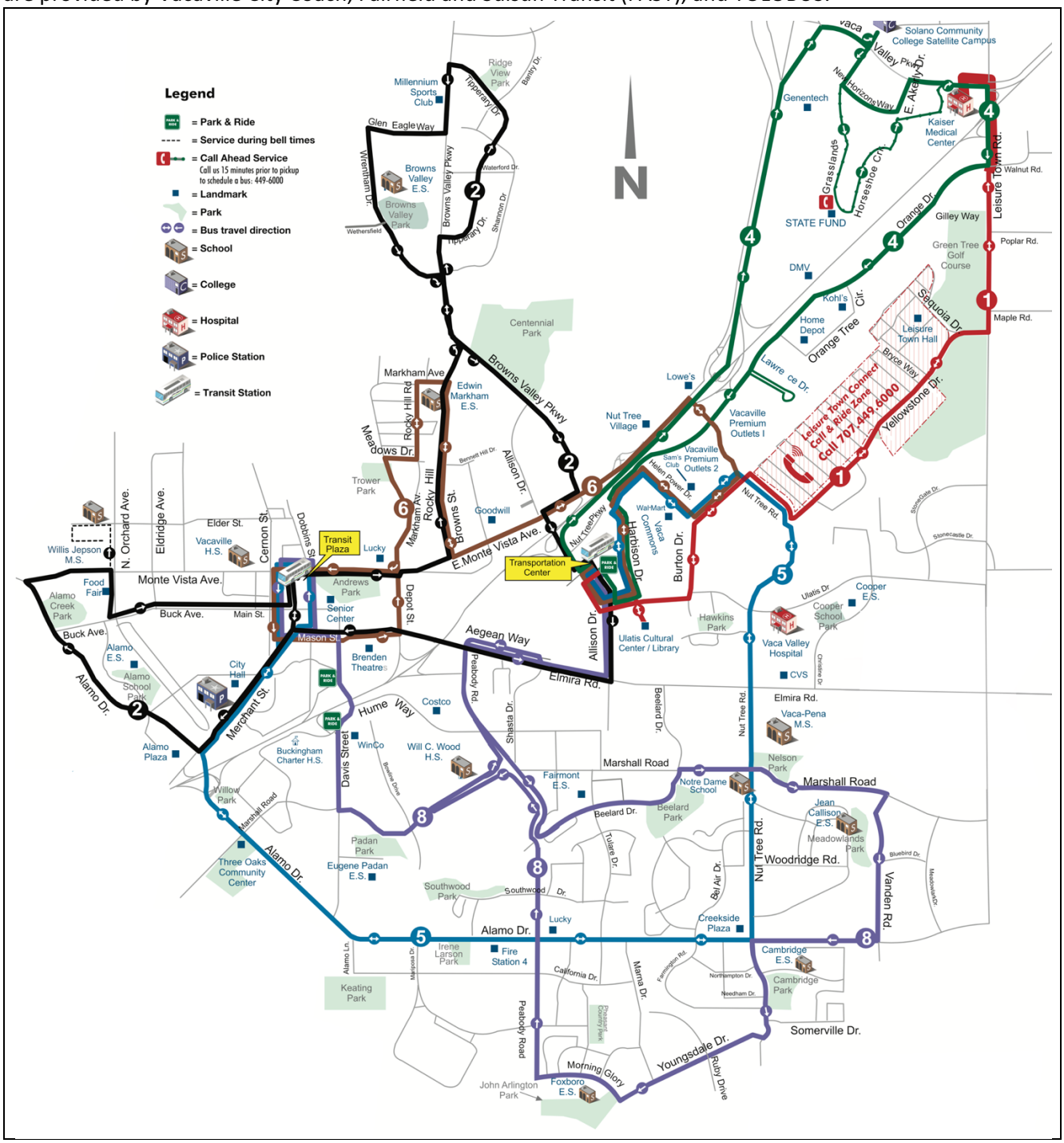


Figure 8. Transit Service in Vacaville
Source: www.citycoach.com

Vacaville City Coach offers six local fixed-route services to or from the Vacaville Transportation Center located on Allison Drive at Travis Way. The Transportation Center also serves as a transfer point for intercity routes operated by Fairfield and Suisun Transit. The Vacaville Regional Transportation Center, located at the corner of Davis Street and Hickory Lane, is another key intercity transit hub, with two nearby park and ride lots along Davis Street on either side of Interstate 80. In addition to the fixed-route service, City Coach Special Services provides Americans with Disabilities Act (ADA) paratransit service to eligible residents within Vacaville. Trips beyond the city limits of Vacaville may be specially arranged with City Coach. Fairfield and Suisun Transit (FAST) offers three intercity routes through Vacaville, primarily to serve weekday commuters. YOLOBUS offers one fixed bus route between Vacaville and Davis via Interstate 505 and Winters that provides three daily trips in each direction from Monday to Saturday.

The Farm at Alamo Creek Specific Plan project site is not currently directly served by any public transit service (does not exist on Leisure Town Road south of Sequoia Drive. The nearest bus stop for City Coach's Route 5 is located on Nut Tree Road near Ulatis Drive, which is over 1.5 miles away from the corner of Leisure Town at Hawkins or at Elmira Road. City Coach Route 5 operates in both directions, connecting with the Transit Plaza via Nut Tree to Alamo to Merchant St. Its operating hours are between 6:15 A.M. and 6:45 P.M. on weekdays and 8:15 A.M. and 6:15 P.M. on Saturday.

Existing Bicycle Facilities

Figure 9, Bicycle Facilities in Vacaville, shows the various bike routes and paths currently in place in Vacaville.

The City currently classifies bikeways into three categories: bike path (Class I), bike lane (Class II), and bike route (Class III). Bike paths meet the state requirements for Class I shared-use paths. These paths are dedicated off-street public paths designed and constructed for both bicycle and pedestrian traffic. In the project vicinity, Alamo Creek Bikeway is a bike path along Alamo Creek between Marshall Road and Leisure Town Road. Bike lanes meet the State requirements for striped on-street Class II bike lanes. These lanes are marked exclusively for bike travel on roadways. Bike lanes are provided between Leisure Town Road and just east of Nut Tree Road in the vicinity of the project. Bike routes meet the State requirements for Class III on-street bike routes. On-street bike routes, which must be signed or marked, bicycle riders must share the roadway with vehicles. There are no existing on-street bike routes in the project vicinity. However, several facilities are planned in the study area, including the Elmira Road Bike Path, Ulatis Creek Bike Path, and Jepson Parkway Bike Path.

Existing Pedestrian Facilities Fronting Project Site

Existing pedestrian facilities in the "The Farm at Alamo Place" Specific Plan project vicinity are limited because this area is currently at the urban fringe. In Vacaville, sidewalks with raised curb and gutter are typically provided along arterials and collectors, as well as in newer residential developments. In the project site vicinity, sidewalks are provided only on the west side of Leisure Town Road from Elmira Road to Hawkins Road. Also, there are sidewalks installed for that portion of Brighton Landing on the south side of Elmira Road west of where Carroll Way will be installed (1/2 mile east of Leisure Town Road). There are no sidewalks or paved shoulders installed on Elmira Road east of Leisure Town Road.

At the signalized intersection of Leisure Town Road (Jepson Parkway) / Elmira Road (#6), pedestrian signal heads are provided as well as marked crosswalks on the north and west legs of the intersection. There are no sidewalks or paved shoulders on Hawkins Road.

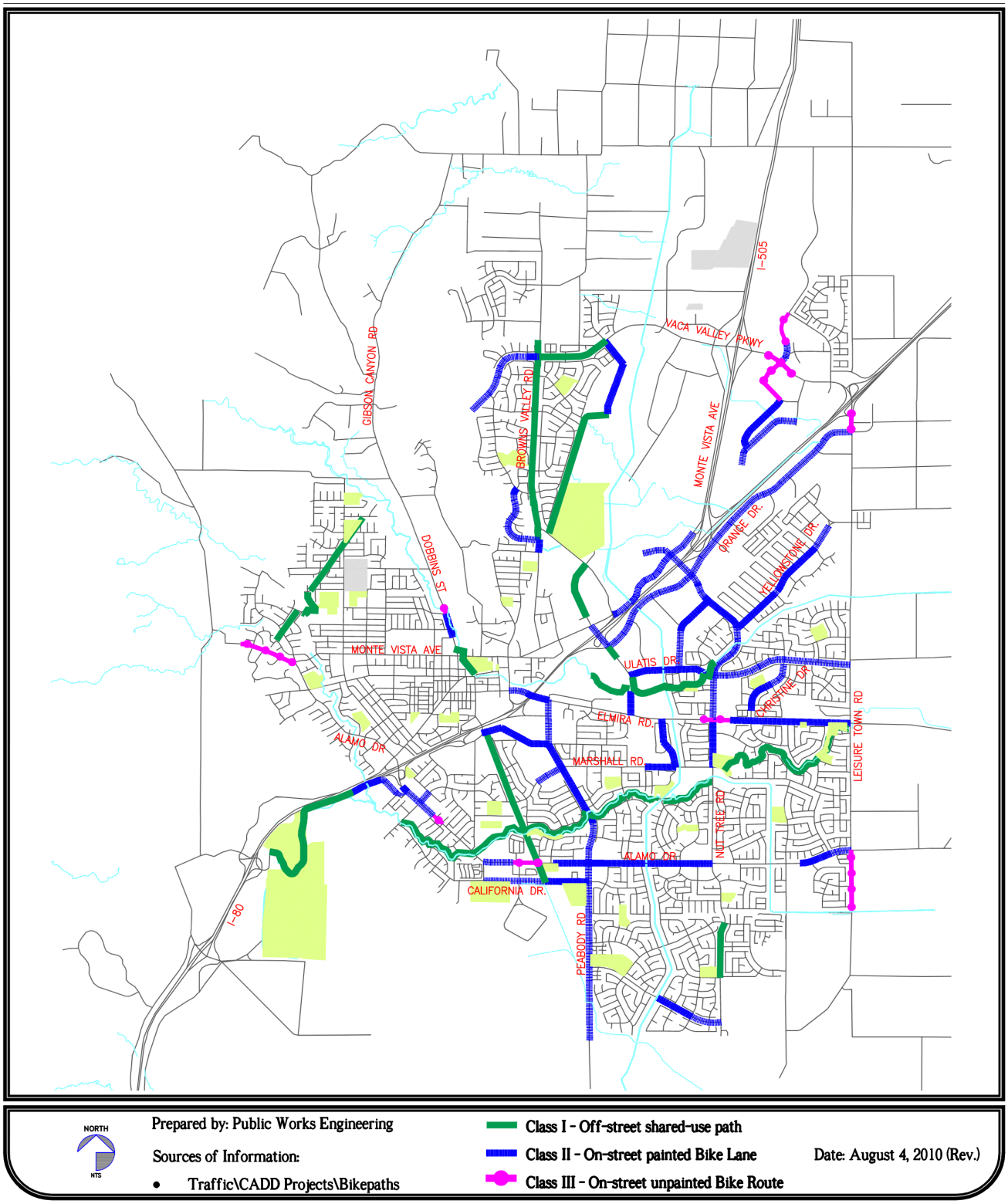


Figure 9. Bicycle Facilities in Vacaville

Source: www.citycoach.com

Planned Transportation Improvements

The planned transportation improvement most relevant to The Farm at Alamo Creek Specific Plan is the Jepson Parkway Road Widening Project, currently underway, which will widen Leisure Town Road to four lanes.

Jepson Parkway Road Widening Project

Jepson Parkway is planned as a four-lane road connecting SR 12 in Fairfield/Suisun City with I-80 in Vacaville. The alignment would include portions of the current alignments of Peabody Road, Vanden Road and Leisure Town Road. The Jepson Parkway Concept Plan provides design guidelines and requirements for each segment of the Parkway. The full project is not funded for implementation.

The City of Vacaville has construction taking place for the initial phase of Jepson Parkway between Vanden Road on the south and to a point on Leisure Town Road just north of the intersection with Elmira Road. Construction started in the spring of 2017, and is expected to take two years. The Jepson Parkway Road Widening Project will include an off-street bicycle and pedestrian path on the west side of the roadway.

Regulatory Setting

Existing transportation policies, plans, laws and regulations that apply to the proposed project are summarized below. This information provides a context for the impact discussion related to the project's consistency with applicable regulatory conditions.

FEDERAL REGULATIONS

This section summarizes federal agencies and laws pertinent to the proposed project.

Federal Highway Administration

The Federal Highway Administration (FHWA) is the agency of the United States Department of Transportation (DOT) responsible for the federally funded roadway system, including the interstate highway network and portions of the primary State highway network, such as Interstate 80 (I-80). FHWA funding is provided through the Moving Ahead for Progress in the 21st Century (MAP-21). MAP- 21 can be used to fund local transportation improvements in Vacaville, such as projects to improve the efficiency of existing roads, traffic signal coordination, bikeways, and transit system upgrades.

Americans with Disabilities Act

The Americans with Disabilities Act (ADA) of 1990 provides comprehensive rights and protections to individuals with disabilities. The goal of the ADA is to assure equality of opportunity, full participation, independent living, and economic self-sufficiency. To implement this goal, the United States Access Board has created accessibility guidelines for public rights-of-way. The guidelines address various issues, including roadway design practices, slope and terrain issues, and pedestrian access to streets, sidewalks, curb ramps, street furnishings, pedestrian signals, parking, and other components of public rights-of-way. The guidelines would apply to proposed roadways in the project area.

STATE REGULATIONS

This section summarizes State agencies, regulations, and policies that pertain to transportation in Vacaville.

California Department of Transportation (Caltrans). The California Department of Transportation (Caltrans) is the primary State agency responsible for transportation issues. One of its duties is the construction and maintenance of the State highway system. Caltrans has established standards for roadway traffic flow and developed procedures to determine if State-controlled facilities require improvements. For projects that may physically affect facilities under its administration, Caltrans requires encroachment permits before any construction work may be undertaken. For projects that would not physically affect facilities, but may influence traffic flow and levels of services at such facilities, Caltrans may recommend measures to mitigate the traffic impacts of such projects. Caltrans facilities within the Vacaville study area include Interstate 80 and Interstate 505, as well as the on- and off-ramps from these State facilities.

The following Caltrans procedures and directives are relevant to the project:

- **Level of Service Target**. Caltrans maintains a minimum level of service at the transition between LOS C and LOS D for all of its facilities. Where an existing facility is operating at less than the LOS C/D threshold, the existing measure of effectiveness should be maintained[1].
- **Environmental Assessment Review and Comment**. Caltrans, as a responsible agency under the California Environmental Quality Act (CEQA), is available for early consultation on projects to provide guidance on applicable transportation analysis methodologies or other transportation related issues, and is responsible for reviewing traffic impact studies for errors and omissions pertaining to the State highway facilities. In relation to this role, Caltrans published the Guide for the Preparation of Traffic Impact Studies (December 2002), which establishes the Measures of Effectiveness as described under "Level of Service Target" above. The Measures of Effectiveness are used to determine significant impacts on State facilities. The Guide also mandates that traffic analyses include mitigation measures to lessen potential project impacts on State facilities and to meet each project's fair share responsibility for the impacts. However, the ultimate mitigation measures and their implementations are to be determined based on consultation between Caltrans, the City of Vacaville, and the project proponent.

Regional Regulations

This section summarizes regional agencies, plans, and policies that pertain to transportation in Vacaville.

Metropolitan Transportation Commission. The Metropolitan Transportation Commission (MTC) is the transportation planning, coordinating, and financing agency for the nine-county Bay Area, including Solano County. It also functions as the federally mandated metropolitan planning organization (MPO) for the region. MTC authored the current regional transportation plan known as Transportation 2035 that was adopted on April 22, 2009. Transportation 2035 specifies a detailed set of investments and strategies throughout the region from 2010 through 2035 to maintain, manage, and improve the surface transportation system, specifying how anticipated federal, State, and local transportation funds will be spent. The projects included in the 2035 Plan that will most directly affect the proposed project are:

- Construction of a new Fairfield/Vacaville Multi-Modal Train Station at the southeast corner of Peabody Road and Vanden Road in northeast Fairfield for Capitol Corridor intercity rail service.
- Construction of Jepson Parkway from Route 12 to Interstate 80 at the Leisure Town Road Interchange. In Vacaville, Jepson Parkway will follow the Leisure Town Road alignment along the western border of the Brighton Landing Specific Plan area.

Solano Transportation Authority. The Solano Transportation Authority (STA) has been designated as the Congestion Management Agency to address congestion issues in Solano County and the seven cities within the county, including Vacaville. It is responsible for countywide transportation planning, programming transportation funds, managing and providing transportation programs and services, delivering transportation projects, and setting transportation priorities. The STA Board of Directors adopted the Solano County

[1] California Department of Transportation, 2002. Guide for the Preparation of Traffic Impact Studies.

Comprehensive Transportation Plan (CTP 2030)[2] in June 2005. The Plan envisions, directs, and prioritizes the transportation needs of Solano County through 2030. As the designated Congestion Management Agency, STA worked with jurisdictions within the county, including Vacaville, to identify locations where periodic congestion monitoring would occur as required by the State's CMP legislation. Level of service standards are established for segments of the CMP roadway system that connect communities with each other and with the State highway system.

Local Regulations

This section summarizes City policies and regulations that pertain to transportation in Vacaville.

Vacaville General Plan. The City of Vacaville's General Plan contains guiding and implementing policies that are relevant to transportation and circulation in the study area. These guiding and implementing policies are presented in Table 7.

Through the General Plan update and adoption process in 2015, the City assessed the operational analysis methodology in the Transportation Research Board's Highway Capacity Manual as an alternative to the Circular 212 Planning Method that the City previously used to perform intersection level of service.

Table 7: City of Vacaville General Plan – Guiding Policies

POLICY	DESCRIPTION
TR-P1.3	Continue to coordinate and support regional efforts to construct Jepson Parkway in accordance with the Jepson Parkway Concept Plan (2000), or subsequent updates to the Plan for Jepson Parkway.
TR-P2.1	Work with the California Department of Transportation (Caltrans) and Solano Transportation Authority (STA) to achieve timely construction of programmed freeway and interchange improvements.
TR-P2.3	Encourage Caltrans to widen and upgrade Interstate 80 through Vacaville. In new development areas adjoining Interstate 80 and Interstate 505, require major building setbacks and offers-of-dedication to permit the long-term planning and widening of the freeways.
TR-P3.1	Strive to maintain LOS C as the LOS goal at all intersections and interchanges to facilitate the safe and efficient movement of people, goods, and services. Design improvements to provide LOS C conditions based on the City's most recent 20+ year traffic forecast. At unsignalized intersections, maintain an overall LOS C standard with the worst approach to the intersection not exceeding LOS D.
TR-P3.2	At signalized and all-way stop control intersections, LOS mid-D shall be the LOS significance threshold. At two-way stop control intersections, LOS mid-E shall be the LOS significance threshold on the worst approach.
TR-P3.3	To allow for infill development and higher density development at transit centers, the LOS significance threshold shall be LOS D at signalized and all-way stop control intersections in the Downtown Urban High Density Residential Overlay District or other Priority Development Areas (PDA) designated by the City. At two-way stop controlled intersections in these areas, the overall LOS significance threshold shall be LOS mid-E with the worst approach not exceeding LOS E.

[2] Solano Transportation Authority, Solano Comprehensive Transportation Plan, adopted June 8th 2005.

TR-P3.4	The City may allow LOS above the established LOS significance thresholds for a particular location as an interim level of service where improvements are programmed by the City that will improve the service to an acceptable level.
TR-P3.5	The City may allow LOS above the established LOS significance thresholds for a particular location on the basis of specific findings described in Chapter 14.13 of the Vacaville Land Use and Development Code, Traffic Impact Mitigation Ordinance.
TR-P3.7	Roadway improvements implemented by the City using the Development Impact Fee Program or other funding sources shall be designed based on the level of service standards prescribed in Policies TR-P3.1 and TR-P3.3.
TR-P3.8	Require roadway improvements implemented by development projects to be designed based on the level of service standards prescribed in Policies TR-P3.2 and TR-P3.3.
TR-P4.1	Evaluate development proposals based on the level of service standards prescribed in Policies TR-3.1 through TR-3.5.
TR-P4.2	As part of development approvals, require reasonable demonstration that traffic improvements necessary to mitigate development in accordance with Policies TR-3.1 through TR-3.3 will be in place in time to accommodate trips generated by the project, or satisfy findings identified in Policies TR-3.4 and TR-3.5.
TR-P4.3	In order to ensure that adequate roadway capacity is provided for the buildout of the General Plan and that new development does not preclude the construction of adequate circulation facilities, require all new development to provide right-of-way dedications consistent with this Transportation Element (Figure TR-6).
TR-P4.4	When reviewing development proposals, consider Year 2035 projections for fair share contributions to transportation improvements (as shown in Figure TR-5) and full buildout projections (beyond Year 2035) for dedication of right of way for future road improvements (as shown in Figure TR-6).
TR-P4.5	For locations where the LOS would exceed thresholds described in Policies TR-P3.2 and TR-P3.3 without the addition of traffic from a proposed development, the City may establish impact and mitigation criteria based on the incremental traffic contribution from the proposed development as described in Chapter 14.13 of the Land Use and Development Code (Traffic Impact Mitigation Ordinance).
TR-P5.1	Design intersections on arterial roadways to meet level of service standards and to avoid traffic diversion to local roadways or the freeway.
TR-P5.2	Locate high traffic generating uses so that they have direct access or immediate secondary access to arterial roadways, while balancing the need to control the number of driveways that enter arterial roadways.
TR-P6.3	Consider traffic calming measures consistent with the City's traffic calming policies and approved by the City as part of development proposals in an effort to lower vehicle speeds and enhance mobility for bicyclists and pedestrians.
TR-P6.4	Review phased developments for the potential for contributing to, or creating routes for, cut-through traffic, and establish conditions of approval as needed to limit the potential for cut-through traffic on residential roadways.
TR-P7.3	Require that new development applications include transit amenities, such as bus stops, bus bays, transit shelters, benches, and on-site drop-off locations, as appropriate, or explain why these features are infeasible or unnecessary.
TR-P7.4	Require that new development applications design roadway networks to accommodate transit vehicles and facilitate efficient transit routes.
TR-P7.6	Require that new development applications design roadway networks to accommodate on-street bicycle lanes, and only allow bicycle routes with sharrows when on-street bicycle lanes are impractical or infeasible.
TR-P7.7	Require that new roadway networks be designed as a grid pattern to reduce circuitous travel patterns and improve access and circulation for all modes.
TR-P7.8	Prioritize transportation improvements that support and enhance travel by transit, bicycle, and pedestrian modes to and from designated Priority Development Areas (PDA).

TR-P8.4	Require that new development applications include bike paths or bike lanes, when appropriate
TR-P8.5	Enhance and improve bicycle connections between neighborhoods and between neighborhoods and significant destinations, such as parks, schools, transit stops and transit centers, shopping centers, and employment centers
TR-P8.9	Require that new multi-family and non-residential developments provide adequate public and private bicycle parking and storage facilities.
TR-P10.1	Cooperate with public agencies and other entities to promote local and regional public transit serving Vacaville
TR-P11.4	Continue to work with Caltrans and the Solano Transportation Authority (STA) to identify and evaluate sites for parking to connect with transit and support rideshare parking, and establish standards for the development of parking sites for rideshare and transit users.
TR-P11.5	Support and encourage Caltrans to preserve options for future transit use when designing improvements for Interstate and State highways.
TR-P11.7	Require specific plans in new growth areas to include planning for future public transit service to these areas by considering the addition of future transit stops and route connections as part of the public transportation system.

Source: City of Vacaville General Plan

Vacaville Municipal Code

The City's Municipal Code includes regulations that govern the transportation system. The Land Use and Development Code, and the Traffic Impact Mitigation Ordinance are of particular relevance to the project. The Land Use and Development Code identifies off-street parking requirements for each type of land use and provides development standards for emergency vehicle and fire apparatus access to residential projects. The Traffic Impact Mitigation Ordinance establishes a procedure to assess and mitigate the potential impacts of proposed development projects on the transportation system.

The Traffic Impact Mitigation Ordinance establishes traffic impact standards, which specifically allow City decision-makers to allow and accept LOS D without mitigation improvements. This standard is more lenient than that indicated in the General Plan, which establishes mid-LOS D using delay-based HCM methodology as the minimum standard of LOS for all intersections, road links, and interchanges. The Traffic Impact Mitigation Ordinance also provides for LOS E and LOS F approval under defined circumstances.

The City's Traffic Impact Mitigation Ordinance requires traffic studies for development projects found to meet the trip generation thresholds established in the ordinance. Traffic studies are required to include traffic analysis for three conditions: Existing Conditions, Existing Conditions plus projects that have been approved (Existing plus Approved Projects) and a 20- to 25-year projection. Transportation improvements required to mitigate impacts are based on results of this analysis. Right of way dedication is required for roadway improvements identified in the current General Plan to accommodate traffic conditions associated with buildout of all allowable land uses. Conditions of approval for development projects involving transportation improvements are based on short term impacts (Existing plus Approved Projects) and the 20-year projections.

Project Impacts for Existing Conditions Analysis

The environmental impacts related to traffic and transportation for the proposed "The Farm at Alamo Place" specific plan project defined in this section, and are compared to existing conditions. Various mitigation measures are set forth to address impacts from the project. PRISM Engineering utilized the latest version of the City's "Cube" traffic model last utilized in the Robert's Ranch traffic study[3]. This model was used to estimate the chip generation and resulting trip distribution of the project traffic for The Farm at Alamo Place. The model assigned the project traffic to the street system, and this information was utilized to determine how to add the project traffics to the existing traffic count data to develop an existing plus project scenario. The resulting turning movements are summarized in the figures that follow, and represent the data that was utilized in the capacity analysis for existing and existing plus project conditions.

Trip Generation

The trip generation totals for the proposed project are presented in *Table 8, Trip Generation of The Farm at Alamo Place.* Table 9 shows the trip distribution of the project. The project had four general land-use categories which require different generation rates. Trip generation rates for the project were obtained from the City's traffic model as well as the Institute of Transportation Engineer's (ITE) Trip Generation, 9th edition (2012), and the City of San Diego Trip Generators for developed city park. These include:

- Single-Family Residential land use category (ITE 210 land use category)
- Neighborhood Commercial (City's traffic model)
- Condo/Townhouse Residential land use category (ITE 230 land use category)
- City Park Developed (San Diego Trip Generators, City Park Developed)

The project site land uses are diverse, and because they complement each other, this situation can help to reduce impacts to adjacent streets outside the project. There is a portion of the trip generation within the project site that will be made by residents living in the development, and these include any vehicle trips made to local parks, neighborhood commercial sites, etc. The proposed neighborhood commercial centers are located on the northwest and the southwest quadrants of the project site. Some of that commercial traffic will be satisfied by local residents who live within the project. The trip generation table shown below shows the various components of this internal to internal and internal to external dynamic (in the footer). Specifically, it was assumed that 25% of the commercial and regional park land uses would be satisfied by local residents that live within the project boundaries. The remaining 75% of traffic from parks and commercial uses were assumed to come from patrons that live outside of the project site. Of those 75% of the commercial trips which could have "pass-by" traffic[4], it was assumed that there would be pass-by reductions for this neighborhood commercial land use. A pass by trip is one where the driver of a car is already on the road as part of another trip, and they stop by a commercial establishment along the way. In other words, the commercial establishment did not increase the local trip generation of the adjacent street traffic for these specific pass-by drivers. Recognizing these kind of trips helps to prevent double counting of traffic and overestimating trip generation increases.

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[3] PRISM Engineering utilized the data sets received from the City of Vacaville, and used the latest version of Cube Voyager ver. 6.4 for use in this study.

[4] Pass-by traffic is traffic that is already on the road (i.e. making a trip home from work) and decides to stop by a store, etc.

Table 8. Trip Generation of The Farm at Alamo Place

			TRIP RATES			DIRECTIONALITY				TRIP ENDS			TRIP ASSIGNMENT			
LAND USE and ITE Code and Description	Qty.	Unit	Week day	AM	PM	AM In	AM Out	PM In	PM Out	Daily	AM	PM	AM In	AM Out	PM In	PM Out
210 - Single Family Home	584	DU	9.52	0.75	1.00	25%	75%	63%	37%	5560	438	584	110	329	368	216
RL, RLM, Lot #'s: 1-2, 4-8, 24-25																
Neighborhood Comm*	7.4	AC	410.30	31.38	37.30	51%	49%	52%	48%	3036	232	276	118	114	144	132
CN, Lot #'s: 3, 12																
230 - Condo/Townhouse	184	DU	5.81	0.44	0.52	17%	83%	67%	33%	1069	81	96	14	67	64	32
RMHD, Lot #'s: 9-10, 13																
City Park DEVELOPED**	19.4	AC	50.00	2.00	4.00	56%	44%	57%	43%	970	39	78	22	17	44	33
PARK, Lot #'s: 17-18																
	768	DU							*Full project driveway volumes*	10635	790	1033	263	527	620	414
									Internal capture of commercial and regional park (assume 25%)	1002	68	88	35	33	47	41
									Pass-by percentage for neighborhood commercial uses (assume 34% of remaining 75%)	1032	59	70	30	29	37	34
									These are the net external project volumes	8601	663	875	198	465	536	338

Source of Trip Rates: ITE Trip Generation Manual 9th ed., with some exceptions as follows:

**Neighborhood Commercial trip rate by acre, source is City of Vacaville*

***PARK (DEVELOPED) Developed parks are those parks that provide a variety of recreation facilities. Such parks provide swings, slides, etc., as well as facilities and fields for participant sports (baseball, softball, tennis, swimming, soccer, football, etc.). Project park site proposes over 200 parking spaces*

Source of this park rate from San Diego Trip Generators, Developed City Park, Table 7

Table 9. Trip Distribution of Project Traffic to Street System

	AM %	PM %	AM total	PM total	AM Peak IN	AM Peak OUT	PM Peak IN	PM Peak OUT
Leisure Town Road, North	28%	23%	186	201	46	107	123	78
Leisure Town Road, South	6%	6%	40	52	12	28	32	20
Ulatis Road, West	26%	28%	172	245	55	130	150	95
Hawkins Road, East	2%	2%	13	17	4	9	11	7
Elmira Road, West	22%	23%	146	201	46	107	123	78
Elmira Road, East	1%	1%	7	9	2	5	5	3
Marshall Road, West	3%	2%	20	17	4	9	11	7
Alamo Drive, West	10%	13%	66	114	26	60	70	44
Alamo/Fry, East	2%	2%	13	17	4	9	11	7
	100%	100%	663	875	198	465	536	338

Source: Table 4 Trip Generation Totals, and City of Vacaville Traffic Model

The City's traffic model also has similar mechanisms built into it to address this dynamic trip generation. The net increase traffic totals from the proposed project are shown at the base of Table 7, and are 663 weekday A.M. and 875 weekday P.M. peak hour vehicle trips, with 8,601 daily trips.

Figures 10 and 11 have been prepared to show the specific "The Farm at Alamo Place" project traffic turning movement volumes at each of the 20 study intersections. These volumes do not include the existing traffic, but only represent distributed project traffic as defined in Tables 7 and 8. The existing traffic control and lane geometry are also shown on these figures. These volumes were developed using the City's traffic model as explained previously.

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the Vacaville General Plan, and professional judgment, a significant impact with respect to transportation and circulation would occur if development of the proposed project would do any of the following:

Circulation System Performance

Would the project conflict with an applicable plan, ordinance or establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

The project impact is considered significant if project-generated traffic would:

For intersections in Vacaville:

- Cause a signalized or all-way stop controlled intersection outside of the Downtown Urban High Density Residential Overlay District to operate below LOS mid-D (average delay of 45 seconds or more for signalized, and 30 seconds or more for all-way stop).
- Cause the worst approach at a one/two-way stop controlled intersection outside of the Downtown Urban High Density Residential Overlay District to operate below LOS mid-E on the worst approach (average delay 45 seconds or more), or conflict with City policy to design intersections to provide for LOS D on the worst approach in the horizon year development forecast.
- Cause a signalized intersection or all-way stop controlled intersection in the Downtown Urban High Density Residential Overlay District to operate below LOS D (an average delay of 55 seconds or more for signalized and 35 seconds or more for all-way stop).
- Cause a one/two-way stop controlled intersection in the Downtown Urban High Density Residential Overlay District to operate below LOS mid-E (an average delay of 45 seconds or more), or the worst approach to the intersection to operate below LOS E (an average delay of 50 seconds or more).
- Cause the volume-to-capacity ratio to increase by 0.02 or more at a signalized intersection or road segment operating at an unacceptable service level without the project.
- Cause the average delay to increase by 5 seconds or more at an unsignalized intersection operating at an unacceptable service level without the project.

These guidelines were followed in determining the need for mitigation of substandard conditions.

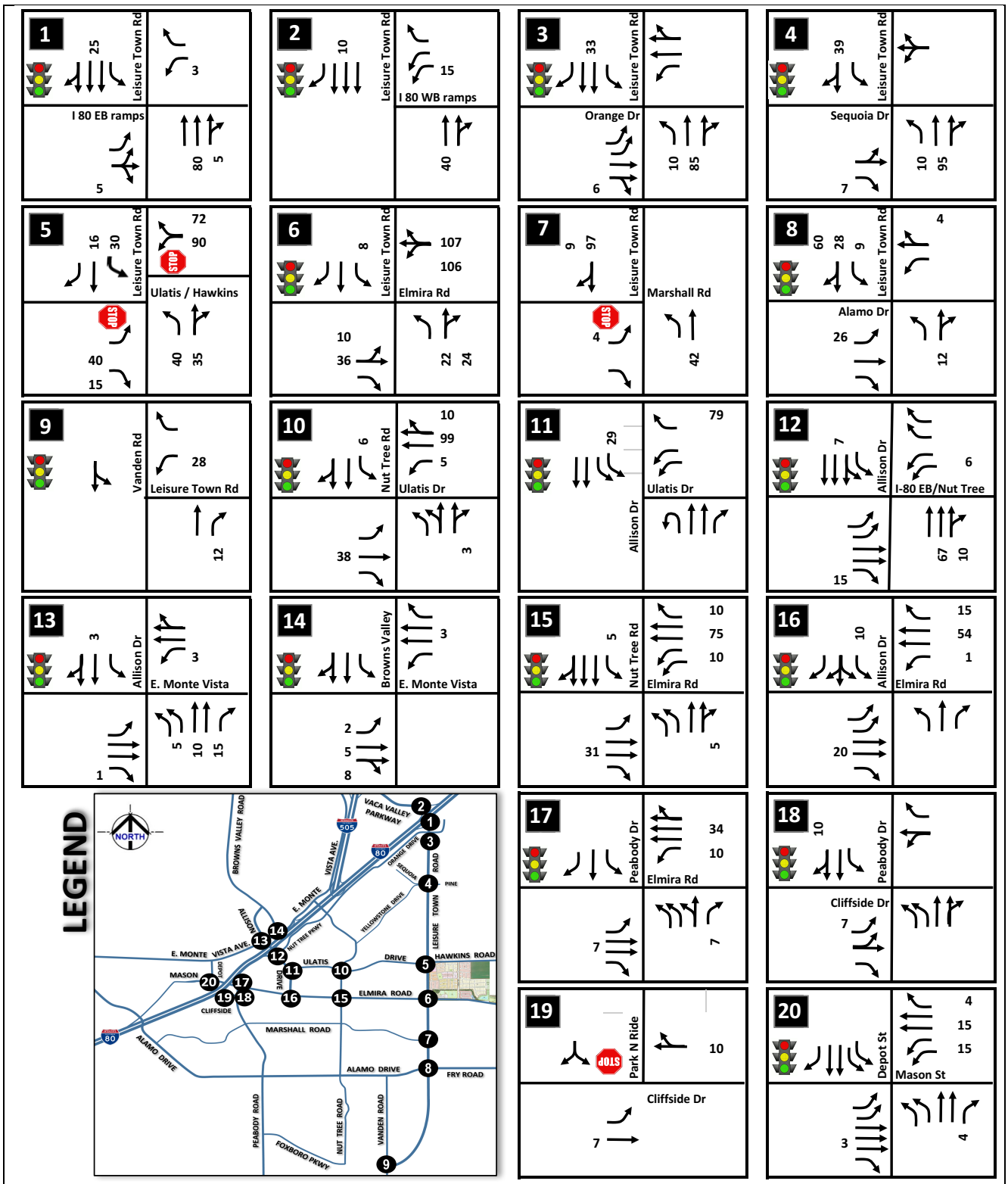


Figure 10. AM Peak Hour Project Only Traffic Volumes

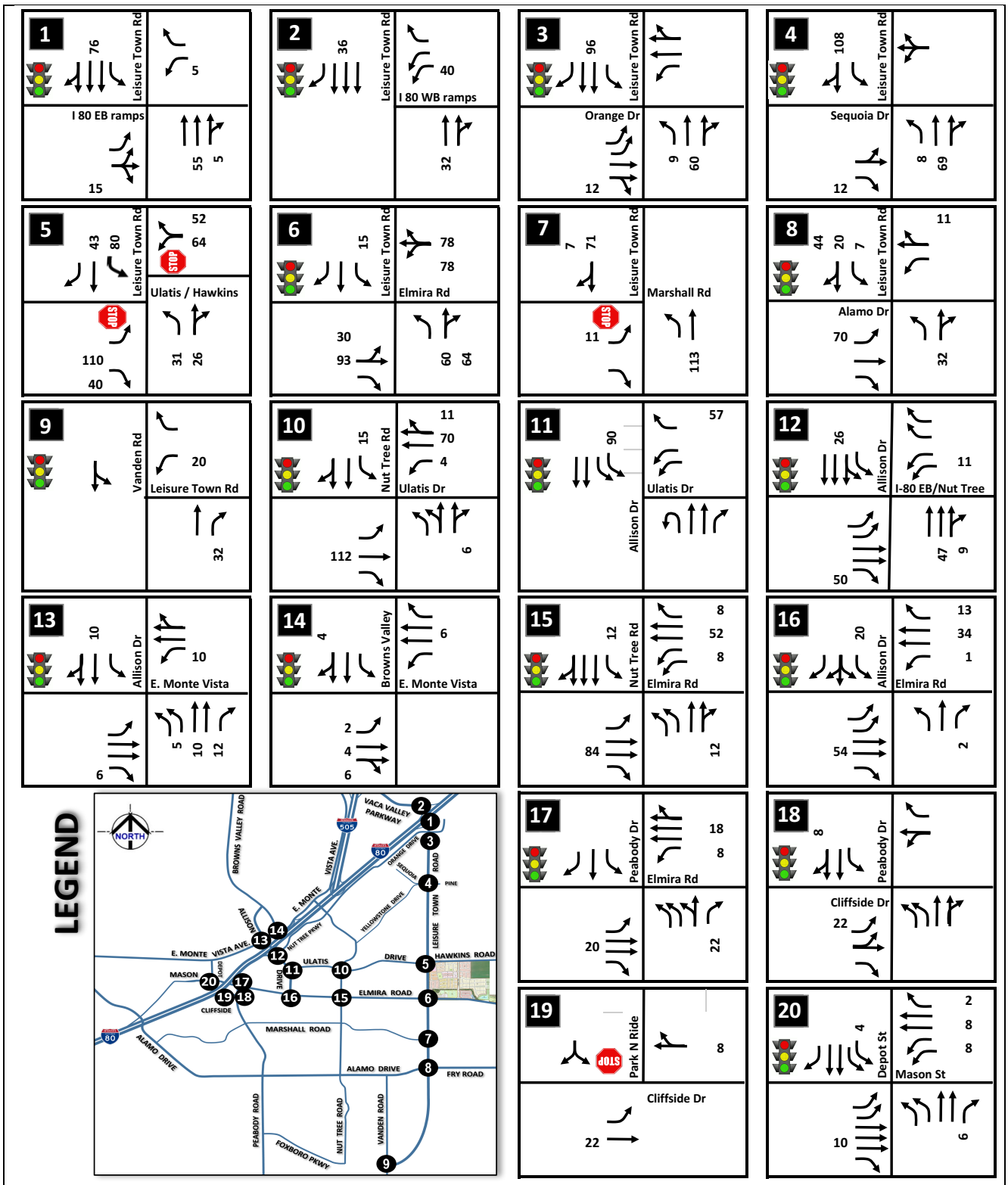


Figure 11. PM Peak Hour Project Only Traffic Volumes

For road segments in Vacaville:

- Cause peak hour traffic volumes to exceed LOS C thresholds.

For intersections and road segments on the Solano County Congestion Management System:

- Cause an intersection to degrade to below LOS C except where the existing level of service is below LOS C; at which point the project should not decrease the existing level of service.

Conflicts with Congestion Management Programs

Would the project conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways?

According to Section III, CMP System Performance Element, of the Solano County Congestion Management Program, the project impact is considered significant if the project-generated traffic would:

- Cause the following road segments to degrade below LOS E:
  - Interstate 80 (I-80) between Post Mile 23.03 (Pena Adobe Road) and 24.08 (Alamo Drive). All other adjacent segments of I-80 have a CMP LOS standard of LOS F, including I-80 west of Pena Adobe Road to SR 12 West in Fairfield, and I-80 east of Alamo Drive to SR 113 South in Dixon.
  - Interstate 505 between I-80 and the county line.
  - Elmira Road between Leisure Town Road and the Vacaville city limits.
  - Peabody Road between California Drive and Fairfield city limits.
  - Vaca Valley Parkway between Interstate 80 and Interstate 505.
- Cause the following road segments to degrade below LOS D:
  - Vanden Road between Peabody Road and Leisure Town Road.

For the purposes of this study, the City of Vacaville considers the project impact to be significant if the project-generated traffic would cause any intersection or road segment on the Congestion Management System to degrade from LOS E or better to LOS F, even if the CMP LOS standard for that segment is LOS F. This standard is more stringent than the LOS standards established by the CMP.

Result in a Change in Air Traffic Patterns

Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

Substantially Increase Hazards

Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Result in Inadequate Emergency Access

Would the project result in inadequate emergency access?

Conflicts with Transit, Bicycle or Pedestrian Transportation

Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

IMPACTS AND MITIGATION MEASURES

Circulation System Performance

Impacts on the circulation system were assessed in terms of traffic operations at study intersections and traffic volumes on local street segments.

Intersection Level of Service Calculations. HCM "planning level" intersection levels of service were determined at each study intersection for the Existing plus Project conditions and compared to existing conditions. The result of the capacity analysis for this scenario are summarized in *Table 10, Existing Conditions Intersection Capacity Analysis*. The weekday a.m. and p.m. Existing plus Project peak hour intersection volumes for this scenario are illustrated in Figures 12 and 13, respectively. Table 9 indicates that the p.m. peak hour is more critical than the a.m. peak hour because there are seven study intersections currently operating at an acceptable level of service, whereas in the a.m. peak hour only two study intersections operate at unacceptable conditions. These locations are identified in the table through a color coding/shading that is defined in the legend at the bottom of the table. Depending upon the traffic control type, the criteria is different for say, signalized intersection's verses and unsignalized intersection that has a side street stop sign control. This is also defined in the legend. In addition, there is a distinction between signalized intersection's that exist within a priority development area, and all other signalized intersection's that do not exist within a priority development area. The priority development area as defined in the legend, allows for up to 55 seconds of Delay for LOS D conditions, whereas outside of a priority development area the maximum threshold of delay is only 45 seconds before mitigation is required.

Intersection #5, Leisure Town Road at Ulatis Drive, is shown as green-shaded cells representing a mitigation based on the fact that a new realigned Hawkins Road aligning with Ulatis Drive will interface directly with the project site. This three-way intersection operating at an unacceptable LOS F condition will immediately be mitigated automatically when a new signal control at the new four-way intersection is constructed when the project is developed. Therefore, this is shown in this table as mitigated accordingly, with a resulting LOS A condition.

In addition, when the project is developed the intersection of Leisure Town Road at Elmira Road be immediately mitigated with road widening to accommodate a three-lane approach on Elmira westbound, and a signal upgrade will be installed with the widening of Elmira Road.

The remaining intersections that were operating at unacceptable conditions (shaded cells) in the peak hour, are impacted by the additional project traffic, but for the most part not at a level that is considered a significant impact. Only Elmira Road at Leisure Town Road has a significant increase in delay of more than 5 seconds, but the intersection is being improved already as part of the Jepson Parkway road improvement project, so it is not critical, and needs no immediate mitigation related to the project in the existing plus project scenario. The project should pay its fair share towards improvements in general, and mitigate its frontage along Elmira Road as needed. The Marshall Road and Leisure Town Road intersection is also being mitigated as part of the same Jepson Parkway project, and does not require mitigation by the project beyond payment of fair share.

Table 10. Existing Conditions Plus Project Intersection Capacity Analysis

	INTERSECTION LOCATION	Control	YEAR 2017 AM Peak				YEAR 2017 PM Peak			
			No PROJ		w/PROJ		No PROJ		w/PROJ	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Leisure Town Rd at I-80 EB Ramps	S	B	19.3	C	20.5	B	20.0	C	21.4
2	Leisure Town Rd at I-80 WB Ramps	S	A	5.9	A	6.2	A	5.8	A	6.3
3	Leisure Town Rd at Orange Dr	S	B	16.4	B	17.5	B	18.5	C	20.2
4	Leisure Town Rd at Sequoia Dr	S	A	8.6	A	8.8	B	12.0	C	22.9
5	Leisure Town Rd at Ulatis	*TW*	B	12.9	A	*9.0*	A	*5.5*	A	*8.9*
		EB	F	123	new signal		F	65	new signal	
6	Leisure Town Rd at Elmira Rd	S	C	33.6	F	80.1	D	36.1	F	87.7
7	Leisure Town Rd at Marshall Rd	*TW*	A	6.9	B	*12.8*	A	*3.9*	A	*9.9*
		EB	F	78	F	*157*	F	75	F	*194*
8	Leisure Town Rd at Alamo Dr	S	C	24.9	D	35.2	D	39.8	D	39.2
9	Leisure Town Rd at Vanden Rd	S	A	9.2	A	9.5	A	9.2	A	9.6
10	Nut Tree Rd at Ulatis Dr	S	C	27.4	C	28.7	E	55.3	E	69.6
11	Allison Dr at Ulatis Dr	S	B	13.4	B	13.9	B	13.6	B	17.4
12	Allison Dr at Nut Tree Parkway	S	B	17.8	B	18.4	C	32.8	C	34.8
13	Allison Dr at E. Monte Vista Ave	S	C	20.6	C	20.8	D	35.6	D	36.9
14	Browns Valley Pkwy at E.Monte Vista	S	B	17.1	B	16.9	B	18.3	B	17.8
15	Nut Tree Rd at Elmira Rd	*S*	D	36.5	D	38.2	D	44.4	D	45.8
16	Allison Dr at Elmira Rd	S	B	19.5	C	21.6	C	33.2	D	35.6
17	Peabody Rd at Elmira Rd	S	C	23.3	C	23.9	E	57.6	E	58.7
18	Peabody Rd at Cliffside Dr	S	B	19.3	B	19.5	D	46.4	D	48.5
19	Park / Ride at Cliffside Dr (I-80 ramps)	*TW*	A	0.1	A	*0.1*	A	*0.1*	A	*0.1*
		SB	B	10.9	B	*11.0*	B	14.5	B	*15*
20	Depot St at Mason St (I-80 ramps)	S	D	54.0	E	56.4	E	79.9	F	80.1

LEGEND

Control: S=Signal, AW=All-Way Stop, TW=Stop Sign Side Street, NB=NB approach Stop

NOTE: Calculations based on HCM 2010 & 2000 methdology for intersection level of service (signal, two-way), with specific City of Vacaville GP exceptions as defined below:

#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Inside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **55** secs delay*
#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Outside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **45** secs delay*
#	**SIGNALIZED, MITIGATION REQUIRED**	***Increase in delay exceeds 5.0 seconds over non-project volumes***
#	**SIGNALIZED, SIGNIFICANT and UNAVOIDABLE**	***right-of-way and funding cannot be ascertained***
#	**TWSC, LOS UNACCEPTABLE...** *Outside PDA (Priority Development Area)*	*Two-way Stop max LOS threshold = LOS mid-E @ **42.5** secs delay worst approach, **or** overall max LOS threshold = LOS D @ **35** secs*

Source: Synchro 9 HCM and PRISM Engineering

Existing Year 2017 plus Project IMPACTS

The existing plus project scenario shows that the project would have a significant impact on the surrounding streets system if no improvements are made. Implementation of the proposed project would significantly degrade operations at several study intersections including:

- Leisure Town Road at Ulatis Drive (however, this is mitigated simultaneously with project construction).
- Leisure Town Road at Elmira Road (however, this is mitigated with the Jepson Parkway construction project that widens Leisure Town Road to four lanes and modifies existing signal. In addition, with Elmira Road widening for project construction).
- Leisure Town Road at Marshall Road (however, this is mitigated with the Jepson Parkway construction project that widens Leisure Town Road to four lanes and installs new signal).
- Nut Tree Road at Ulatis Drive degrades to LOS E conditions (however, this intersection cannot be further mitigated without widening of roadways. Right-of-way and funding cannot be ascertained. The impact would remain significant and unavoidable). It is important to note that this intersection was already at LOS E conditions without the project at 55.3 seconds of delay.

The technical results of the capacity analysis shown in table 10 are not based on a realistic scenario. They merely show the magnitude of the increase in delay of traffic for the purposes of comparing to existing conditions. Since the project would develop overtime, the more realistic scenario of comparing existing with future delays would be the existing plus approved projects scenario in the section that follows.

MITIGATION of Impacts

The mitigations to the intersections that are impacted by the project traffic are discussed in detail in the sections that follow. There are many improvements to the study intersections that have been conditioned upon various projects which have been approved recently. These are shown in detail on the figures that follow which define turning the big volumes that each of the study intersections along with the specific Lane geometry assumed. These are mitigations to the existing Street system that have already been figured out in previous traffic studies. It would not be appropriate to redevelop these mitigations in this section, as they have already been programmed by the City.

There are also major construction projects underway at this time along Leisure Town Road (Jepson Parkway) where this road is being widened to two lanes in each direction from Vanden Road on the south to just past Elmira Road on the north. New signals are being installed. Modern roundabouts have been installed. This increase in capacity will mitigate several of the intersections along this section of the Jepson Parkway that have been at unsatisfactory conditions for some time now, especially in the p.m. peak hour.

Cumulative Existing Plus Approved Projects (EAP) Conditions

Development of Baseline EAP Conditions

In order to be consistent with recent past traffic studies, the recently approved Roberts Ranch project was included as a component in the Cumulative EAP and Year 2035 Scenarios of the City's Cube Voyager traffic model[5]. The full trip generation and street network for that project was included in the City's traffic model for analysis of The Farm at Alamo Place project. This model includes the Existing Plus Approved Projects (EAP) scenarios for this study, as well as the Year 2035 scenarios of development in the City of Vacaville. These scenarios in the model include all of the roadway planned / programmed improvements, as well as any additional improvements conditioned for the Roberts Ranch project. Also, since the Jepson Parkway construction is now underway, all improvements for that construction project are assumed to be in place for this scenario. For half of the study area intersections PRISM Engineering utilized the same information contained in the Roberts Ranch EIR (RR EIR), but it was necessary to use the City's traffic model to develop intersection data for the remaining 10 intersections. Specifically, PRISM Engineering used the intersection turning movements for the EAP plus RR a.m. and p.m. peak hour scenarios contained in the RR EIR for Intersections #1-9, and #15 in this study, which coincide with Intersections #1-9, and #17 in the RR EIR. For Intersections #10-14, and #16-20 in this study however, it was necessary to assign Roberts Ranch project traffic to these intersections to complete the EAP scenario for this study. We used the same project distribution used in the RR EIR from the City's traffic model to determine where this Roberts Ranch project traffic would go, and added this to the previous RR EIR EAP scenario volumes (so that this report's EAP scenarios contain the Roberts Ranch traffic).

The "EAP only" projections for Intersections #10-14, and #16-20 before the Roberts Ranch traffic was added in, were developed by PRISM Engineering for this study using the City's traffic model outputs to determine where the growth took place at the specific study intersections. Using turning movement outputs from the model (node to node volumes in spreadsheet), the magnitude of growth by turning movement was calculated yielding overall intersection growth, and a specific growth rate by specific intersection was developed. This is summarized in Table 11.

Transportation Network for EAP Scenarios

Figures 12 and 13 show the assumed EAP Scenario intersection geometry and peak hour turning movement volumes for each of the study intersections (a.m. and p.m. peak hours). Arrows and lines shown in red indicate a new improvement coming on line with this scenario (such as adding lanes, or a signal). For example, at intersection #7, Leisure Town Road at Marshall Road, new items are shown highlighted in red:

- a new signal is being installed,
- a new east leg of the intersection (westbound approach, WBL, WBTR) is being installed,
- an additional southbound through lane SBT, southbound left turn lane SBL,
- an additional northbound through lane NBT, northbound right turn pocket NBR,
- an additional eastbound through lane EBT are being installed as a part of the scenario.

[5] PRISM Engineering used the latest Cube Voyager ver. 6.4 software to run the City's traffic model. The data and street network were fully updated to include traffic from The Farm at Alamo Place project.

Table 11. Specific Growth for EAP and 2035 Scenarios at Study Intersections

		EAP to 2035 GROWTH - Russell Ranch		
		TOTAL Intersection/Node GROWTH		
Int. #	EXI to EAP	AM EAP to 2035	PM EAP to 2035	
10	1.08	1.04	1.11	Nut Tree Rd at Ulatis Dr
11	1.16	1.14	1.19	Allison Dr at Ulatis Dr
12	1.22	1.30	1.14	Allison Dr at Nut Tree Parkway
13	1.19	1.28	1.11	Allison Dr at E. Monte Vista Ave
14	1.20	1.20	1.19	Browns Valley Pkwy at E.Monte Vista
15	*1.11**	*1.12*	*1.09*	*Nut Tree Rd at Elmira Rd*
16	1.13	1.12	1.13	Allison Dr at Elmira Rd
17	1.13	1.10	1.16	Peabody Rd at Elmira Rd
18	1.15	1.15	1.15	Peabody Rd at Cliffside Dr
19	1.15	1.15	1.15	Park / Ride at Cliffside Dr (I-80 ramps)
20	1.13	1.10	1.17	Depot St at Mason St (I-80 ramps)

*calculated directly by dividing intersection total for EAP+RR / EXI = 1.11 (see Fig 10 in RR EIR)
SBR volume of 20 in report was corrected to 200 since EXI is already 127 on Fig 10 in report

Source: City's 2015 GP Traffic Model and Roberts Ranch EIR Traffic Model

Table 11 documents the specific growth rates that were derived directly from the City's traffic model for use in the no project scenarios for existing plus approved projects, and for the year 2035 scenario. This table only includes the additional 11 intersections not included in the Roberts Ranch traffic study, but correspond directly to the node number of the intersections shown in the figures that follow (#10-#20). Generally speaking, the growth rates in the first column are multiplied against existing traffic counts to come up with the existing plus approved projects total volume (includes existing volume). The second column for the a.m. peak hour is multiplied against the existing plus approved projects turning movement volumes at study intersections to arrive at the year 2035 volume for the a.m. peak hour. The third and final column are the growth rates used for the p.m. peak hour year 2035 condition.

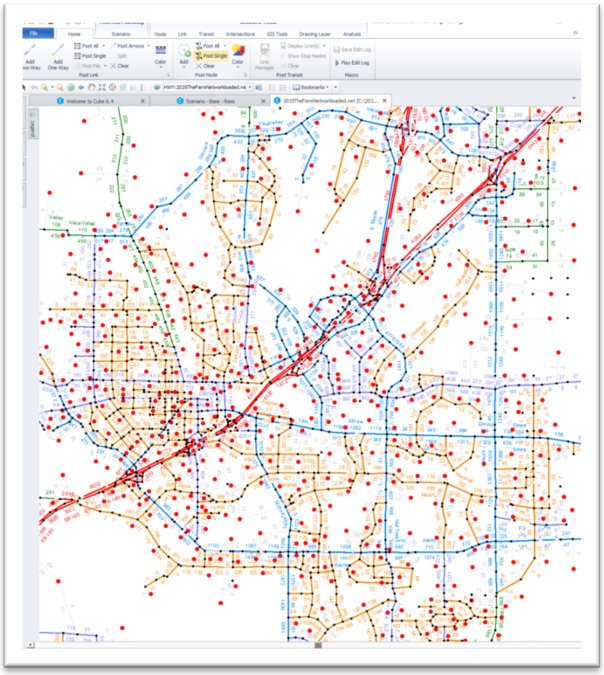


Exhibit 1 Cube Voyager Traffic Model with edits for **The Farm at Alamo Place** ***by PRISM Engineering***

All turning movement volumes for each of the 20 intersections are documented in the four figures that follow for the existing plus approved project scenarios:

- *Figure 12. AM EAP Turn Moves, Geometry, and Traffic Control*
- *Figure 13. PM EAP Turn Moves, Geometry, and Traffic Control*
- *Figure 14. AM EAP + Project Turn Moves, Geometry, and Traffic Control*
- *Figure 15. PM EAP + Project Turn Moves, Geometry, and Traffic Control*

The capacity analysis results for the volumes shown in each of these four figures listed above are summarized in *Table 12. Existing+Approved Projects Conditions Intersection Capacity Analysis,* which follows.

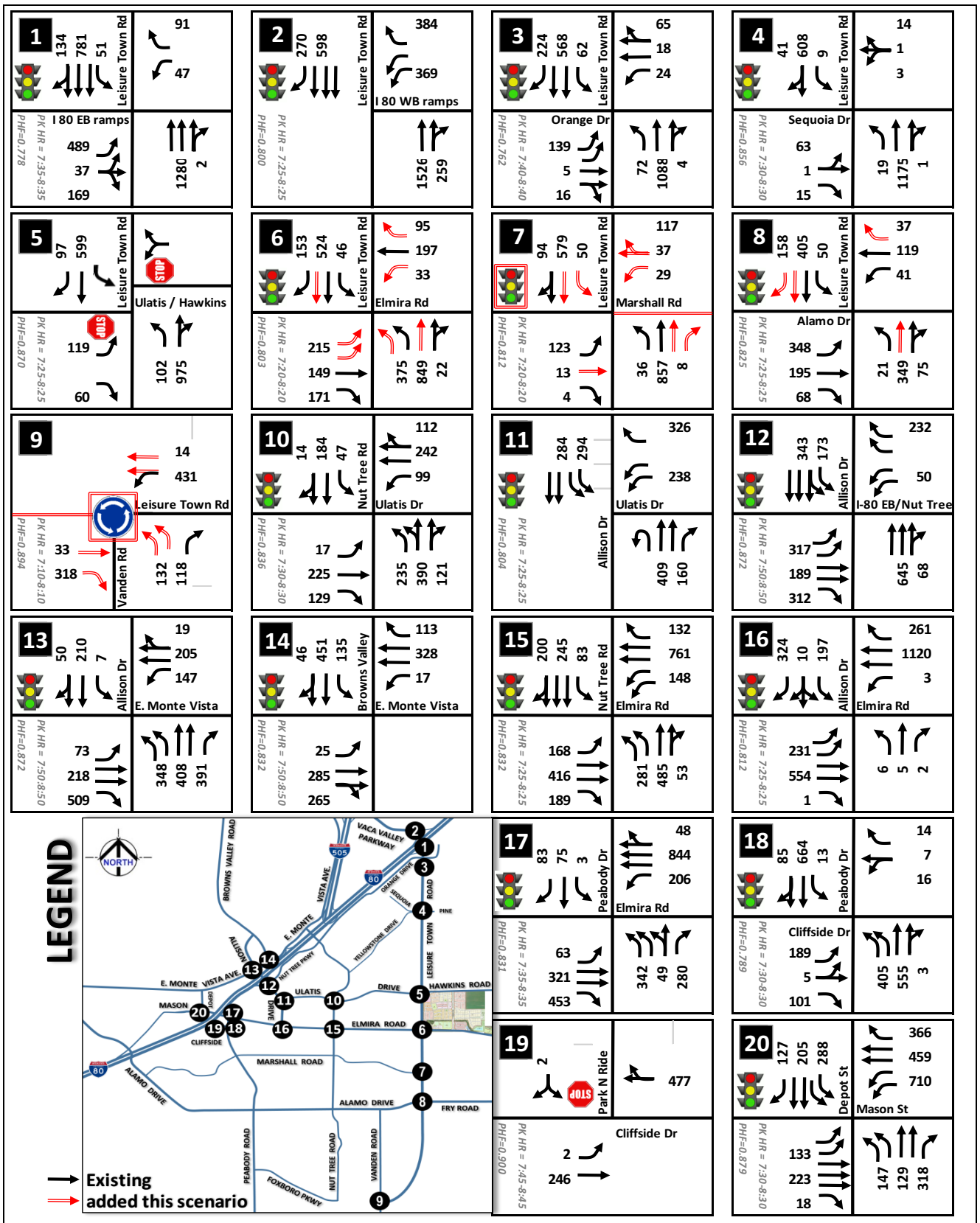


Figure 12. AM EAP Turn Moves, Geometry, and Traffic Control

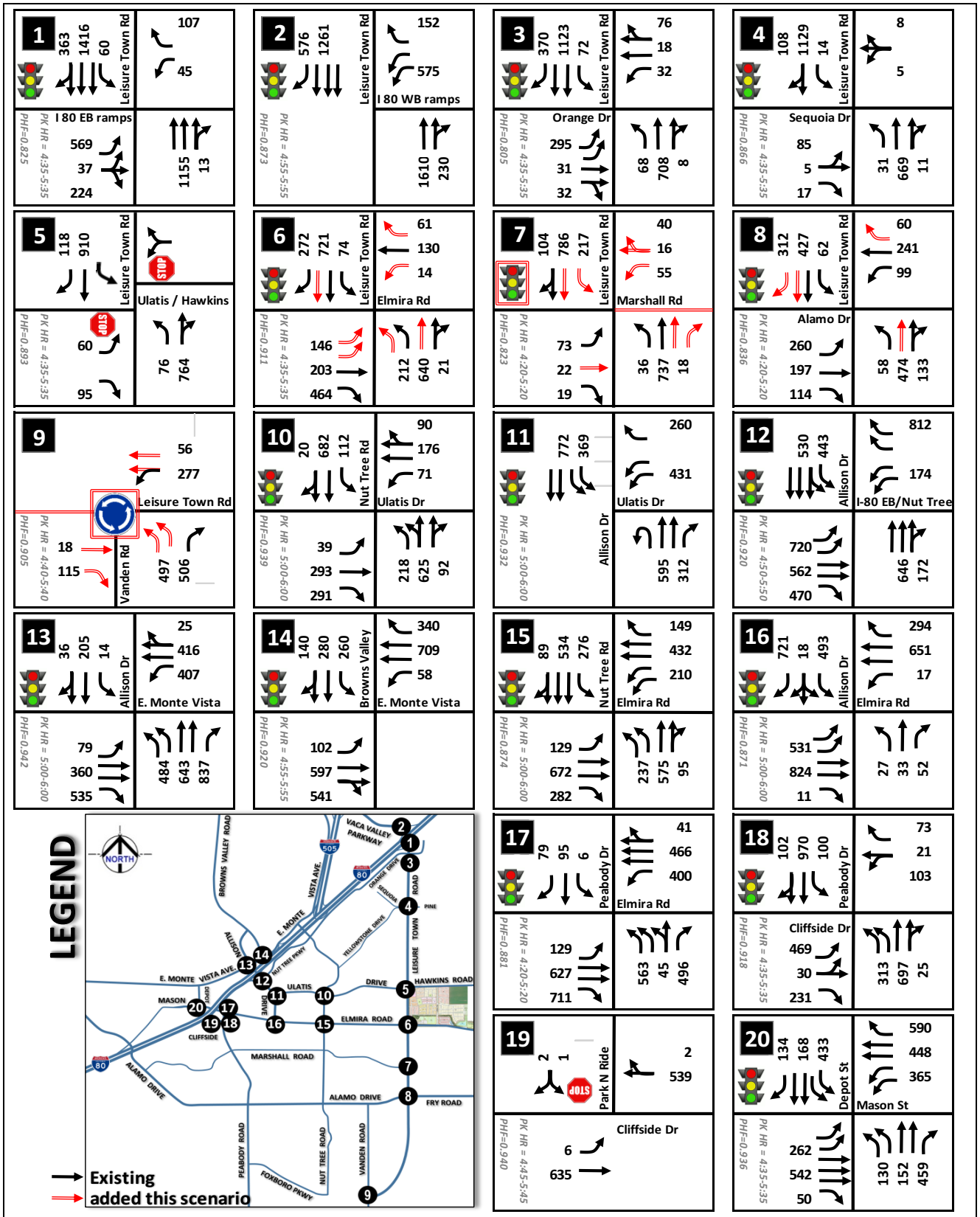


Figure 13. PM EAP Turn Moves, Geometry, and Traffic Control

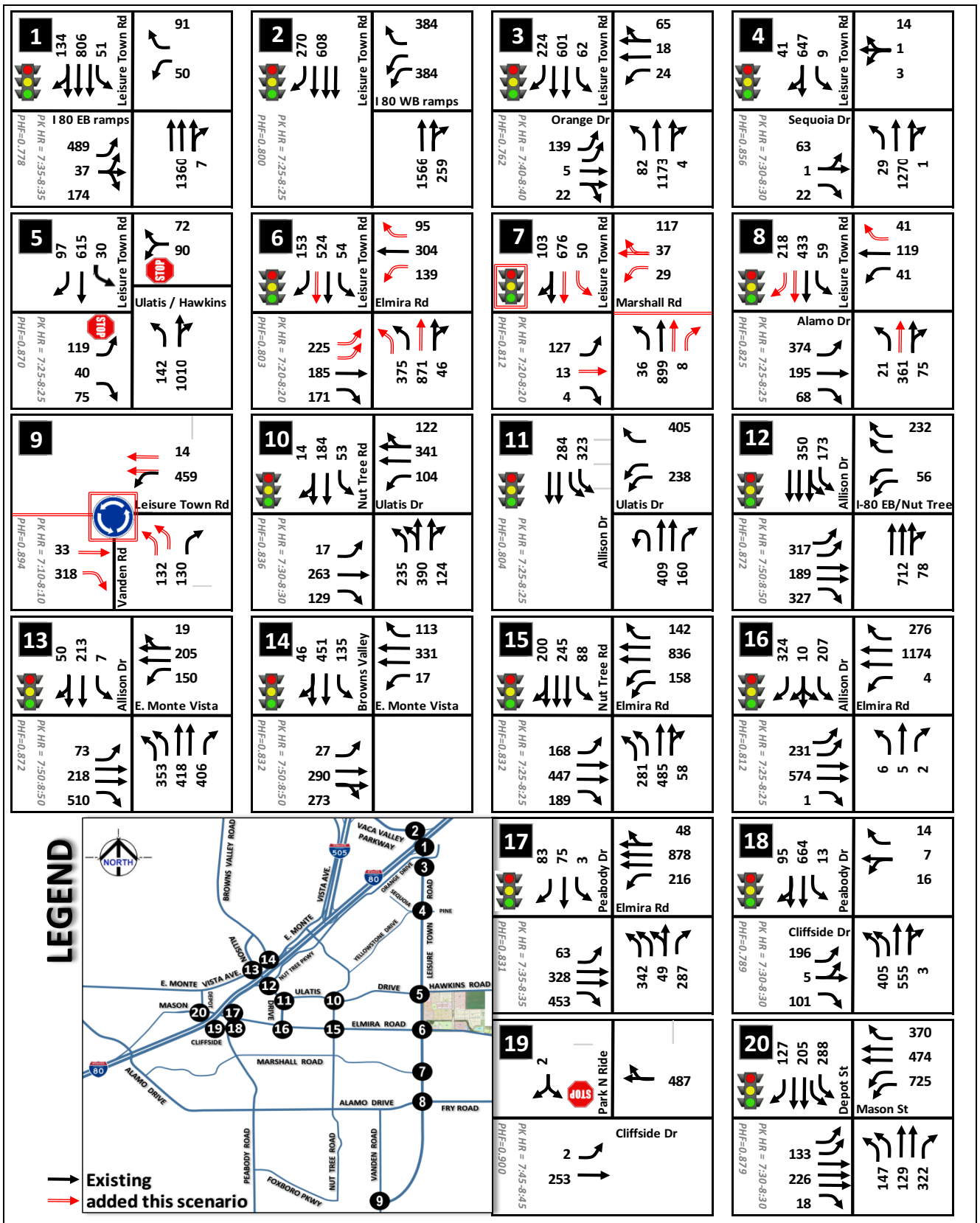


Figure 14. AM EAP + Project Turn Moves, Geometry, and Traffic Control

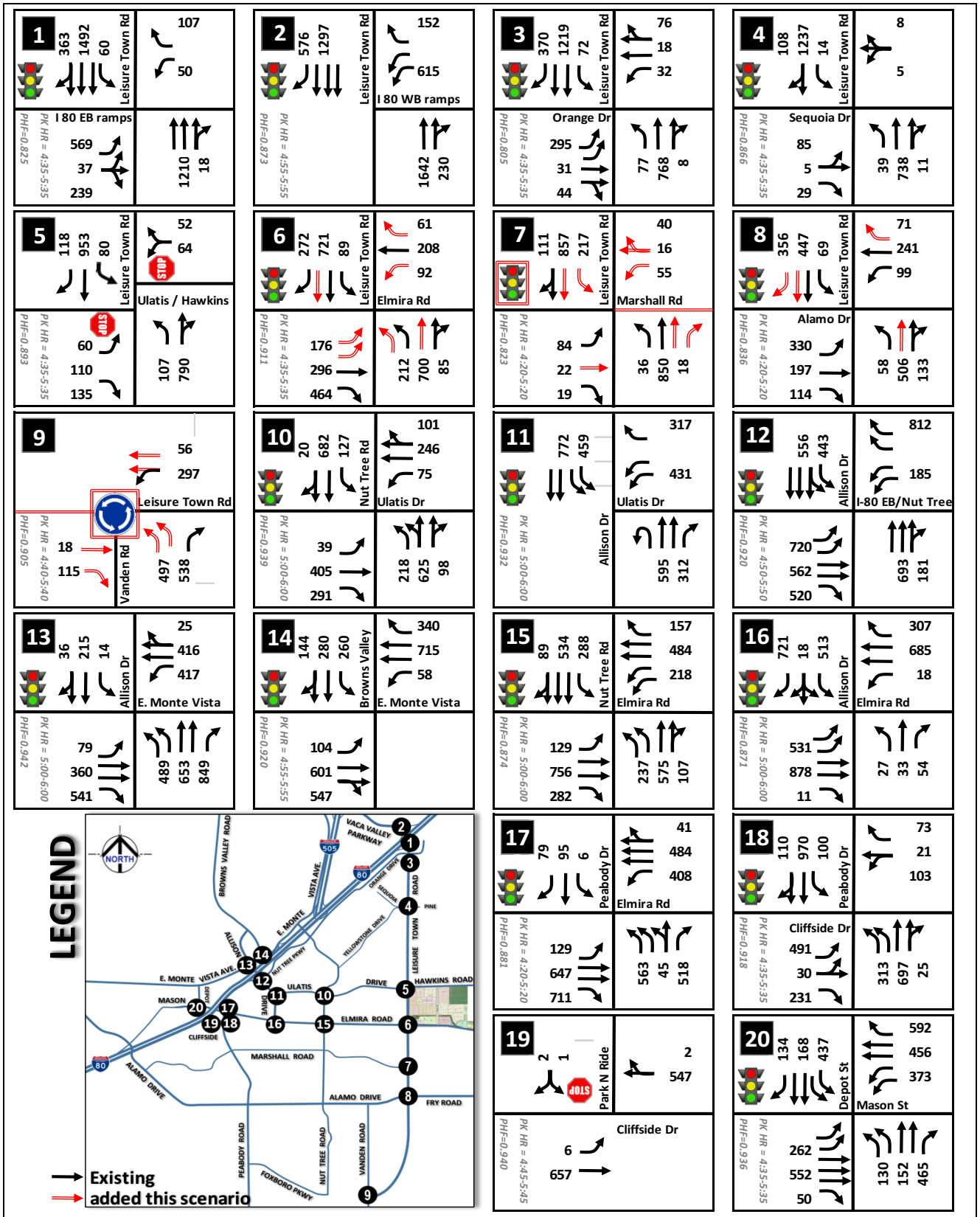


Figure 15. PM EAP + Project Turn Moves, Geometry, and Traffic Control

Table 12. EAP and EAP + Project Conditions Intersection Capacity Analysis

	INTERSECTION LOCATION	Control	EAP AM Peak				EAP PM Peak			
			No PROJ		w/PROJ		No PROJ		w/PROJ	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Leisure Town Rd at I-80 EB Ramps	S	C	30.5	C	31.9	C	34.7	D	37.5
2	Leisure Town Rd at I-80 WB Ramps	S	B	11.4	B	12.3	B	14.8	B	16.3
3	Leisure Town Rd at Orange Dr	S	B	16.9	C	20.6	B	19.5	C	21.4
4	Leisure Town Rd at Sequoia Dr	S	A	8.6	A	8.9	D	41.4	E	63.2
5	Leisure Town Rd at Ulatis	*TW*	F	51.9	A	*7.5*	B	*11.3*	C	*21.0*
		EB	F	560	new signal		F	142	new signal	
6	Leisure Town Rd at Elmira Rd	S	C	34.1	D	46.7	E	61.4	E	63.5
7	Leisure Town Rd at Marshall Rd	S	B	18.4	C	*19.6*	C	*16.7*	C	*17.7*
8	Leisure Town Rd at Alamo Dr	S	C	21.4	C	22.9	C	26.1	C	29.0
9	Leisure Town Rd at Vanden Rd	R	A	6.1	A	6.3	A	7.1	A	7.4
10	Nut Tree Rd at Ulatis Dr	S	C	29.6	C	31.2	D	50.9	E	77.7
11	Allison Dr at Ulatis Dr	S	B	15.4	B	16.6	B	15.3	B	15.6
12	Allison Dr at Nut Tree Parkway	S	C	21.1	C	22.0	D	40.0	D	42.2
13	Allison Dr at E. Monte Vista Ave	S	C	20.7	C	21.3	D	51.1	D	51.0
14	Browns Valley Pkwy at E.Monte Vista	S	B	14.6	B	14.9	B	19.8	B	19.9
15	Nut Tree Rd at Elmira Rd	*S*	D	41.5	D	47.0	D	49.3	D	51.8
16	Allison Dr at Elmira Rd	S	C	25.0	C	28.0	D	36.4	D	47.8
17	Peabody Rd at Elmira Rd	S	C	26.8	C	27.0	D	42.4	D	45.1
18	Peabody Rd at Cliffside Dr	S	C	22.0	C	22.4	D	42.5	D	44.9
19	Park / Ride at Cliffside Dr (I-80 ramps)	*TW*	A	0.1	A	*0.1*	A	*0.1*	A	*0.1*
		SB	B	11.5	B	*11.6*	C	16.5	C	*17*
20	Depot St at Mason St (I-80 ramps)	S	E	77.9	F	81.6	F	100	F	103

LEGEND

Control: S=Signal, AW=All-Way Stop, TW=Stop Sign Side Street, NB=NB approach Stop

NOTE: Calculations based on HCM 2010 & 2000 methdology for intersection level of service (signal, two-way), with specific City of Vacaville GP exceptions as defined below:

#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Inside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **55** secs delay*
#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Outside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **45** secs delay*
#	**SIGNALIZED, MITIGATION REQUIRED**	***Increase in delay exceeds 5.0 seconds over non-project volumes***
#	**SIGNALIZED, SIGNIFICANT and UNAVOIDABLE**	***right-of-way and funding cannot be ascertained***
#	**TWSC, LOS UNACCEPTABLE...** *Outside PDA (Priority Development Area)*	*Two-way Stop max LOS threshold = LOS mid-E @ **42.5** secs delay worst approach, **or** overall max LOS threshold = LOS D @ **35** secs*

Source: Synchro 9 HCM and PRISM Engineering

Table 12 shows that for the existing plus approved projects scenarios, there are several intersections that will operate at a deficient level of service. When these intersections are significantly impacted by the project the cell is shaded yellow. When not significant, a tan shading is used. Green cells represent where mitigation is taking place because of the project. These specific deficiencies are defined in the color-coded legend at the bottom of the table based on control type and level of delay. The p.m. peak hour is more critical than the a.m. peak hour volumes.

EAP Scenario IMPACTS from The Farm at Alamo Place

The following four impacts as identified in Table 12 (yellow cells) are direct impacts The Farm at Alamo Place which are also significant impacts (greater than five seconds of delay added to the non-project EAP-only scenario volume):

Impact 1: Leisure Town Road at Sequoia (p.m. peak hour significant impacts, LOS E, 63.2).

Impact 2: Leisure Town Road at Ulatis Drive (a.m. and p.m. peak hour significant impacts, side street EB stop @ LOS F is significantly impacted from project, but a new signal goes in automatically for mitigation).

Impact 3: Leisure Town Road at Elmira Road (a.m. peak hour significant impact, 34.1 goes to 46.7, increase of 12.6, will require mitigation, but is being partially mitigated on Leisure Town only as part of Jepson Parkway construction.).

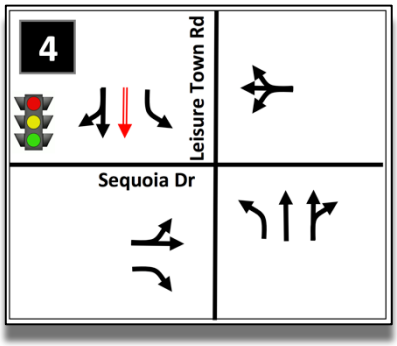
Impact 4: Nut Tree Road at Ulatis Drive (p.m. peak hour significant impact, 50.9 goes to 77.7, increase of 26.8, will require mitigation, but there is insufficient right of way to do so. Right of way funding cannot be ascertained. This is significant and unavoidable, since existing bike lanes must be maintained and lane expansion or restriping is not feasible).

Other intersections are also operating at deficient levels, but are not significantly impacted by the project. These include Allison Drive at E. Monte Vista Avenue, Peabody Road at Elmira Road, and Depot Street at Mason Street (I-80 ramps).

EAP Scenario MITIGATION of Project Impacts

Legend of Lane Arrows in mitigation diagrams: **Existing** **added for EAP** **added for project mitigation**

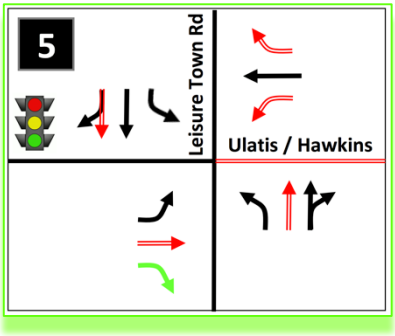
Mitigation Intersection #4: Leisure Town Road at Sequoia Drive. Leisure Town Road (Jepson Parkway) / Sequoia-White Pine Street (#4) intersection, the City shall implement the following improvements:



- Add a through lane on southbound Leisure Town Road to provide one left-turn lane, one through lane and one shared through-right lane on the southbound approach.
- Widen the south leg of the intersection to provide a corresponding receiving lane.

This mitigation is consistent with the ultimate configuration of Jepson Parkway, but is not part of the Jepson Parkway Road Widening Project currently underway. With this mitigation, the intersection would operate at LOS B or better during both peak hours.

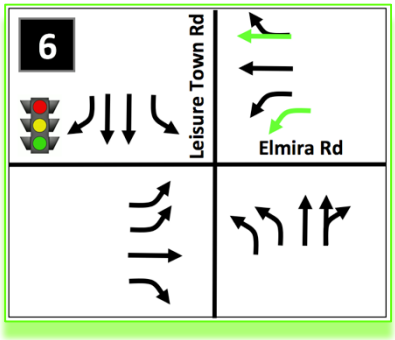
Significance after Mitigation: Implementation of Mitigation would allow the intersection to operate above the city's LOS thresholds. This section of Leisure Town Road is not part of the Jepson Parkway Road Widening Project, and therefore right-of-way and funding cannot be ascertained. Until then, the impact would remain significant and unavoidable.



Mitigation Intersection #5: Leisure Town Road at Ulatis Drive. Leisure Town Road at Ulatis Drive EAP volumes are already at LOS F without the project, but will be mitigated automatically as part of new project site construction to provide primary access to the project's internal roadways along a realigned Hawkins Road. The full mitigation consists of:

- Install a traffic signal
- Add a through lane on southbound Leisure Town Road to provide one left-turn lane, one through lane and one shared through-right lane on the southbound approach.
- Add a through lane on northbound Leisure Town Road to provide one left-turn lane, one through lane and one shared through-right lane on the southbound approach.
- Restripe EB approach to have EBL, EBT, and EBR separate lanes.
- Stripe new WB constructed approach with separate WBL, WBT, and WBL lanes.

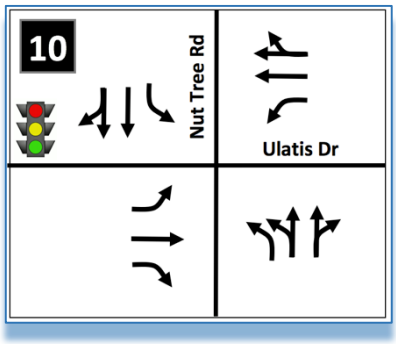
Significance after Mitigation: Implementation of Mitigation would allow the intersection to operate above the city's LOS thresholds. This section of Leisure Town Road is not part of the Jepson Parkway Road Widening Project, but it is adjacent to The Farm at Alamo Place project frontage, therefore, the right-of-way for widening Leisure Town Road is available. The mitigation can happen concurrent with development of the initial phase of the project.



Mitigation Intersection #6: Leisure Town Road at Elmira Road. Leisure Town Road at Elmira Road will be partially mitigated by the Jepson Parkway widening. However, the planned improvements are not sufficient without also expanding the westbound approach beyond the planned WBL, WBT, and WBR lanes. In order to achieve satisfactory levels of service it will be necessary to add a lane to this approach as follows:

- Modify traffic signal to eliminate split phase (as part of Jepson Parkway project)
- Restripe WB approach within existing pavement to accommodate a dual WBL, WBT, and WBT/RT lanes (expand from three lane to a four lane approach).

Significance after Mitigation: Implementation of Mitigation would allow the intersection to operate above the city's LOS thresholds at LOS D with 38.6 seconds of delay in the p.m. peak hour. The mitigation can happen concurrent with development of the initial phase of the project.



Mitigation Intersection #10: Nut Tree Road at Ulatis Drive. PRISM Engineering consulted with the City Traffic Engineer on several occasions to investigate a variety of mitigation solutions at this location, including eliminating the split phase, restriping the north and southbound approaches to increase capacity, doubling the NBL turn pocket, as well as new construction to add a NBR turn pocket. Ultimately, the right of way was not available, and it was not feasible to eliminate existing striped bike lanes to accommodate an expansion of vehicle lanes.

Significance: The project has a significant and unavoidable impact at this location because of constraints to increasing vehicle capacity without sacrificing existing and striped bicycle lanes, as well as trees in the median of the NB approach. Until such time as additional right of way acquisition can be programmed to occur, ***the impacts to this location will remain significant and unavoidable***. LOS E with 77.7 seconds delay is the result. Even without the project this intersection is unacceptable for EAP p.m. peak hour volumes.

The results of the mitigated capacity analysis are shown in *Table 13. Mitigated EAP + Project Conditions Intersection Capacity Analysis*. The green shaded cells show where the required mitigation of the project's impact was applied to intersections #4, #5, and #6. The blue shaded cells are where mitigation of the project's impact was not possible (at intersection #10), and therefore would remain a significant and unavoidable impact.

Other intersections that are highlighted with a light tan color cell (13, 17, and 20) represent intersections that are operating below the City's LOS D standard for this scenario, but the project is not required to mitigate the impact because it did not increase the overall delay by more than 5.0 seconds (was not significant by definition).

Table 13. Mitigated EAP + Project Conditions Intersection Capacity Analysis

	INTERSECTION LOCATION	Control	EAP AM Peak				EAP PM Peak			
			No PROJ		w/PROJ		No PROJ		w/PROJ	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Leisure Town Rd at I-80 EB Ramps	S	C	30.5	C	31.9	C	34.7	D	37.5
2	Leisure Town Rd at I-80 WB Ramps	S	B	11.4	B	12.3	B	14.8	B	16.3
3	Leisure Town Rd at Orange Dr	S	B	16.9	C	20.6	B	19.5	C	21.4
4	Leisure Town Rd at Sequoia Dr	S	A	8.6	A	8.9	D	41.4	A	9.6
5	Leisure Town Rd at Ulatis	*TW*	F	51.9	A	*7.5*	B	*11.3*	C	*21.0*
		EB	F	560	new signal		F	142	new signal	
6	Leisure Town Rd at Elmira Rd	S	C	34.1	C	32.8	E	61.4	D	38.6
7	Leisure Town Rd at Marshall Rd	S	B	18.4	C	*19.6*	C	*16.7*	C	*17.7*
8	Leisure Town Rd at Alamo Dr	S	C	21.4	C	22.9	C	26.1	C	29.0
9	Leisure Town Rd at Vanden Rd	R	A	6.1	A	6.3	A	7.1	A	7.4
10	Nut Tree Rd at Ulatis Dr	S	C	29.6	C	31.2	D	50.9	E	77.7
11	Allison Dr at Ulatis Dr	S	B	15.4	B	16.6	B	15.3	B	15.6
12	Allison Dr at Nut Tree Parkway	S	C	21.1	C	22.0	D	40.0	D	42.2
13	Allison Dr at E. Monte Vista Ave	S	C	20.7	C	21.3	D	51.1	D	51.0
14	Browns Valley Pkwy at E.Monte Vista	S	B	14.6	B	14.9	B	19.8	B	19.9
15	Nut Tree Rd at Elmira Rd	*S*	D	41.5	D	47.0	D	49.3	D	51.8
16	Allison Dr at Elmira Rd	S	C	25.0	C	28.0	D	36.4	D	47.8
17	Peabody Rd at Elmira Rd	S	C	26.8	C	27.0	D	42.4	D	45.1
18	Peabody Rd at Cliffside Dr	S	C	22.0	C	22.4	D	42.5	D	44.9
19	Park / Ride at Cliffside Dr (I-80 ramps)	*TW*	A	0.1	A	*0.1*	A	*0.1*	A	*0.1*
		SB	B	11.5	B	*11.6*	C	16.5	C	*17*
20	Depot St at Mason St (I-80 ramps)	S	E	77.9	F	81.6	F	100	F	103

LEGEND

Control: S=Signal, AW=All-Way Stop, TW=Stop Sign Side Street, NB=NB approach Stop

NOTE: Calculations based on HCM 2010 & 2000 methdology for intersection level of service (signal, two-way), with specific City of Vacaville GP exceptions as defined below:

#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Inside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **55** secs delay*
#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Outside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **45** secs delay*
#	**SIGNALIZED, MITIGATION REQUIRED**	***Increase in delay exceeds 5.0 seconds over non-project volumes***
#	**SIGNALIZED, MITIGATED RESULT**	***Mitigated to within 5.0 seconds over non-project volumes delay***
#	**SIGNALIZED, SIGNIFICANT and UNAVOIDABLE**	***right-of-way and funding cannot be ascertained***
#	**TWSC, LOS UNACCEPTABLE...** *Outside PDA (Priority Development Area)*	*Two-way Stop max LOS threshold = LOS mid-E @ **42.5** secs delay worst approach, **or** overall max LOS threshold = LOS D @ **35** secs*

Source: Synchro 9 HCM and PRISM Engineering

Cumulative Year 2035 Conditions

Traffic Volume Forecasts

Traffic volume forecasts are derived from the Vacaville citywide traffic model, and the resulting growth rates for traffic are shown in Table 11 (previous section). The inputs to the model are land uses and road network assumptions throughout the city. The version of the model is the same that was used for the Roberts Ranch EIR traffic study (which relied on the traffic model used in the General Plan EIR (2015)). That model, used in this study, had specific updates (new street network) to reflect the latest development projections from the City and represent the Roberts Ranch project. PRISM Engineering utilized and modified as appropriate the RR EIR traffic model to develop Year 2035 traffic projections (*which now include the Roberts Ranch project as a default*), and to develop the intersection turning movement volumes for the study intersections that were not in the RR EIR, namely, Intersections #10-14, and #16-20 in this report. The same methodology used in the previous section as detailed in table 11 was utilized in the section as well, adding the incremental growth from the EAP cumulative scenario to the Year 2035 cumulative scenario.

The City's traffic model projections for the 2035 Cumulative scenarios were derived from a parcel-based land use database maintained by the City of Vacaville, linked to a geographic information system (GIS). Parcels labeled as likely to develop under the Approved or 2035 Cumulative scenarios were tabulated for each geographic area (transportation analysis zone or TAZ) used in the traffic model. Residential uses were tabulated by numbers of single-family or multi-family units, Non-residential uses are tabulated by the number of developed acres. As far as the project traffic is concerned, the full trip generation calculated for the a.m. and p.m. peak hour of the farm at Alamo place was entered into the traffic model for assignment to the adjacent street system including all internal roadways within the farm at Alamo Place, as well as adjacent streets such as Leisure Town Road, Elmira Road, Hawkins Road, Ulatis Drive, and beyond. The traffic model uses a gravity model methodology that has previously been calibrated to existing and future conditions, to assign traffic throughout the City based on estimated ship generation per traffic analysis zone. A screen shot of the "Cube Voyager" traffic model used is shown in Figure 16, which also shows 9 Traffic Analysis Zones (TAZ) used for the project (The Farm at Alamo Place) generally between Elmira Road and Hawkins Road, east of Leisure Town Road (Jepson Parkway). PRISM also replicated in the model the Roberts Ranch trip generation as well as the Brighton Landing trip generation totals, to make sure that the worst-case collective cumulative traffic was assigned to the local street system in the model surrounding The Farm at Alamo Place project site.

Transportation Network

The following changes to the transportation network are assumed for Cumulative Year 2035 conditions. Arrows and lines shown in red on Figures 17-20 indicate a new improvement coming on line with this scenario (such as adding lanes, or a signal).

- Vaca Valley / Interstate 505 interchange and overcrossing improvements.
- California Drive overcrossing.
- Jepson Parkway project, which would improve Leisure Town Road to a four-lane divided arterial from Route 12 to Interstate 80 at the Leisure Town Road interchange. In Vacaville, Jepson Parkway will follow the Leisure Town Road alignment along the western border of the Roberts Ranch Specific Plan area.
- Signalization and realignment of the Leisure Town Road/Ulatis Drive and Leisure Town Road/Hawkins Road intersections
- Signalization of the Leisure Town Road/Marshall Road intersection.

- Widening of Fry Road to a four-lane arterial east of Leisure Town Road
- Widening of Peabody Road to a four-lane arterial between the Vacaville City Limits and Markley Lane.

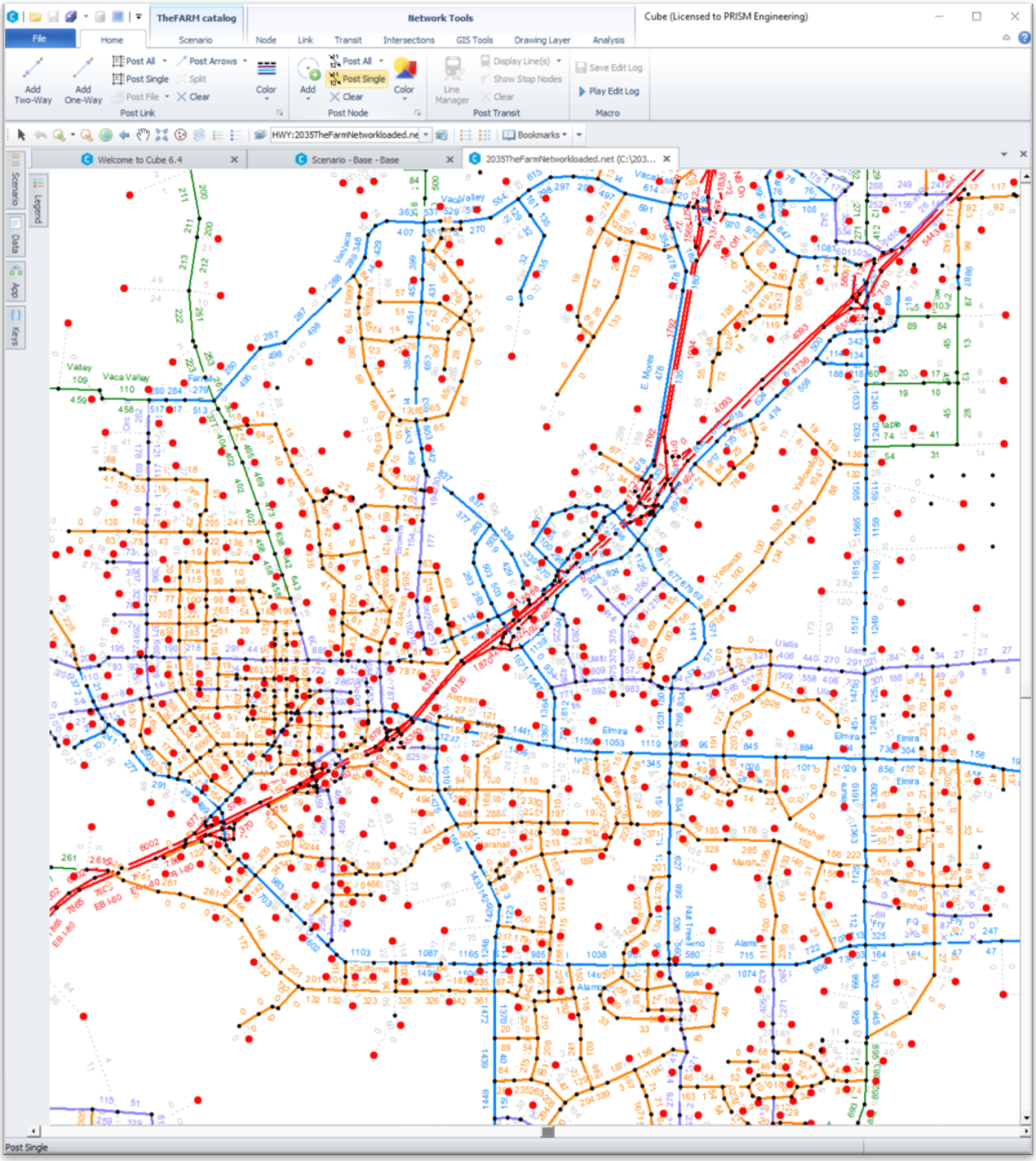


Figure 16. Cube Voyager Traffic Model updated for The Farm at Alamo Place Project

These changes to the network are depicted in Figures 17 through 20 for Cumulative conditions (Year 2035) and assumed-in-place intersection changes have been highlighted in red (showing the assumed change of traffic

control or increased number of lanes being added from the EAP scenarios). These assumptions of future improvements-in-place were worked out in advance with the City Traffic Engineer based on programmed improvements that are known, and consistent with previous transportation studies approved by the City.

The following bicycle facilities are planned in the study area:

- Elmira Road Bike Path. A Class I bike path would be built along the old Southern Pacific Railroad right-of-way on the north side of Elmira Road between Leisure Town Road and Edwin Drive.
- Ulatis Creek Bike Path. A Class II bike lane and Class I bike path along Ulatis Creek between Ulatis Drive and Leisure Town Road would be completed by the summer of 2012.
- Jepson Parkway Bike Path. A Class I bike path would be provided as a part of the Jepson Parkway improvements from Interstate 80 along Leisure Town Road and Vanden Road to Fairfield.

The following transit facilities are planned in the study area:

- Commuter Rail Station. Construction of a new Fairfield/Vacaville Multi-Modal Train Station at the southeast corner of Peabody Road and Vanden Road in northeast Fairfield for Capitol Corridor intercity rail service. The Fairfield/Vacaville Multi-Modal Rail Station would further enhance regional transit connections.

All study intersection Cumulative Year 2035 and plus Project turning movement volumes for each of the 20 study intersections are documented in the four figures that follow:

- *Figure 17. AM Year 2035 Turn Moves, Geometry, and Traffic Control*
- *Figure 18. PM Year 2035 Turn Moves, Geometry, and Traffic Control*
- *Figure 19. AM Year 2035 + Project Turn Moves, Geometry, and Traffic Control*
- *Figure 20. PM Year 2035 + Project Turn Moves, Geometry, and Traffic Control*

The capacity analysis results for the volumes shown in each of these four figures listed above are summarized in *Table 14. Year 2035+Project Conditions Intersection Capacity Analysis,* which follows.

The MITIGATED capacity analysis results for the volumes shown in each of these four figures listed above are summarized in *Table 15. Year 2035+Project MITIGATED Conditions Intersection Capacity Analysis*.

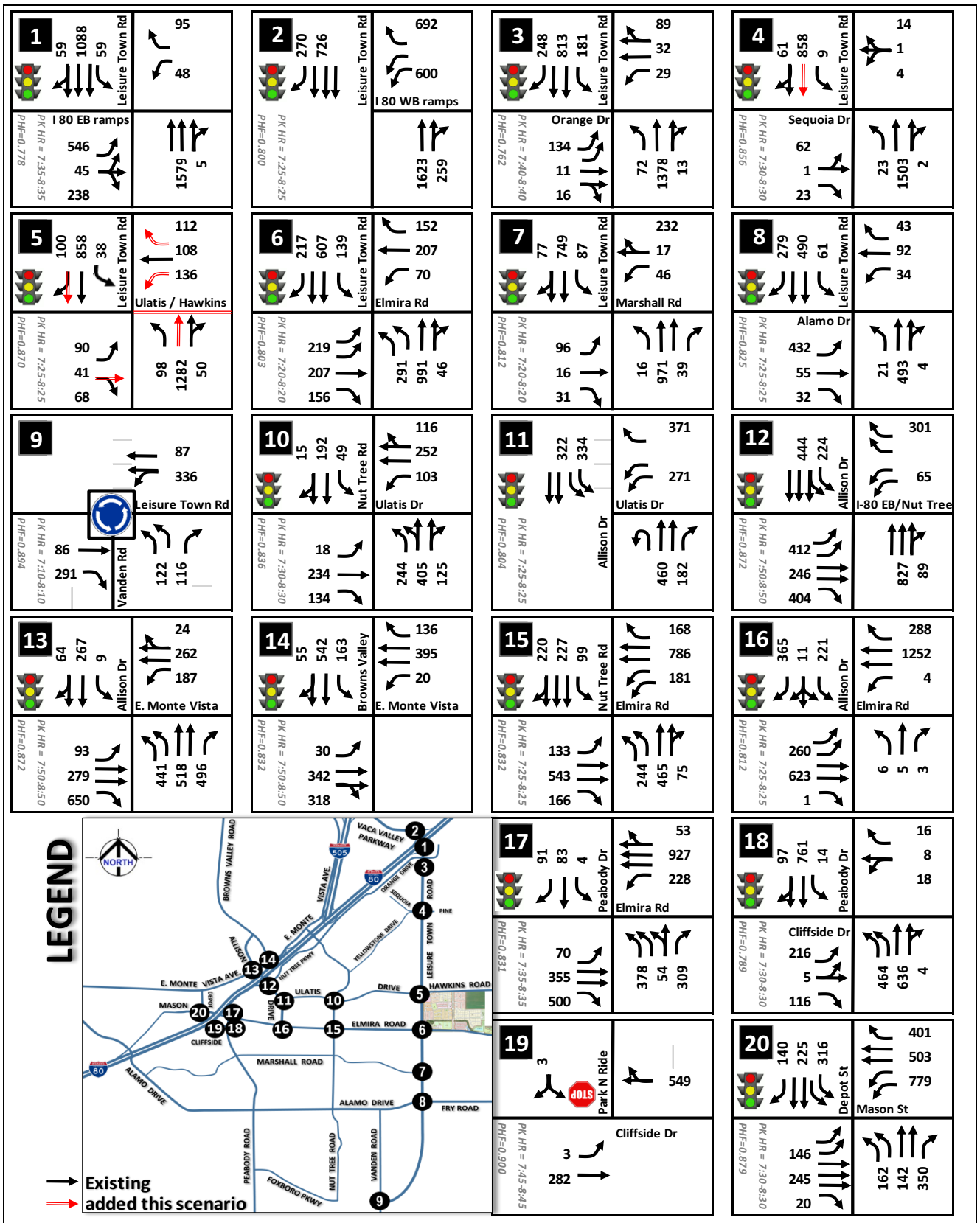


Figure 17. AM Year 2035 Turn Moves, Geometry, and Traffic Control

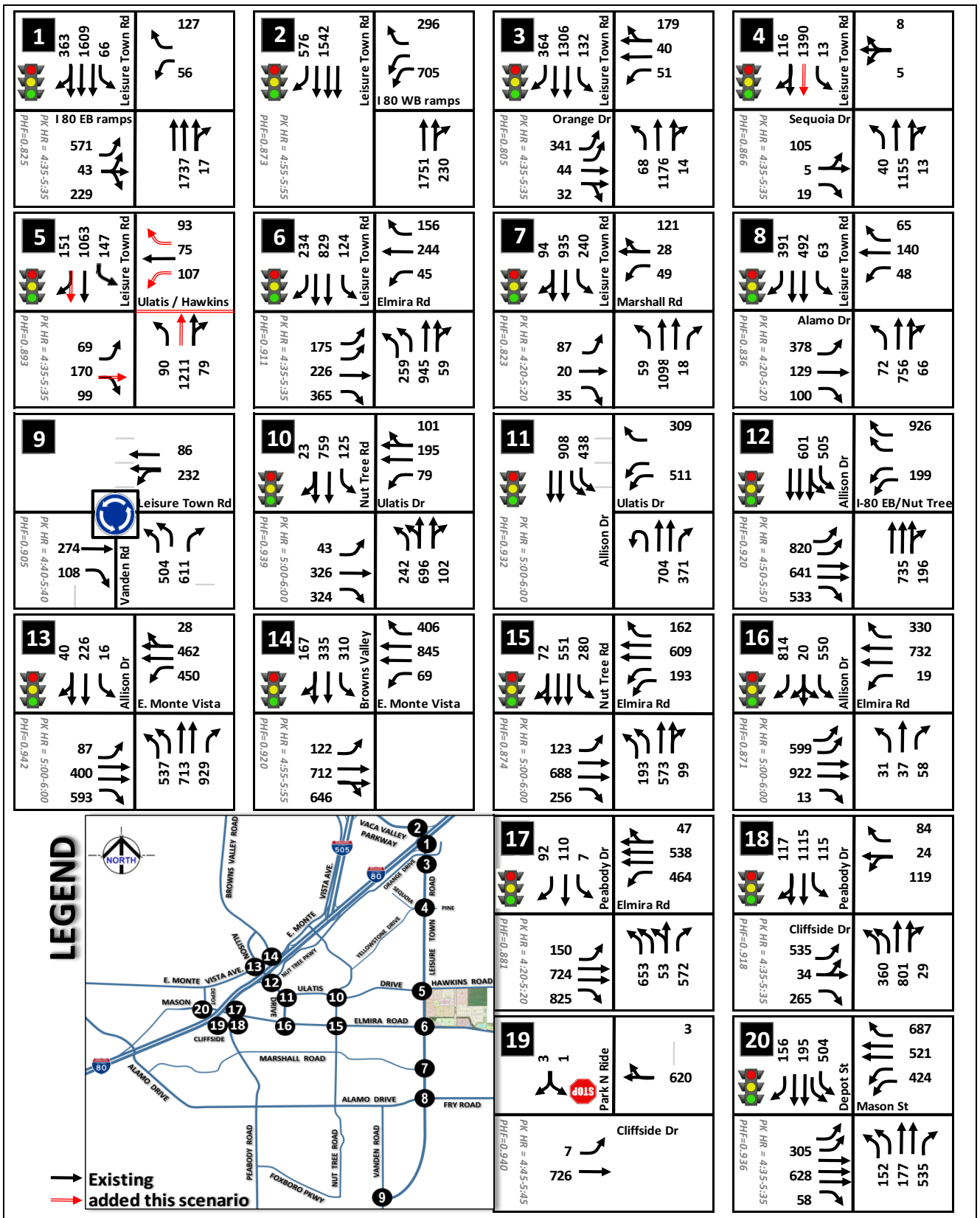


Figure 18. PM Year 2035 Turn Moves, Geometry, and Traffic Control

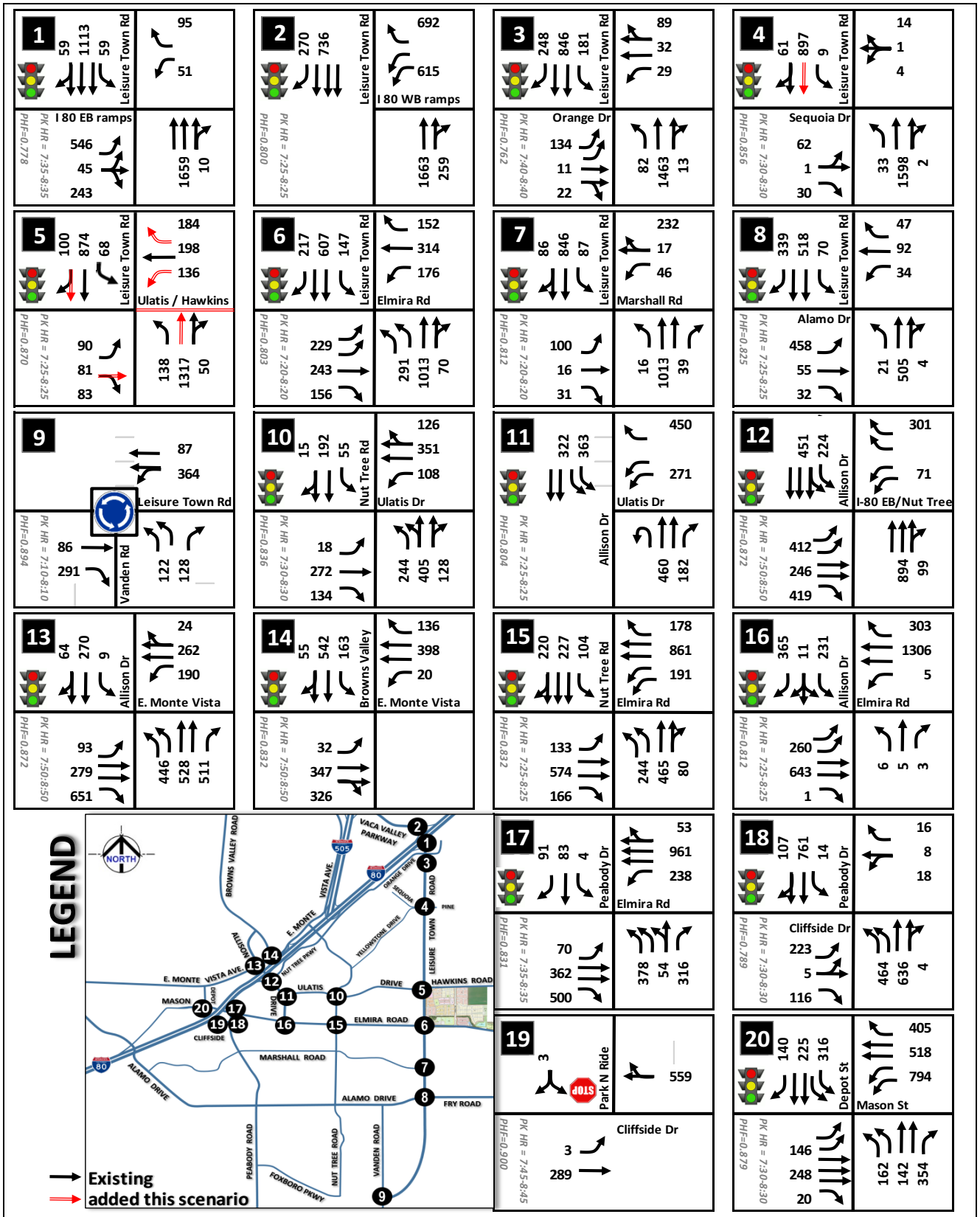


Figure 19. AM Year 2035 + Project Turn Moves, Geometry, and Traffic Control

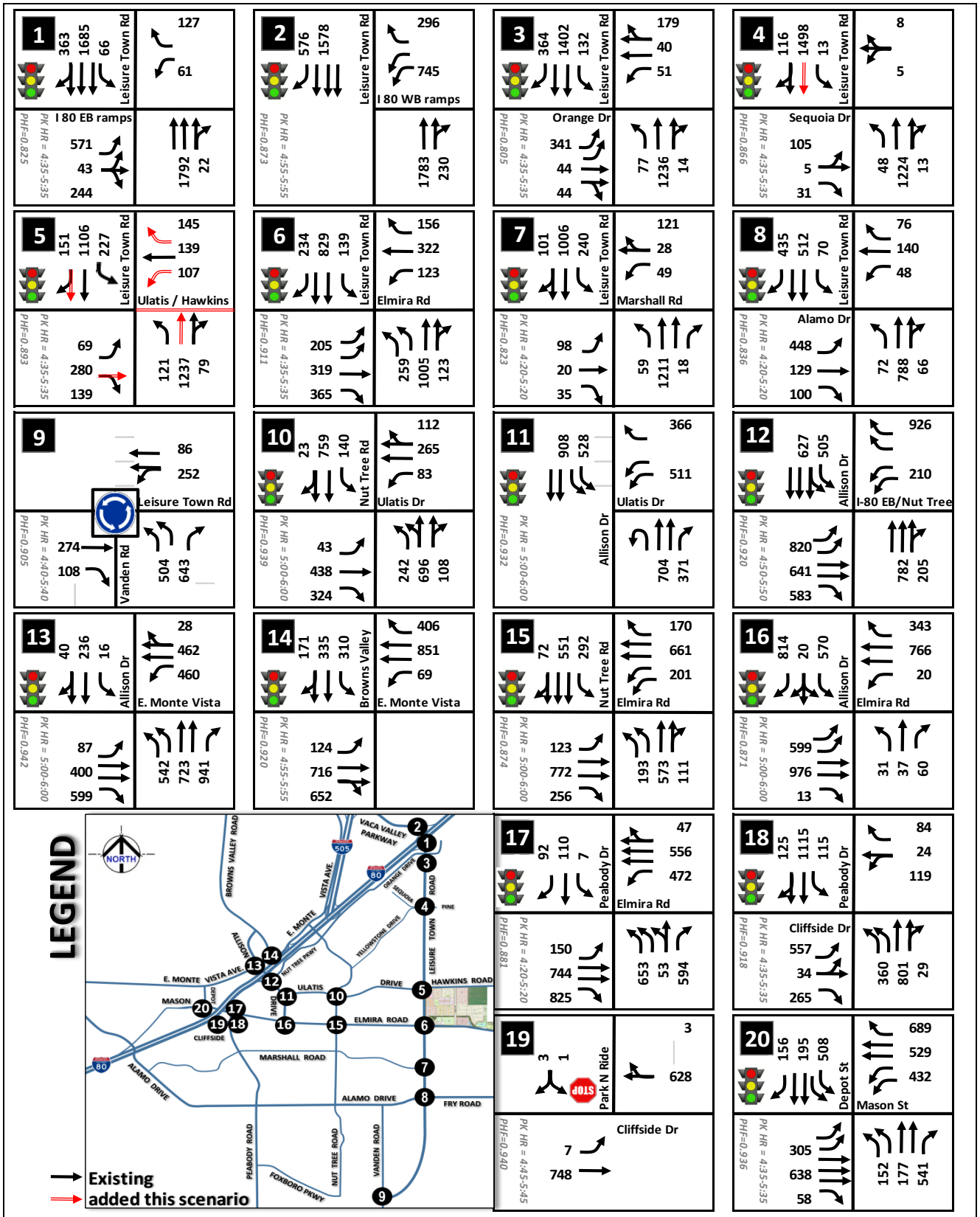


Figure 20. PM Year 2035 + Project Turn Moves, Geometry, and Traffic Control

Table 14. Year 2035+Project Conditions Intersection Capacity Analysis

#	INTERSECTION LOCATION	Control	2035 AM Peak				2035 PM Peak			
			No PROJ		w/PROJ		No PROJ		w/PROJ	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Leisure Town Rd at I-80 EB Ramps	S	D	42.0	D	46.8	D	44.5	D	49.8
2	Leisure Town Rd at I-80 WB Ramps	S	C	20.7	C	23.0	C	20.7	C	23.3
3	Leisure Town Rd at Orange Dr	S	C	32.7	D	37.7	D	38.2	D	44.8
4	Leisure Town Rd at Sequoia Dr	S	A	8.6	A	9.6	B	10.7	B	13.4
5	Leisure Town Rd at Ulatis	S	C	22.3	C	30.9	D	35.4	E	64.5
6	Leisure Town Rd at Elmira Rd	S	D	41.3	E	59.1	D	44.6	D	53.4
7	Leisure Town Rd at Marshall Rd	S	C	25.4	D	*27.1*	C	*28.5*	C	*32.9*
8	Leisure Town Rd at Alamo Dr	S	C	26.5	C	31.5	C	33.0	D	44.6
9	Leisure Town Rd at Vanden Rd	R	A	4.9	A	5.2	A	8.1	A	8.2
10	Nut Tree Rd at Ulatis Dr	S	C	30.7	C	32.9	E	67.6	F	82.5
11	Allison Dr at Ulatis Dr	S	B	16.0	B	17.3	B	16.3	B	17.5
12	Allison Dr at Nut Tree Parkway	S	D	44.4	D	48.2	E	58.2	E	64.3
13	Allison Dr at E. Monte Vista Ave	S	C	28.9	C	29.6	E	65.9	E	68.4
14	Browns Valley Pkwy at E.Monte Vista	S	B	14.5	B	14.7	C	28.7	C	28.9
15	Nut Tree Rd at Elmira Rd	*S*	D	38.4	D	39.5	D	49.3	D	51.9
16	Allison Dr at Elmira Rd	S	D	53.3	E	63.4	D	50.1	D	54.0
17	Peabody Rd at Elmira Rd	S	C	29.6	C	30.3	E	68.8	E	70.5
18	Peabody Rd at Cliffside Dr	S	C	28.6	C	29.4	E	60.4	E	62.6
19	Park / Ride at Cliffside Dr (I-80 ramps)	*TW*	A	0.1	A	*0.1*	A	*0.1*	A	*0.1*
		SB	B	12.2	B	*12.3*	C	17.7	C	*18*
20	Depot St at Mason St (I-80 ramps)	S	F	105	F	109	F	122	F	123

LEGEND

Control: S=Signal, AW=All-Way Stop, TW=Stop Sign Side Street, NB=NB approach Stop

NOTE: Calculations based on HCM 2010 & 2000 methdology for intersection level of service (signal, two-way), with specific City of Vacaville GP exceptions as defined below:

#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Inside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **55** secs delay*
#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Outside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **45** secs delay*
#	**SIGNALIZED, MITIGATION REQUIRED**	***Increase in delay exceeds 5.0 seconds over non-project volumes***
#	**SIGNALIZED, SIGNIFICANT and UNAVOIDABLE**	***right-of-way and funding cannot be ascertained***
#	**TWSC, LOS UNACCEPTABLE...** *Outside PDA (Priority Development Area)*	*Two-way Stop max LOS threshold = LOS mid-E @ **42.5** secs delay worst approach, **or** overall max LOS threshold = LOS D @ **35** secs*

Source: Synchro 9 HCM and PRISM Engineering

Table 14 shows that for the Cumulative Year 2035 scenarios, there are several intersections that will operate at a deficient level of service. When these intersections are significantly impacted by the project the cell is shaded yellow. When not a significant project impact, a tan shading is used. These specific deficiencies are defined in the color-coded legend at the bottom of the table based on control type and level of delay. The p.m. peak hour is more critical than the a.m. peak hour volumes in that there are five intersections which are significantly impacted by the project traffic versus only three intersections impacted in the a.m. peak hour. The a.m. peak hour scenario has an additional intersection that is significantly impacted by the project at #16 intersection, Alison Drive and Elmira Road (highlighted in yellow). This intersection is within a Priority Development Area (PDA), and therefore has a higher allowable threshold of delay at 55 seconds, LOS D (as defined in the table footer). A total of six intersections would be significantly impacted by the project in the Year 2035 scenarios. Some of the intersections that were previously significantly impacted by the project traffic in the EAP scenario, such as at Leisure Town Road and Sequoia Drive, have been already been mitigated to acceptable conditions the assumed widening of Leisure Town Road (Jepson Parkway). Therefore, these do not show up as significant impacts in the Cumulative Year 2035 scenario, and in this case, operate at LOS B.

Cumulative Year 2035 Scenario IMPACTS from The Farm at Alamo Place

The following six impacts as identified in Table 14 (yellow cells) are direct impacts from The Farm at Alamo Place, and which are also ***significant*** impacts (greater than five seconds of delay added to the non-project Year 2035-only scenario volume):

Impact 1: Leisure Town Road at I-80 EB Ramps (p.m. peak hour significant impacts, 5.3 increase to LOS D, 49.8).

Impact 2: Leisure Town Road at Ulatis Drive (p.m. peak hour significant impacts even with signal, increasing 29.9 to LOS E at 64.5 seconds of delay).

Impact 3: Leisure Town Road at Elmira Road (a.m. and p.m. peak hour significant impacts, a.m. 41.3 goes to 59.1, increase of 17.8 to LOS E. The p.m. peak increased from 44.6 to 53.4, an increase of 8.8 to LOS D. This requires additional mitigation beyond the Jepson Parkway improvements currently under construction).

Impact 4: Nut Tree Road at Ulatis Drive (p.m. peak hour significant impact, 67.6 LOS E goes to 82.5 LOS F, an increase of 14.9, will require mitigation, but there is insufficient right of way to do so. There are currently no planned or programmed improvements for this intersection. Right of way funding cannot be ascertained. This is significant and unavoidable, since the City has maintained that the existing bike lanes must remain in place, and lane expansion or restriping is not feasible).

Impact 5: Allison Drive at Nut Tree Parkway (This intersection is in a PDA, and the p.m. peak hour has significant impacts, increasing 6.1 from LOS E 58.2 to LOS E at 64.5 seconds of delay. There are currently no planned or programmed improvements for this intersection. Right of way funding cannot be ascertained. This is significant and unavoidable).

Impact 6: Allison Drive at Elmira Road (The a.m. peak hour has significant impacts, increasing 10.1 seconds to unacceptable LOS E at 63.4 seconds of delay from acceptable LOS D 53.3 seconds of delay in the PDA. Mitigation is possible at this location through modification of lane striping, and can be done within existing right of way and curb-to-curb pavement).

Other intersections are also operating at deficient levels, but are not significantly impacted by the project. These include Allison Drive at E. Monte Vista Avenue, Peabody Road at Elmira Road, Peabody at Cliffside Drive, and

Depot Street at Mason Street (I-80 ramps). The results of the link segment capacity analysis are shown in *Table 15. Link Segment Capacity Analysis for Year 2035+Project AM and PM Peak Hour*. There were no link segments operating below the City's LOS C capacity standard for the Year 2035 plus Project scenarios.

Table 15. Link Segment Capacity Analysis for Year 2035+Project AM and PM Peak Hour

		2035 PM Peak+PROJ				2035 AM Peak+PROJ				
ROAD		Volume		Analysis		Volume		Analysis		
TYPE	SEGMENT LOCATION	2way	1way	LOS C	OK?	2way	1way	LOS C	OK?	ADT*
	LEISURE TOWN ROAD									
6LDA	a. North of I 80 east bound ramps	4604	2490	3120	yes	3531	2300	3120	yes	55248
6LDA	b. I 80 east bound ramps to Orange Drive	3654	1898	3120	yes	2961	1686	3120	yes	43848
4LDA	c. Orange drive to Sequoia white Pine	2964	1627	2064	yes	2641	1674	2064	yes	35568
4LDA	d. Ulatis/Hawkins to Sequoia White Pine	2935	1484	2064	yes	2633	1591	2064	yes	35220
4LDA	e. Elmira road to Ulatis Drive Hawkins Road	2568	1366	2064	yes	2365	1394	2064	yes	30816
4LDA	f. Alamo Drive fry Road to Elmira Dr.	2329	1312	2064	yes	1937	1010	2064	yes	27948
4LDA	g. Vanden Road to Alamo Drive	2329	1312	2064	yes	1937	1010	2064	yes	27948
4LDA	h. South of Vanden Road	1507	1147	2064	yes	905	655	2064	yes	18084
	HAWKINS ROAD									
2LUA	a. East of north south arterial	489	293	900	yes	359	259	900	yes	5862
4LDA	b. Leisure Town Road to north south arterial	977	586	2064	yes	717	518	2064	yes	11724
	ULATIS DRIVE									
4LDA	a. West of nut tree Road	1336	530	2064	yes	862	491	2064	yes	16028
4LDA	b. Leisure Town Road to Nut tree Road	760	272	2064	yes	378	199	2064	yes	9120
	ALLISON DRIVE									
4LDA	a. Ulatis Road to nut tree Parkway	2507	1070	2064	yes	1313	735	2064	yes	30079
6LDA	b. North of nut tree Parkway	3660	2528	3120	yes	1710	1194	2064	yes	43923
	ELMIRA ROAD									
4LDA	a. West of nut tree Road	2077	926	2064	yes	2015	1242	2064	yes	24924
4LDA	b. Nut tree road to leisure Town Road	2207	1032	2064	yes	1593	1041	2064	yes	26484
4LDA	c. Leisure Town Road to north south arterial	1182	581	2064	yes	542	217	2064	yes	14184
2LUA	d. East of north south arterial	591	291	900	yes	271	109	900	yes	7092

LEGEND for LOS Calculation

6LDA = 6 lane divided arterial, LOS C two-way capacity=5200, LOS C directional=60% = 3120

4LDA = 4 lane divided arterial, LOS C two-way capacity=3440, LOS C directional=60% = 2064

2LUA = 2 lane undivided arterial, LOS C two-way capacity=1500, LOS C directional=60% = 900

Source: New hose counts and conservatively high intersection counts for am and pm peak hours. Example calculation for segment north of intersection: NB Link = EBL+NBT+WBR. SB Link = SBL+SBT+SBR. 2-way total = EBL+NBT+WBR+SBL+SBT+SBR.

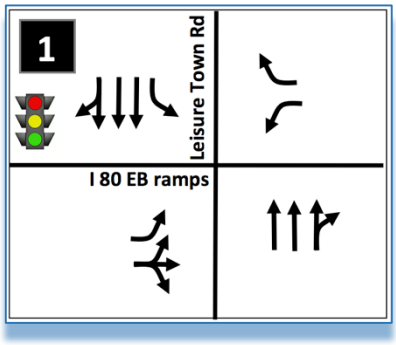
*Note: *ADT averages approximately 12 times the peak hour two-way total.*

Cumulative Year 2035 Scenario MITIGATION of Project Impacts

Legend of Lane Arrows in mitigation diagrams: **Existing** **added for 2035** **added for project mitigation**

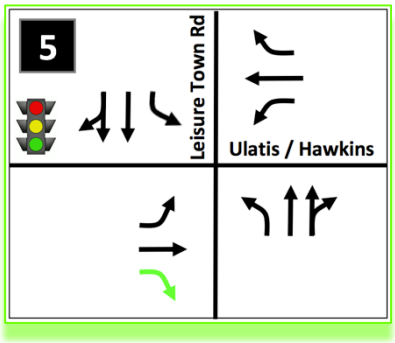
The results of the mitigated capacity analysis are shown in *Table 16. Year 2035+Project Mitigated Conditions Intersection Capacity Analysis*. The green shaded cells show where the required mitigation of the project's impact was applied to intersections #4, #5, and #6. The blue shaded cells are where mitigation of the project's impact was not possible (at intersection #10), and therefore would remain a significant and unavoidable impact.

Mitigation Intersection #1: Leisure Town Road at I-80 EB Ramps. PRISM Engineering consulted with the City Traffic Engineer to investigate possible mitigation solutions at this location, including adding a fourth SBT lane to increase capacity. Ultimately, the right of way downstream was not available based on other planned improvements already programmed, and it was not feasible to increase capacity.



Significance: The project has a significant and unavoidable impact at this location because of constraints to increasing vehicle capacity without sacrificing existing and striped bicycle lanes, as well as trees in the median of the NB approach. Until such time as additional right of way acquisition can be programmed to occur, ***the impacts to this location will remain significant and unavoidable***. LOS E with 77.7 seconds delay is the result. Even without the project this intersection is unacceptable for EAP p.m. peak hour volumes.

Mitigation Intersection #5: Leisure Town Road at Ulatis Drive. Leisure Town Road at Ulatis/Hawkins (#5) intersection, the City shall implement the following improvements:



- Add a separate EBR turn pocket on the eastbound approach of Ulatis Drive.

This mitigation is consistent with the ultimate configuration of Jepson Parkway, but is not part of the Jepson Parkway Road Widening Project currently underway. With this mitigation, the intersection would operate at LOS D 43.3 or better during both peak hours.

Significance after Mitigation: Implementation of Mitigation would allow the intersection to operate slightly above the city's LOS thresholds. The threshold at this location would be 45 seconds of delay maximum.

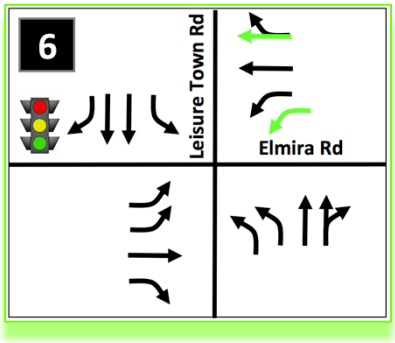
Mitigation Intersection #6: Leisure Town Road at Elmira Road. Leisure Town Road at Ulatis Drive EAP volumes are already at LOS F without the project, but will be mitigated automatically as part of new project site construction to provide primary access to the project's internal roadways along a realigned Hawkins Road. The full mitigation consists of:

- Install a traffic signal
- Add a through lane on southbound Leisure Town Road to provide one left-turn lane, one through lane and one shared through-right lane on the southbound approach.

- Add a through lane on northbound Leisure Town Road to provide one left-turn lane, one through lane and one shared through-right lane on the southbound approach.
- Restripe EB approach to have EBL, EBT, and EBR separate lanes.
- Stripe new WB constructed approach with separate WBL, WBT, and WBL lanes.

Significance after Mitigation: Implementation of Mitigation would allow the intersection to operate above the city's LOS thresholds. This section of Leisure Town Road is not part of the Jepson Parkway Road Widening Project, but it is adjacent to The Farm at Alamo Place project frontage, therefore, the right-of-way for widening Leisure Town Road is available. The mitigation can happen concurrent with development of the initial phase of the project.

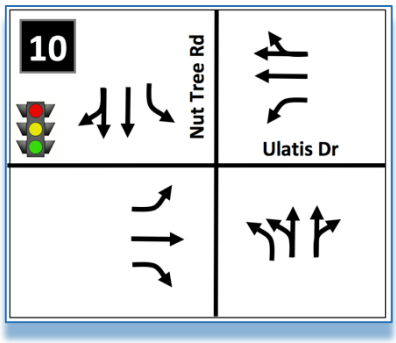
Mitigation Intersection #6: Leisure Town Road at Elmira Road. Leisure Town Road at Elmira Road will be partially mitigated by the Jepson Parkway widening. However, the planned improvements are not sufficient without also expanding the westbound approach beyond the planned WBL, WBT, and WBR lanes. In order to achieve satisfactory levels of service it will be necessary to add a lane to this approach as follows:



- Modify traffic signal to eliminate split phase (as part of Jepson Parkway project)
- Restripe WB approach within existing pavement to accommodate a dual WBL, WBT, and WBT/RT lanes (expand from three lane to a four lane approach).

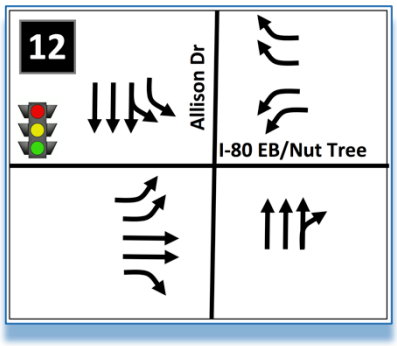
Significance after Mitigation: Implementation of Mitigation would allow the intersection to operate above the city's LOS thresholds at LOS D with 38.6 seconds of delay in the p.m. peak hour. The mitigation can happen concurrent with development of the initial phase of the project.

Mitigation Intersection #10: Nut Tree Road at Ulatis Drive. PRISM Engineering consulted with the City Traffic Engineer on several occasions to investigate a variety of mitigation solutions at this location, including eliminating the split phase, restriping the north and southbound approaches to increase capacity, doubling the NBL turn pocket, as well as new construction to add a NBR turn pocket. Ultimately, the right of way was not available, and it was not feasible to eliminate existing striped bike lanes to accommodate an expansion of vehicle lanes.



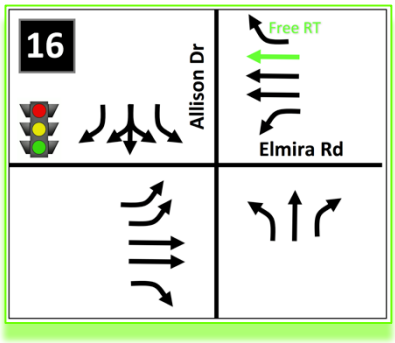
Significance: The project has a significant and unavoidable impact at this location because of constraints to increasing vehicle capacity without sacrificing existing and striped bicycle lanes, as well as trees in the median of the NB approach. Until such time as additional right of way acquisition can be programmed to occur, ***the project impacts to this location will remain significant and unavoidable***. LOS F with 82.5 seconds delay is the result with the project. Even without the project this intersection is unacceptable for Year 2035 p.m. peak hour volumes.

Mitigation Intersection #12: Allison Drive at Nut Tree Parkway. PRISM Engineering consulted with the City Traffic Engineer on several occasions to investigate a variety of mitigation solutions at this location, including eliminating the split phase, restriping the north and southbound approaches to increase capacity, doubling the NBL turn pocket, as well as new construction to add a NBR turn pocket. Ultimately, the right of way was not available, and it was not feasible to eliminate existing striped bike lanes to accommodate an expansion of vehicle lanes.



Significance: The project has a significant and unavoidable impact at this location because of constraints to increasing vehicle capacity without sacrificing existing and striped bicycle lanes, as well as trees in the median of the NB approach. Until such time as additional right of way acquisition can be programmed to occur, ***the project impacts to this location will remain significant and unavoidable***. LOS F with 82.5 seconds delay is the result with the project. Even without the project this intersection is unacceptable for Year 2035 p.m. peak hour volumes.

Mitigation Intersection #16: Allison Drive at Elmira Road. Elmira Road at this location is very wide, and can accommodate more lanes within the existing pavement width. It is possible to mitigate the unacceptable year 2035+ project traffic impact by adding an additional westbound through Lane, and converting the existing westbound right turn pocket into a free right turn pocket. These changes are possible through restriping of the westbound approach of this intersection. The resulting level of service



Significance: The project has a significant and unavoidable impact at this location because of constraints to increasing vehicle capacity without sacrificing existing and striped bicycle lanes, as well as trees in the median of the NB approach. Until such time as additional right of way acquisition can be programmed to occur, ***the project impacts to this location will remain significant and unavoidable***. LOS F with 82.5 seconds delay is the result with the project. Even without the project this intersection is unacceptable for Year 2035 p.m. peak hour volumes.

Other intersections that are highlighted with a light tan color cell (13, 17, 18, and 20) represent intersections that are operating below the City's LOS D standard for this scenario, but the project is not required to mitigate the impact because it did not increase the overall delay by more than 5.0 seconds (was not significant by definition).

Table 16. Year 2035+Project MITIGATED Conditions Intersection Capacity Analysis

#	INTERSECTION LOCATION	Control	2035 AM Peak				2035 PM Peak			
			No PROJ		w/PROJ		No PROJ		w/PROJ	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Leisure Town Rd at I-80 EB Ramps	S	D	42.0	D	46.8	D	44.5	D	49.8
2	Leisure Town Rd at I-80 WB Ramps	S	C	20.7	C	23.0	C	20.7	C	23.3
3	Leisure Town Rd at Orange Dr	S	C	32.7	D	37.7	D	38.2	D	44.8
4	Leisure Town Rd at Sequoia Dr	S	A	8.6	A	9.6	B	10.7	B	13.4
5	Leisure Town Rd at Ulatis	S	C	22.3	C	34.8	D	35.4	D	43.3
6	Leisure Town Rd at Elmira Rd	S	D	41.3	D	44.8	D	44.6	D	46.1
7	Leisure Town Rd at Marshall Rd	S	C	25.4	D	*27.1*	D	*28.5*	D	*32.9*
8	Leisure Town Rd at Alamo Dr	S	C	26.5	C	31.5	C	33.0	D	44.6
9	Leisure Town Rd at Vanden Rd	R	A	4.9	A	5.2	A	8.1	A	8.2
10	Nut Tree Rd at Ulatis Dr	S	C	30.7	C	32.9	E	67.6	F	82.5
11	Allison Dr at Ulatis Dr	S	B	16.0	B	17.3	B	16.3	B	17.5
12	Allison Dr at Nut Tree Parkway	S	D	44.4	D	48.2	E	58.2	E	64.3
13	Allison Dr at E. Monte Vista Ave	S	C	28.9	C	29.6	E	65.9	E	68.4
14	Browns Valley Pkwy at E.Monte Vista	S	B	14.5	B	14.7	C	28.7	C	28.9
15	Nut Tree Rd at Elmira Rd	*S*	D	38.4	D	39.5	D	49.3	D	51.9
16	Allison Dr at Elmira Rd	S	D	53.3	C	21.9	D	50.1	D	41.8
17	Peabody Rd at Elmira Rd	S	C	29.6	C	30.3	E	68.8	E	70.5
18	Peabody Rd at Cliffside Dr	S	C	28.6	C	29.4	E	60.4	E	62.6
19	Park / Ride at Cliffside Dr (I-80 ramps)	*TW*	A	0.1	A	*0.1*	A	*0.1*	A	*0.1*
		SB	B	12.2	B	*12.3*	C	17.7	C	*18*
20	Depot St at Mason St (I-80 ramps)	S	F	105	F	109	F	122	F	123

LEGEND

Control: S=Signal, AW=All-Way Stop, TW=Stop Sign Side Street, NB=NB approach Stop

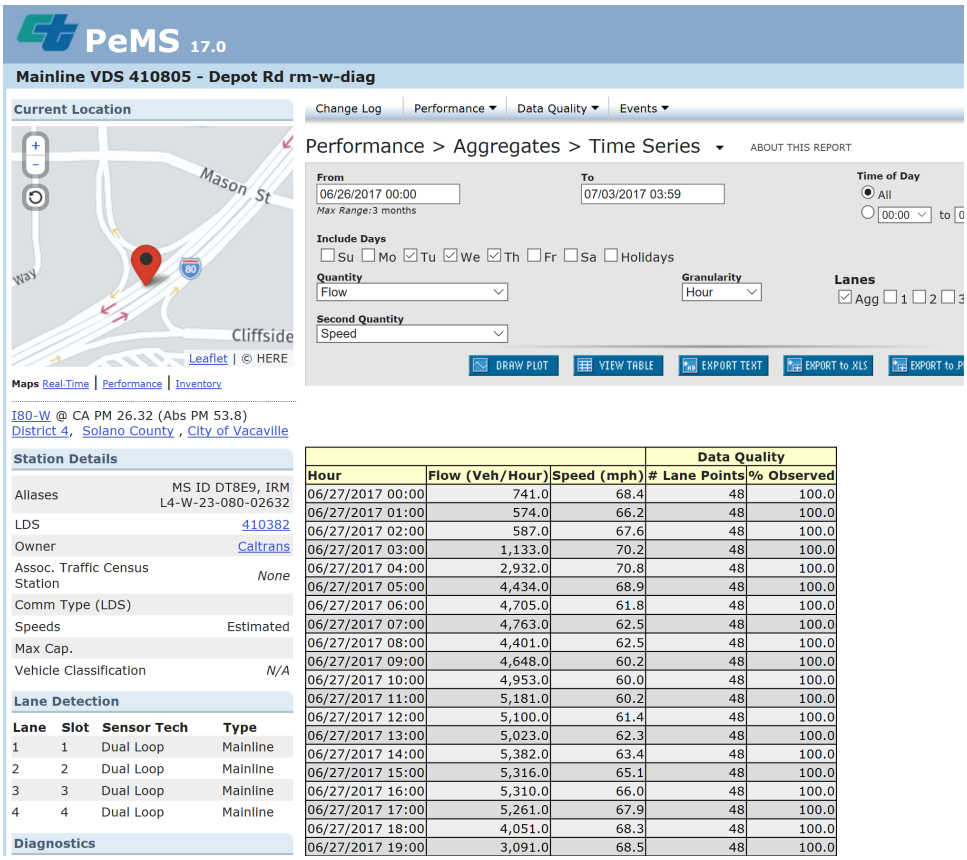
NOTE: Calculations based on HCM 2010 & 2000 methdology for intersection level of service (signal, two-way), with specific City of Vacaville GP exceptions as defined below:

#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Inside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **55** secs delay*
#	**SIGNALIZED, LOS UNACCEPTABLE.** *(**Outside PDA**)*	*Unacceptable signal LOS threshold = LOS D @ **45** secs delay*
#	**SIGNALIZED, MITIGATION REQUIRED**	***Increase in delay exceeds 5.0 seconds over non-project volumes delay***
#	**SIGNALIZED, MITIGATED RESULT**	***Mitigated to within 5.0 seconds over non-project volumes delay***
#	**SIGNALIZED, SIGNIFICANT and UNAVOIDABLE**	***right-of-way and funding cannot be ascertained***
#	**TWSC, LOS UNACCEPTABLE...** *Outside PDA (Priority Development Area)*	*Two-way Stop max LOS threshold = LOS mid-E @ **42.5** secs delay worst approach, **or** overall max LOS threshold = LOS D @ **35** secs*

Source: Synchro 9 HCM and PRISM Engineering

APPENDIX

Sample Outputs and Data Sources, and Synchro Calculations



			Data Quality	
Hour	Flow (Veh/Hour)	Speed (mph)	# Lane Points	% Observed
06/27/2017 00:00	741.0	68.4	48	100.0
06/27/2017 01:00	574.0	66.2	48	100.0
06/27/2017 02:00	587.0	67.6	48	100.0
06/27/2017 03:00	1,133.0	70.2	48	100.0
06/27/2017 04:00	2,932.0	70.8	48	100.0
06/27/2017 05:00	4,434.0	68.9	48	100.0
06/27/2017 06:00	4,705.0	61.8	48	100.0
06/27/2017 07:00	4,763.0	62.5	48	100.0
06/27/2017 08:00	4,401.0	62.5	48	100.0
06/27/2017 09:00	4,648.0	60.2	48	100.0
06/27/2017 10:00	4,953.0	60.0	48	100.0
06/27/2017 11:00	5,181.0	60.2	48	100.0
06/27/2017 12:00	5,100.0	61.4	48	100.0
06/27/2017 13:00	5,023.0	62.3	48	100.0
06/27/2017 14:00	5,382.0	63.4	48	100.0
06/27/2017 15:00	5,316.0	65.1	48	100.0
06/27/2017 16:00	5,310.0	66.0	48	100.0
06/27/2017 17:00	5,261.0	67.9	48	100.0
06/27/2017 18:00	4,051.0	68.3	48	100.0
06/27/2017 19:00	3,091.0	68.5	48	100.0

Basic1.xuf* HCS7 Freeways

START BASIC REPORT

Project Properties

Analyst		Jurisdiction	
Agency		Time Period Analyzed	
Analysis Year	2017	Date	7/3/2017
Project Description			

Geometric Data

Number of Lanes	4	Terrain Type	Level
Measured FFS	☐	Percent Grade, %	-
Base Free Flow Speed, mi/h	75.4	Grade Length, mi	-
Length, ft	-	Right Side Clearance, ft	10
Lane Width, ft	12	Total Ramp Density, ramps/mi	0.00
Managed Lane	☐		

Demand Data

Demand, veh/h	7648	Peak Hour Factor	0.94
Total Trucks, %	0.00	Single-Unit Trucks (SUT), %	-
Tractor-Trailers (TT), %	-	Mixed Flow Model	☐

Adjustment Factors

Driver Population	All Familiar	Speed Adjustment Factor	1.000
Weather Type	Non-Severe W	Capacity Adjustment Factor	1.000
Incident Type	No Incident	Demand Adjustment Factor	1.000
Work Zone	☐		

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Basic1.xuf* HCS7 Freeways

START BASIC REPORT

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HCS7 Basic Freeway Report

Project Information			
Analyst		Date	7/3/2017
Agency		Analysis Year	2017
Jurisdiction		Time Period Analyzed	
Project Description			
Geometric Data			
Number of Lanes (N), ln	4	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	75.4	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	75.4
Right-Side Lateral Clearance, ft	10		
Adjustment Factors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000
Demand and Capacity			
Volume (V), veh/h	7648	Heavy Vehicle Adjustment Factor (f_{HV})	1.000
Peak Hour Factor (PHF)	0.94	Flow Rate (v_p), pc/h/ln	2034
Total Trucks, %	0.00	Capacity (c), pc/h/ln	2400
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2400
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.85
Passenger Car Equivalent (E_T)	2.000		
Speed and Density			
Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	63.3
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	32.1
Total Ramp Density Adjustment	0.0	Level of Service (LOS)	D
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	75.4		

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Switch to Text Report

HCS™ Freeways Version 7.2.1

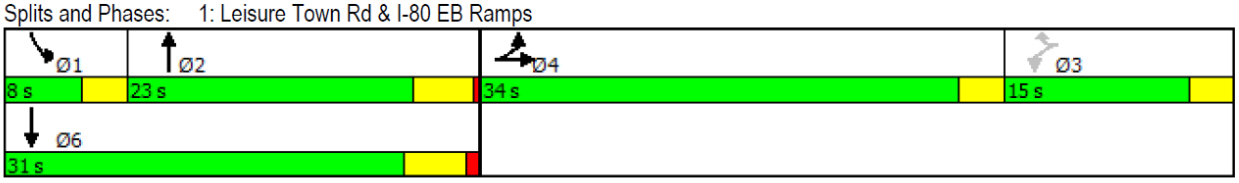
Lanes, Volumes, Timings
1: Leisure Town Rd & I-80 EB Ramps

06/25/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	34.0	34.0		15.0		15.0		23.0		8.0	31.0	
Total Split (%)	42.5%	42.5%		18.8%		18.8%		28.8%		10.0%	38.8%	
Maximum Green (s)	31.0	31.0		12.0		12.0		18.5		5.0	26.0	
Yellow Time (s)	3.0	3.0		3.0		3.0		4.0		3.0	4.0	
All-Red Time (s)	0.0	0.0		0.0		0.0		0.5		0.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0		0.0		0.0		0.0	0.0	
Total Lost Time (s)	3.0	3.0		3.0		3.0		4.5		3.0	5.0	
Lead/Lag	Lead	Lead		Lag		Lag		Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes		Yes		Yes		Yes		
Vehicle Extension (s)	2.0	2.0		2.0		2.0		4.0		2.0	4.0	
Minimum Gap (s)	1.2	1.2		1.0		1.0		3.0		1.0	3.0	
Time Before Reduce (s)	0.8	0.8		0.8		0.8		1.0		0.8	1.0	
Time To Reduce (s)	0.1	0.1		0.1		0.1		0.1		0.1	0.1	
Recall Mode	None	None		None		None		Min		Min	Min	
Walk Time (s)	5.0	5.0									5.0	
Flash Dont Walk (s)	26.0	26.0									12.0	
Pedestrian Calls (#/hr)	0	0									0	
Act Effct Green (s)	17.1	17.1		8.0		8.0		19.2		5.2	27.0	
Actuated g/C Ratio	0.28	0.28		0.13		0.13		0.31		0.08	0.44	
v/c Ratio	0.75	0.62		0.40		0.37		0.76		0.43	0.43	
Control Delay	31.1	17.6		35.2		10.2		25.9		41.2	14.0	
Queue Delay	0.0	0.0		0.0		0.0		0.0		0.0	0.0	
Total Delay	31.1	17.6		35.2		10.2		25.9		41.2	14.0	
LOS	C	B		D		B		C		D	B	
Approach Delay		24.6			18.7			25.9			15.7	
Approach LOS		C			B			C			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 80	
Actuated Cycle Length: 61.2	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 21.9	Intersection LOS: C
Intersection Capacity Utilization 55.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Leisure Town Rd & I-80 EB Ramps



2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	3.2	0.0	0.3	0.0	6.6	0.0	0.1
%ile Storage Ratio (RQ%)	0.00	0.28	0.00	0.02	0.00	0.20	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Right Lane Group Data								
Assigned Mvmt	0	12	0	14	0	16	0	18
Lane Assignment		R		T+R		T+R		T+R
Lanes in Grp	0	1	0	1	0	1	0	1
Grp Vol (v), veh/h	0	264	0	82	0	539	0	21
Grp Sat Flow (s), veh/h/ln	0	1615	0	1615	0	1896	0	1615
Q Serve Time (g_s), s	0.0	6.5	0.0	2.6	0.0	13.1	0.0	0.6
Cycle Q Clear Time (g_c), s	0.0	6.5	0.0	2.6	0.0	13.1	0.0	0.6
Prot RT Sat Flow (s_R), veh/h/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prot RT Eff Green (g_R), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prop RT Outside Lane (P_R)	0.00	1.00	0.00	1.00	0.00	0.01	0.00	1.00
Lane Grp Cap (c), veh/h	0	598	0	117	0	713	0	169
V/C Ratio (X)	0.00	0.44	0.00	0.70	0.00	0.76	0.00	0.12
Avail Cap (c_a), veh/h	0	961	0	967	0	1128	0	958
Upstream Filter (I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d1), s/veh	0.0	12.5	0.0	24.0	0.0	14.4	0.0	21.5
Incr Delay (d2), s/veh	0.0	0.2	0.0	2.8	0.0	0.8	0.0	0.1
Initial Q Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0	12.8	0.0	26.8	0.0	15.2	0.0	21.6
1st-Term Q (Q1), veh/ln	0.0	2.9	0.0	1.2	0.0	6.7	0.0	0.3
2nd-Term Q (Q2), veh/ln	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0
3rd-Term Q (Q3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q Factor (f_B%)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
%ile Back of Q (50%), veh/ln	0.0	2.9	0.0	1.3	0.0	6.9	0.0	0.3
%ile Storage Ratio (RQ%)	0.00	0.25	0.00	0.07	0.00	0.21	0.00	0.00
Initial Q (Qb), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Final (Residual) Q (Qe), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Delay (ds), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Q (Qs), veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sat Cap (cs), veh/h	0	0	0	0	0	0	0	0
Initial Q Clear Time (tc), h	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.