California State University, Stanislaus

Campus Physical Master Plan EIR
Traffic Impact Analysis Report

FINAL REPORT

Prepared for:

California State University, Stanislaus

Prepared by:

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ENGINEERS · PLANNERS

CALIFORNIA STATE UNIVERSITY STANISLAUS CAMPUS PHYSICAL MASTER PLAN EIR
TRAFFIC IMPACT ANALYSIS REPORT

FINAL REPORT

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INTRODUCTION

This study has been prepared to present the results of a Traffic Impact Analysis Report (TIAR) prepared in support of the *California State University Stanislaus* (CSU Stanislaus) *Campus Physical Master Plan Environmental Impact Report* (EIR). This TIAR was performed by OMNI-MEANS for California State University, Stanislaus as required for CEQA clearance of the *CSU Stanislaus Campus Physical Master Plan EIR.*

The CSU Stanislaus campus is located in the City of Turlock in California. The campus perimeter is roughly bound by Christofferson Parkway to the north, Monte Vista Avenue to the south, Crowell Road to the west, and Geer Road to the east. The campus boundary, however, excludes an approximately 17 acre rectangular parcel southeast of the Christofferson Parkway / Crowell Road intersection that contains residential development. Additional campus property includes the 10 acre "Yosemite property," located east of Geer Road across from Calaveras Way. The site is served by six access points. One entrance is located off of Geer Road, two are off of Crowell Road, and three are off of Monte Vista Avenue, including the main campus entrance. There is currently no access from Christofferson Parkway, but an entrance is planned in the near term and will be assumed in this report's "Short Term" analysis scenarios.

The Campus Physical Master Plan, henceforth referred to as "Master Plan" (MP), includes expansions of and additions to existing buildings, as well as infill projects in conformance with the 1968 Master Plan. The new and improved educational, health, parking and residential facilities are intended to serve the needs of increased student enrollment. The campus enrollment as approved in the 1968 Master Plan will remain at approximately 12,000 FTE (15,000 headcount). The Project Site location and vicinity map is presented in Figure 1.

The following scenarios are analyzed as part of this TIAR:

- Existing Conditions
- *Short Term No MP Growth Conditions*
- *Short Term Plus 10 Year MP Growth Conditions*
- *Year 2027 No MP Growth Conditions*
- *Year 2027 Plus 20 Year MP Growth Conditions*

Existing Analysis

The Exiting Conditions analysis provides descriptions of study-area intersections and roadways that provide access to and from the CSU Stanislaus campus and primary circulation within the City of Turlock. Current traffic operations will be quantified at 31 critical study intersections.

"Short Term" Analysis

The "Short Term" scenarios quantify projected increases in travel demand approximately 10 years from now. In these scenarios, all approved and / or pending projects in the City of Turlock are accounted for. Traffic operations will be quantified at 31 study locations both with and without project-related growth.

Short Term No MP Growth Conditions traffic forecasts are based upon the City of Turlock travel demand model interim year projections (approximately Year 2017). Intersection turning movements are projected based on the travel demand model outputs. *Short Term Plus 10 Year MP Growth Conditions* traffic forecasts are obtained by estimating the trips generated by the projected increase in student population over 10 years, as approved by CSU Stanislaus. The trips generated are then distributed through study intersections and subsequently added to *Short Term No MP Growth* turning movements for analysis.

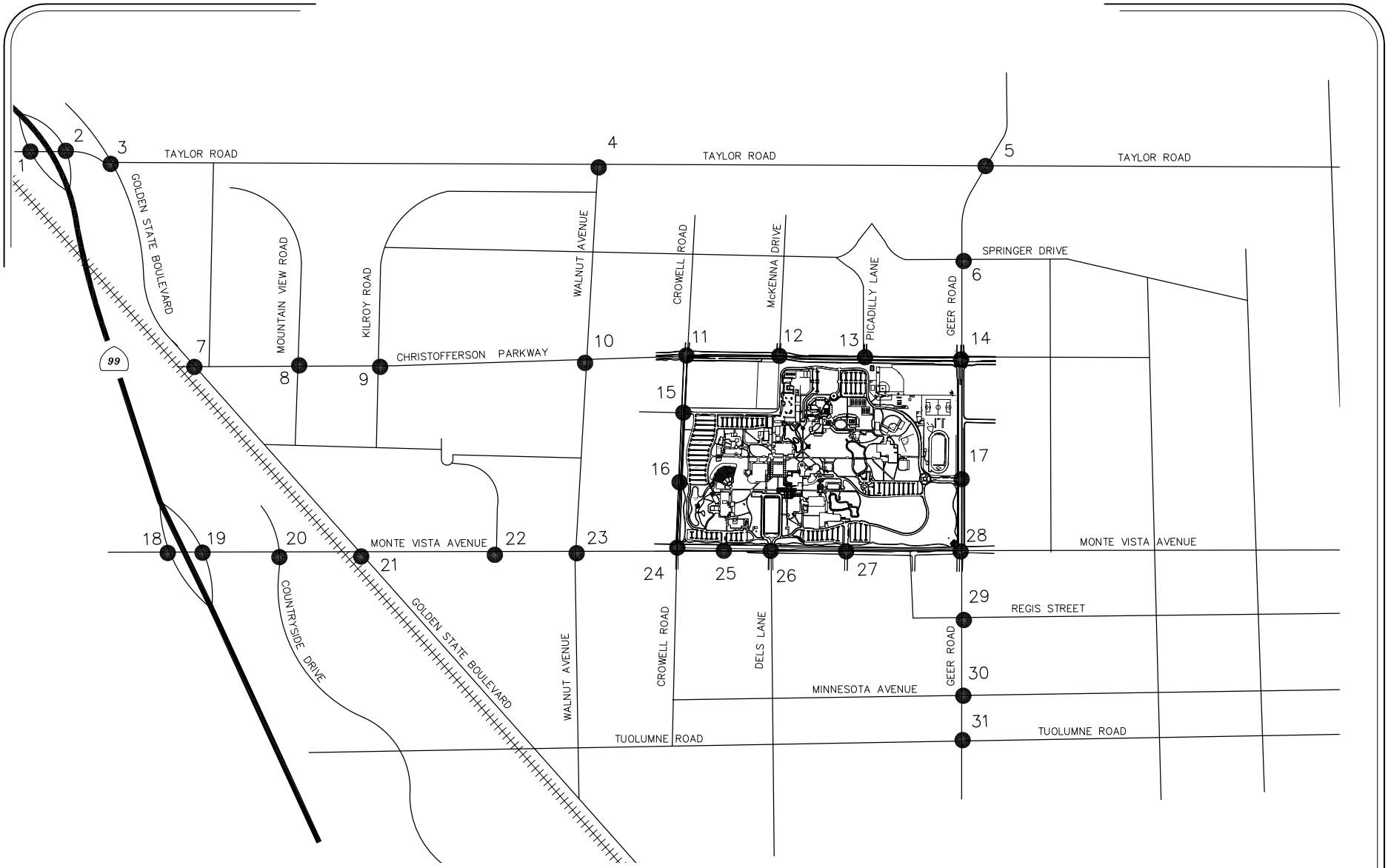

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Figure 1

Project Site Location & Vicinity Map

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"Year 2027" Analysis

The "Year 2027" scenarios quantify projected increases in travel demand approximately 20 years from now. Traffic operations will be quantified at 31 study locations both with and without project-related growth. In addition to the approved and / or pending projects assumed in "Short Term" scenarios, which roughly represent build-out of the existing General Plan, "Year 2027" scenarios will assume the build-out of adjacent "Specific Plan" projects. Improvements to Christofferson Parkway, Monte Vista Avenue, and Walnut Road are assumed during "Year 2027" analysis scenarios. Specific improvements at all study locations will be detailed in the subsequent Year 2027 Conditions section of this report.

Year 2027 No MP Growth Conditions traffic forecasts are based upon the City of Turlock travel demand model long term projections (approximately Year 2027). *Year 2027 Plus 20 Year MP Growth Conditions* traffic forecasts are obtained by estimating the trips generated by the fulfillment of long term student enrollment capacity, as approved by the California State University Board of Trustees. The trips generated are then distributed through the 31 study intersection and subsequently added to *Year 2027 No MP Growth* turning movements for analysis.

EXISTING CONDITIONS

The CSU Stanislaus campus is located towards the northern end of the City of Turlock in California. The campus is about 10 miles southwest of the City of Modesto, along State Route 99 (SR 99) in Stanislaus County. According to the City of Turlock website, the current population is estimated at 69,321. The CSU Stanislaus student enrollment is currently estimated at around 6,182 Full-Time Equivalent (FTE) students. The campus is about two miles east of SR 99, which provides interregional north-south access.

EXISTING TRANSPORTATION SYSTEM

The following roadways provide primary circulation within the City of Turlock and in the vicinity of the proposed project.

> ***State Route 99*** is a major north-south state freeway that spans the majority of California's Central Valley. SR 99 serves as the principal interregional auto and truck route, connecting the Central Valley cities of Stockton, Modesto, Merced and Fresno to the Sacramento area to the north and the Cities of Fresno, Visalia and Bakersfield to the south. The freeway provides the primary connection between the cities of Modesto and Turlock within Stanislaus County and serves as a major north-south route within the City. SR 99 has six lanes with posted speed limits of 65 mph within the Turlock City Limits. The freeway forms a full-access interchange with Monte Vista Avenue about 2 miles west of the campus.
>
> ***Taylor Road*** is a two-lane east-west local roadway in Stanislaus County just beyond the City's northern urban growth boundary. Taylor Road's westernmost terminus is at Moorehead Road, over 10 miles west of the City Limits. Taylor Road continues east where it begins a long continuous segment through the City beginning at Washington Road. Taylor Road provides a full interchange with SR 99, continues east with residential development and an irrigation canal to the south, farmland to the north, and terminates at Quincy Road. Taylor Road resumes discontinuously east of Santa Fe Avenue, between Sperry Road and Gratton Road, and from Merriam Road to its easternmost terminus at Hall Road over 5 miles east of the City Limits.
>
> ***Christofferson Parkway*** is a four-lane east-west expressway that extends from Golden State Boulevard to Berkeley Avenue, a little over 600 yards east of the City Limits. This roadway becomes Zeering Road from Berkeley Avenue through the City of Denair. This

roadway provides access to residential areas and represents the northern boundary of the CSU Stanislaus campus.

Monte Vista Avenue / University Way is a four-lane east-west arterial within the City of Turlock that provides access to major commercial areas near SR 99 and represents the southern boundary of the CSU Stanislaus campus. Adjacent to the campus, this roadway is named University Way but is referred to throughout this report as Monte Vista Avenue. Monte Vista Avenue has three campus access points, including the main entrance, Monte Vista Avenue's westernmost terminus is at Jennings Road, about 9 miles west of the City Limits, and runs discontinuously east from there until Faith Home Road. Monte Vista Avenue resumes continuously from Tegner Road to its easternmost terminus about 14 miles east of the City Limits.

Golden State Boulevard is a four- to six-lane divided arterial that runs parallel to SR 99 and the Union Pacific Railroad. Golden State Boulevard represents a major arterial route within the City and connects to SR 99 at both ends. Golden State Boulevard was the original alignment for US Highway 99 prior to the construction of the SR- 99 freeway bypass in the 1970s.

Walnut Road is a north-south collector that runs from Bradbury Road, about 2 miles south of the City Limits, to East Service Road, about 3 miles north of the City Limits. Walnut Road is discontinuous between the southern segment's northernmost abutment at Canal Drive and the northern segment's southernmost abutment at Golden State Boulevard. The southern segment is a two-lane facility providing access to commercial areas near the SR 99 / Main Street interchange and industrial areas between Main Street and West Linwood Avenue. The northern segment is a two-lane facility south of Monte Vista Avenue and north of Taylor Road. Between Monte Vista and Christofferson Parkway, Walnut Road is a four-lane arterial with a two-way left turn lane. Between Christofferson Parkway and Taylor Road, Walnut Road has recently been widened to four-lane divided arterial standards to serve new residential development.

Crowell Road is a two-lane north-south collector running from Tuolumne Road to Taylor Road. Crowell Road also delineates the western boundary of the CSU Stanislaus campus, and provides two access points to and from the campus.

Geer Road is a four-lane arterial that provides north-south circulation through the City of Turlock. Geer Road's southernmost terminus is at Golden State Boulevard. Geer Road extends to the northern City Limits and then tapers down to a two-lane facility reaching almost 7 miles north of the City Limits to abut at Yosemite Boulevard.

EXISTING TRAFFIC VOLUMES

Intersection traffic counts were obtained by OMNI-MEANS between April 24th and 26th, 2007 during the AM and PM peak-hour periods. The AM peak-hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 7:00 AM and 9:00 AM on a typical weekday. The PM peak-hour is defined as the one-hour of peak traffic flow counted between 4:00 PM and 6:00 PM on a typical weekday. The TIAR will analyze the following critical study intersections:

1. Taylor Road / SB SR 99 ramps
2. Taylor Road / NB SR 99 ramps
3. Taylor Road / Golden States Boulevard

4. Taylor Road / Walnut Avenue
5. Taylor Road / Geer Road
6. Springer Drive / Geer Road
7. Christofferson Parkway / Golden State Highway
8. Christofferson Parkway / Mountain View Road
9. Christofferson Parkway / Kilroy Avenue
10. Christofferson Parkway / Walnut Avenue
11. Christofferson Parkway / Crowell Road
12. Christofferson Parkway / McKenna Drive
13. Christofferson Parkway / Picadilly Lane
14. Christofferson Parkway / Geer Road
15. Ansel Adams Boulevard / Crowell Road
16. Mariposa Drive / Crowell Road
17. Calaveras Way / Geer Road
18. Monte Vista Avenue / SB SR 99 ramps
19. Monte Vista Avenue / NB SR 99 ramps
20. Monte Vista Avenue / Countryside Drive
21. Monte Vista Avenue / Golden State Boulevard
22. Monte Vista Avenue / Four Season Drive
23. Monte Vista Avenue / Walnut Avenue
24. Monte Vista Avenue / Crowell Road
25. Monte Vista Avenue / Theater Drive (right-turn only in future)
26. Monte Vista Avenue / Dels Lane
27. Monte Vista Avenue / Andre Lane
28. Monte Vista Avenue / Geer Road
29. Regis Street / Geer Road
30. Minnesota Avenue / Geer Road
31. Tuolumne Road / Geer Road

Existing intersection lane geometrics and control types at all study intersection are presented in Figure 2. Existing AM and PM peak-hour intersection turning movements are presented in Figure 3.

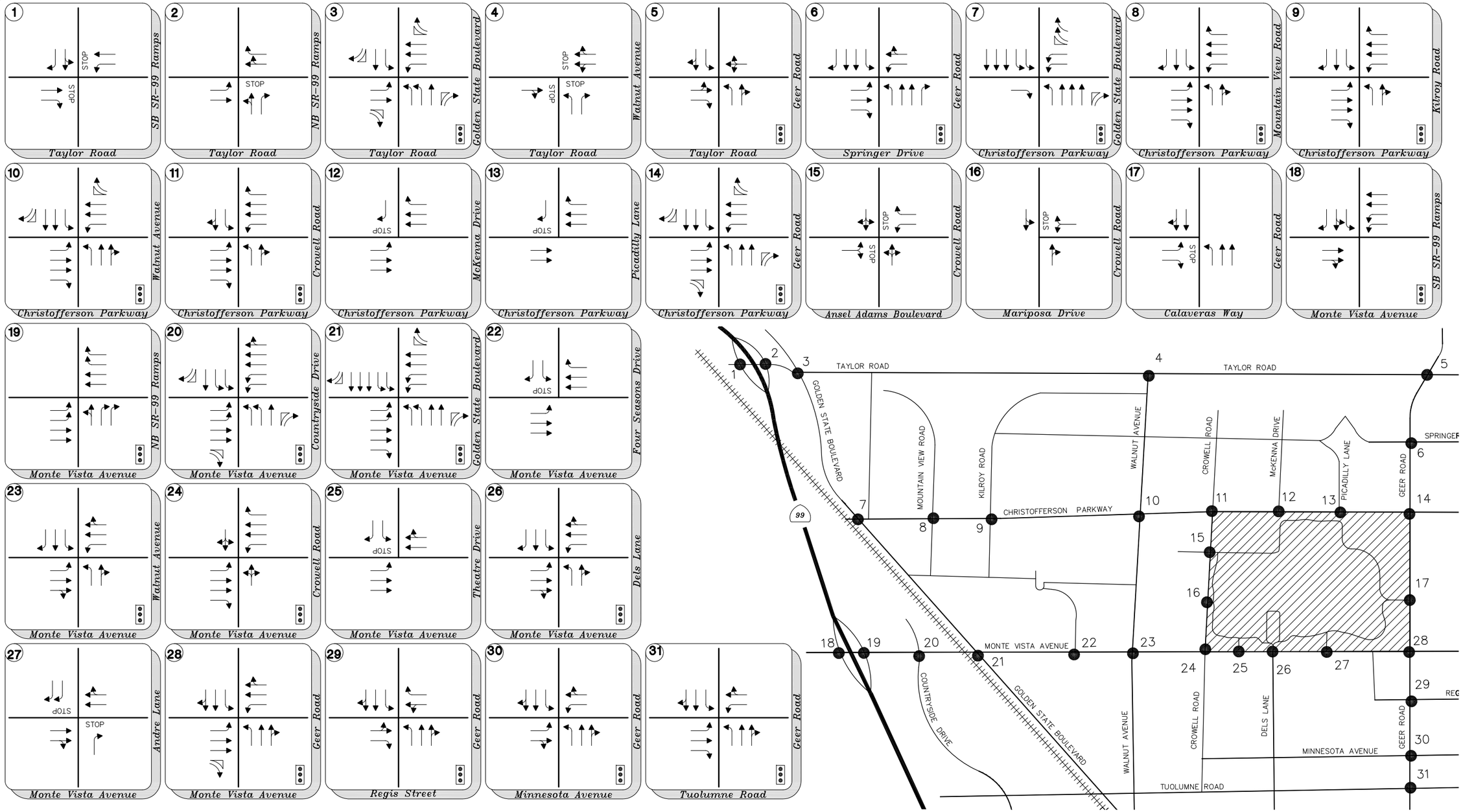

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Figure 2

Existing Intersection Lane Geometrics and Control Types

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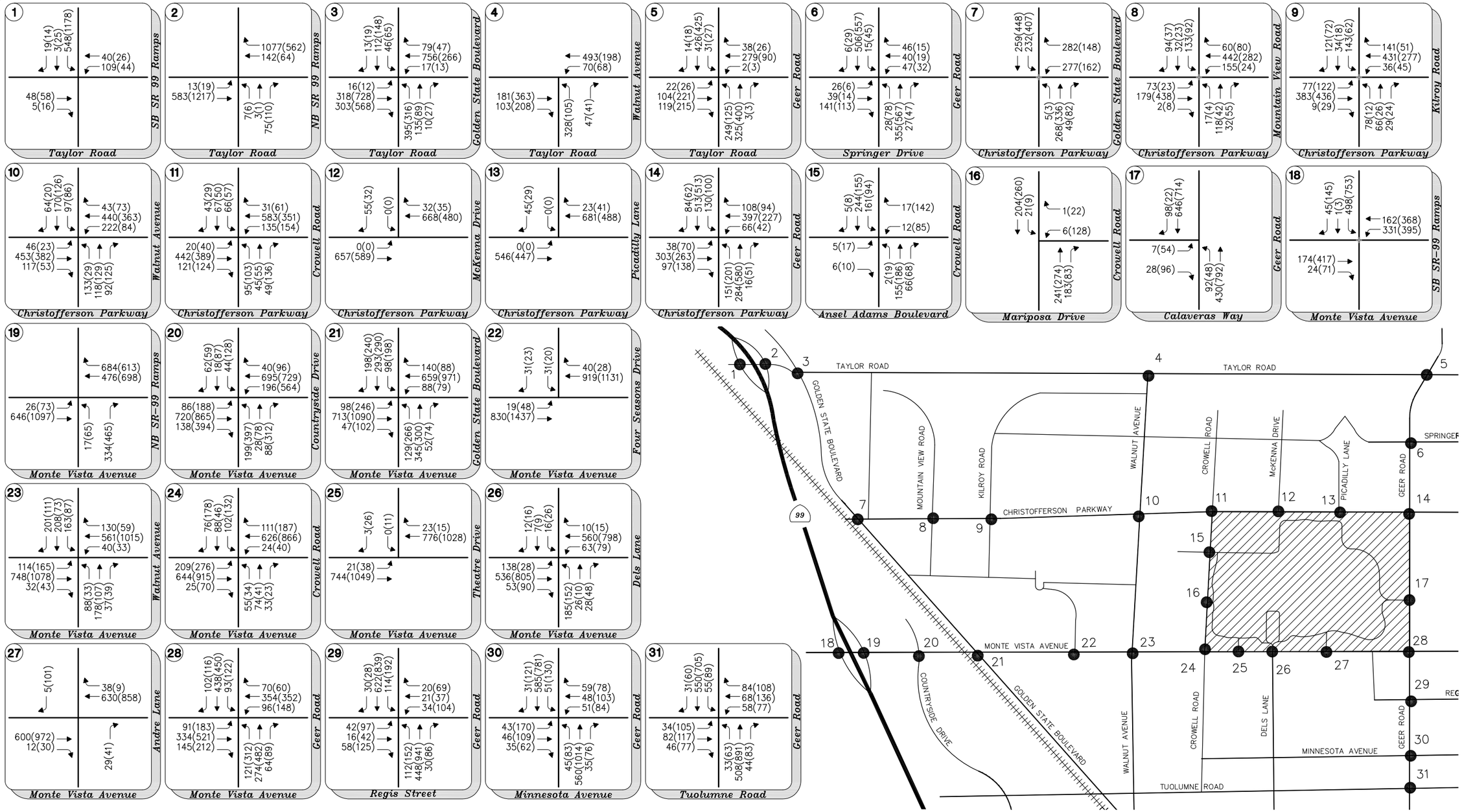

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Figure 3

Existing Intersection Traffic Volumes

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TRAFFIC ANALYSIS PARAMETERS

The following section outlines the methodology and analysis parameters used to quantify existing and projected operations at critical study intersections.

INTERSECTION LOS METHODOLOGIES

Intersection Level-Of-Service (LOS) has been calculated for all control types using the methods documented in the Transportation Research Board publications *Highway Capacity Manual, Fourth Edition, 2000*. Traffic operations have been quantified through the determination of LOS. LOS determinations are presented on a letter grade scale from "A" to "F", whereby LOS "A" represents free-flow operating conditions and LOS "F" represents over-capacity conditions. For a signalized or all-way stop-controlled (AWSC) intersection, an LOS determination is based on the calculated average delay for all approaches and movements. For a two-way stop-controlled (TWSC) intersection, an LOS determination is based upon the calculated average delay for all movements of the worst-performing approach. LOS definitions for different types of intersection controls are presented in Table 1.

Policies concerning acceptable LOS standards are contained in the "Transportation Element" section of the *City of Turlock General Plan 1992-2012 (Reviewed in 2002)*. The default standard is to "strive to maintain LOS C for all freeways and expressways," as determined in policy "5.1-c". However, policy "5.1-d" sets an exception to this guideline, stating the following:

> "Approve LOS D as an allowable standard for arterial and collector streets where existing conditions limit improvements.
>
> *The traffic forecast indicates that the following street segments may operate at Service Level D upon buildout of the General Plan: Monte Vista Avenue between SR 99 and Walnut Avenue; Hawkeye Avenue between SR 99 and Golden State Boulevard; and SR 99 between Main Street and Monte Vista Avenue. "*

Lastly, policy "5.1-e" provides further exceptions to the default LOS C standard, stating the following:

> "Recognize that the City's land use pattern, the limited number of continuous north-south streets, and the concentration of activity on the east side of the freeway will result in very poor service levels on a small number of streets where capacity cannot be increased because it would create unacceptable disruption.
>
> *The following locations are projected to operate at LOS E or F at General Plan buildout: Geer Road between Canal Drive and Tuolumne Road; Lander Avenue between Main Street and Linwood Avenue; Main Street between West Avenue and Lander Avenue; and Olive Avenue between Main Street and Canal Drive.*"

The Caltrans publication *Guide for the Preparation of Traffic Impact Studies* (December 2002) states the following:

> *"Caltrans endeavors to maintain a target LOS at the transition between LOS 'C' and LOS 'D' on State highway facilities, however, Caltrans acknowledges that this may not be always feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS."*

Consistent with Caltrans and City of Turlock policies, LOS "D" has been taken as the general threshold for acceptable operations at study intersections maintained by the City of Turlock. However, under *Year 2027 No MP Growth Conditions* and *Year 2027 Plus 20 Year MP Growth Conditions*, consistent with the policies set forth in the *City of Turlock General Plan 1992-2012*, LOS "D", "E", and "F" where applicable will be taken as the acceptable LOS thresholds for those locations identified in the *City of Turlock General Plan 1992-2012* "Transportation Element."

TABLE 1
LOS CRITERIA AND DEFINITIONS FOR INTERSECTIONS

Level of Service	Type of Flow	Delay	Maneuverability	Stopped Delay / Vehicle		
				Signalized	Un signalized	All-Way Stop
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	< 10.0	< 10.0	< 10.0
B	Stable Flow	Good progression and / or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel some what restricted within groups of vehicles.	>10.0 and < 20.0	>10.0 and < 15.0	>10.0 and < 15.0
C	Stable Flow	Higher delays resulting from fair progression and / or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>20.0 and < 35.0	>15.0 and < 25.0	>15.0 and < 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>35.0 and < 55.0	>25.0 and < 35.0	>25.0 and < 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>55.0 and < 80.0	>35.0 and < 50.0	>35.0 and < 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent move-ment. Volumes may vary widely, depending prin-cipally on the downstream back-up conditions.	> 80.0	> 50.0	> 50.0

References: 2000 Highway Capacity Manual

TRAFFIC SIGNAL WARRANTS

A supplemental traffic signal warrant analysis has been completed to determine whether unsignalized study intersections may require or benefit from the installation of a traffic signal. The term "signal warrant" refers to any of the eight established methods used by Caltrans to quantify the need for a traffic signal at an unsignalized intersection. The eight signal warrant methods are described in the latest edition of the California Manual on Uniform Traffic Control Devises (MUTCD).

The California MUTCD indicates that the installation of a traffic signal should be considered only if one or more of the eight signal warrants are met. This TIAR has performed the peak-hour volume-based Warrant 3 on study intersections projected to operate at LOS "D" or worse. The results of the included signal warrant analyses may indicate that a traffic signal could be beneficial to the operations of an intersection. The final decision to install a traffic signal should, however, be based upon further studies utilizing additional warrants as presented in the California MUTCD. Because Warrant 3 analysis was only applied to intersections operating at LOS "D" or worse, it is possible that unsignalized study intersections operating at LOS "C" or better that also meet Warrant 3 go unidentified in this TIAR.

TECHNICAL ANALYSIS PARAMETERS

This TIAR provides a "planning level" evaluation of traffic condition, which is considered sufficient for CEQA / NEPA clearance purposes. In this TIAR, a general **peak-hour factor (PHF) of 0.92**[1] (as recommended by HCM-2000) and a **heavy-vehicle percentage of 2%** will be applied in the analysis of all study intersections under all analysis scenarios. A minimum traffic signal **cycle time of 90 seconds** will be used for analysis of signalized intersections, with **4 seconds of "lost time"** per critical signal phase, and will be optimized as appropriate. The *Synchro, Version 6 (Build 614)* software suite by Trafficware will be used to implement the HCM-2000 analysis methodologies. A "design level" evaluation (including queuing on intersection lane groups, stacking length requirements, coordinated signal operations analyses, etc.) will not be included in this "planning level" study.

EXISTING TRAFFIC OPERATIONS

Existing AM and PM peak-hour intersection traffic operations were quantified utilizing the existing intersection lane geometrics and control types (Figure 2) and the existing traffic volumes (Figure 3). Table 2 presents a summary of the existing intersection LOS conditions.

[1] *A peak-hour factor of 0.94 was applied to the eastbound and westbound through movements on Monte Vista Avenue between SR 99 and Golden State Boulevard during "Short Term" and "Year 2027" analysis. The observed existing peak-hour factor is 0.934 at Monte Vista Avenue at Countryside Drive. The increase in traffic projected for "Short Term" and "Year 2027" conditions will further saturate this facility and thus further normalize peak-hour traffic flows.*

TABLE 2
EXISTING CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[3]	LOS	Warrant Met?[4]	Delay[3]	LOS	Warrant Met?[4]
1	**Taylor Road / SB SR 99 Ramps**	**TWSC**	**D**	**319.3**	**F**	**No**	**OVR**	**F**	**No**
2	**Taylor Road / NB SR 99 Ramps**	**TWSC**	**D**	16.4	C	No	**50.7**	**F**	**Yes**
3	Taylor Road / Golden State Boulevard	Signal	D	19.5	B	-	24.1	C	-
4	**Taylor Road / Walnut Avenue**	**AWSC**	**D**	**44.3**	**E**	**Yes**	18.7	C	No
5	Taylor Road / Geer Road	Signal	D	41.5	D	-	27.8	C	-
6	Springer Drive / Geer Road	Signal	D	13.2	B	-	13.0	B	-
7	Christofferson Parkway / Golden State Boulevard	Signal	D	8.4	A	-	8.7	A	-
8	Christofferson Parkway / Mountain View Road	Signal	D	21.4	C	-	15.4	B	-
9	Christofferson Parkway / Kilroy Avenue	Signal	D	18.1	B	-	16.0	B	-
10	Christofferson Parkway / Walnut Avenue	Signal	D	20.4	C	-	16.0	B	-
11	Christofferson Parkway / Crowell Road	Signal	D	17.9	B	-	18.3	B	-
12	Christofferson Parkway / McKenna Drive	TWSC	D	11.3	B	No	10.1	B	No
13	Christofferson Parkway / Picadilly Lane	TWSC	D	11.2	B	No	10.1	B	No
14	Christofferson Parkway / Geer Road	Signal	D	17.5	B	-	17.4	B	-
15	Ansel Adams Boulevard / Crowell Road	TWSC	D	14.4	B	No	17.6	C	No
16	Mariposa Drive / Crowell Road	TWSC	D	12.9	B	No	17.1	C	No
17	Calaveras Way / Geer Road	TWSC	D	14.9	B	No	25.5	D	No
18	Monte Vista Avenue / SB SR 99 Ramps	Signal	D	14.1	B	-	20.6	C	-
19	Monte Vista Avenue / NB SR 99 Ramps	Signal	D	21.5	C	-	17.7	B	-
20	Monte Vista Avenue / Countryside Drive	Signal	D	15.6	B	-	25.6	C	-
21	Monte Vista Avenue / Golden State Boulevard	Signal	D	17.1	B	-	22.5	C	-
22	Monte Vista Avenue / Four Seasons Drive	TWSC	D	17.4	C	No	22.0	C	No
23	Monte Vista Avenue / Walnut Avenue	Signal	D	23.8	C	-	23.5	C	-
24	Monte Vista Avenue / Crowell Road	Signal	D	27.8	C	-	37.2	D	-
25	Monte Vista Avenue / Theater Drive	TWSC	D	10.2	B	No	17.1	C	No
26	Monte Vista Avenue / Dels Lane	Signal	D	23.0	C	-	19.4	B	-
27	Monte Vista Avenue / Andre Lane	TWSC	D	10.7	B	No	12.4	B	No
28	Monte Vista Avenue / Geer Road	Signal	D	20.4	C	-	31.8	C	-
29	Regis Street / Geer Road	Signal	D	17.5	B	-	29.3	C	-
30	Minnesota Avenue / Geer Road	Signal	D	14.6	B	-	28.4	C	-
31	Tuolumne Road / Geer Road	Signal	D	15.2	B	-	24.8	C	-

Notes:
1. TWSC = Two Way Stop Control; AWSC = All Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections
3. OVR = Denotes overflow conditions
4. Warrant = Based on California MUTCD Warrant 3

As presented in Table 2, three delay-based deficiencies are identified during existing conditions. Specifically, the following intersections are found to be operating at unacceptable LOS conditions:

- Taylor Road / SB SR 99 Ramps
- Taylor Road / NB SR 99 Ramps

- Taylor Road / Walnut Avenue

These delay-based intersection deficiencies will be addressed in the concluding *Mitigated Conditions* section of this TIAR, along with proposed improvement measures to obtain acceptable LOS operations.

PROPOSED PROJECT

The project is an update to the existing CSU Stanislaus Campus Physical Master Plan that was prepared and approved by the Trustees of the California State Colleges in April of 1968. This document was an update of the original Campus Physical Master Plan that was first approved by the Board in 1962. Since its approval, there have been several modifications to the plan. The present update effort will result in all these modifications being included in the formal Campus Physical Master Plan document with updated documentation.

It should be noted that the planned student population or Full-Time Equivalent (FTE) students remains at 12,000, or enrollment of 15,000 students, as was contained in the 1968 Physical Master Plan. The present (2007) campus population is 7,042 FTE. The campus indicated that the 10 year growth forecast is reasonable and should be representative of conditions in 2017-18; the 20 year growth plan is subject to funding availability and the changing demographics of student demand and higher education enrollments, and may prove to be overly optimistic with respect to the 20 year enrollment goals, as compared with the 10 year enrollment growth forecast. The University's long term enrollment capacity is ultimately determined by the California State University Board of Trustees.

PROJECT TRIP GENERATION

Standard transportation industry practice is to estimate project trip generation utilizing the methodologies outlined in the Institute of Transportation Engineers (ITE) publication *Trip Generation, Seventh Edition*. Often times, proposed project trip generation rates are based upon published fitted-curve equations or average generation rates from the *Trip Generation* publication. However, since the project consists of the expansion of an existing facility, existing campus trip generation characteristics were surveyed through driveway counts and a "localized" trip generation rate was obtained. This observed localized trip generation rate was subsequently used in calculating projected added trips for the proposed campus expansion.

To determine the campus trip generation characteristics, traffic counts were taken at each of the six campus access points for a period of seven days (April 24, 2007 through April 30, 2007). These counts were recorded in consecutive 15-minute intervals for seven consecutive 24-hour periods in order to generate accurate trip generation data for the expansion planned over the next 10 and 20 year periods. Table 3 presents a summary of the trip generation characteristics that have been determined for the 10 and 20 Year MP Growth forecasts for the CSU Stanislaus campus.

TABLE 3
PROJECT TRIP GENERATION

Project Name	Quantity (Units)	AM Peak Hour Trips			PM Peak Hour Trips		
		Total	In	Out	Total	In	Out
Existing CSU Stanislaus Trip Generation	7,042	1,051	925	126	1,298	493	805
2017 CSU Stanislaus Trip Generation	8,821	1,324	1,168	156	1,672	636	1,036
Project Added 2017 Trips	*1,779*	*273*	*243*	*30*	*374*	*143*	*231*
2027 CSU Stanislaus Trip Generation	11,864	1,936	1,712	224	2,311	876	1,435
Project Added 2027 Trips	*4,822*	*885*	*787*	*98*	*1,013*	*383*	*630*

Notes:

1. 1 FTE = 1 "Full-Time Equivalent" Student

2. Trip generation rates calculated using a parking demand model based on total trips recorded during 10 consecutive 24-hour counts conducted at all CSU Stanislaus campus access points between Monday and Friday.

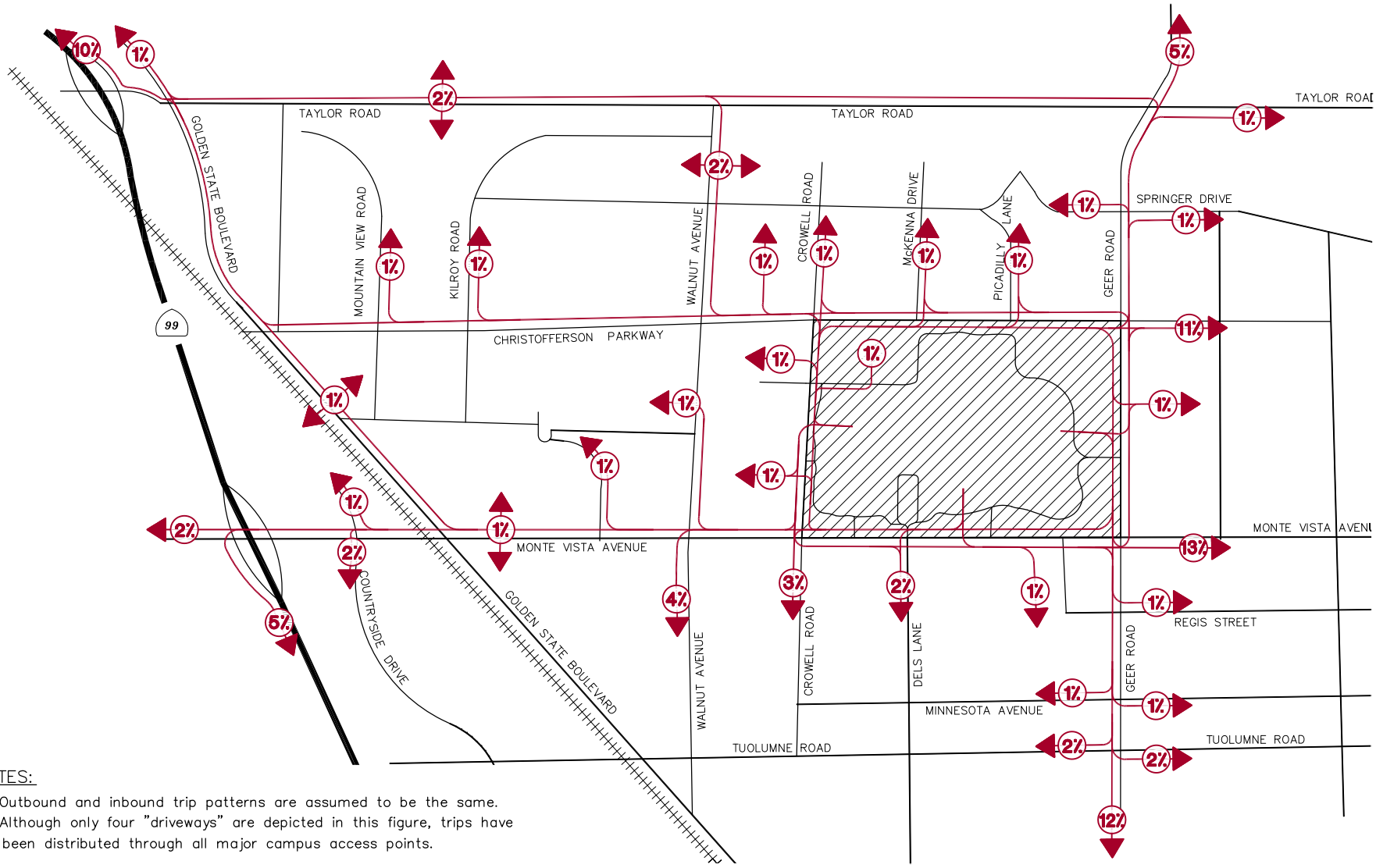
As presented in Table 3, the trip generation characteristics of the current CSU Stanislaus student population (7,042 FTE) is observed as 1,051 AM and 1,298 PM peak-hour trips. Of those 1,051 AM trips, 925 are observed to be inbound and 126 are observed as outbound trips. Of the 1,298 PM trips, 493 are observed as inbound and 805 are observed as outbound.

According to the parking generation model developed based on the observed campus trip generation, 273 AM and 374 PM peak-hour trips are projected to be generated by an added 1,779 FTE. In all, 8,821 FTE students are projected to generate 1,324 AM and 1,672 PM peak-hour trips during *Short Term Plus 10 Year MP Growth Conditions*.

By 2027, an added 4,822 FTE students are projected, generating an additional 885 AM and 1,013 PM peak-hour trips. In all, by *Year 2027 Plus 20 Year MP Growth Conditions* the 11,864 FTE student population of CSU Stanislaus is expected to generate 1,936 AM and 2,311 PM peak-hour trips.

PROJECT TRIP DISTRIBUTION

The directional trip distribution of project-generated trips was based on the *City of Turlock* travel demand model and supplemented by knowledge of the existing traffic flow patterns, as provided by parking lot survey data. While the travel demand model is instrumental in determining regional and local trip ends, the parking lot survey data refines the model outputs in that it provides a more specific look at how trips are distributed, and paths are assigned amongst the various campus driveways. The subsequent trip distribution patterns are presented in Figure 4.


TAYLOR ROAD
TAYLOR ROAD
TAYLOR ROAD
GOLDEN STATE BOULEVARD
MOUNTAIN VIEW ROAD
KILROY ROAD
WALNUT AVENUE
CROWELL ROAD
McKENNA DRIVE
PICADILLY LANE
GEER ROAD
SPRINGER DRIVE
99
CHRISTOFFERSON PARKWAY
MONTE VISTA AVENUE
MONTE VISTA AVENU
COUNTRYSIDE DRIVE
GOLDEN STATE BOULEVARD
WALNUT AVENUE
CROWELL ROAD
DELS LANE
GEER ROAD
REGIS STREET
MINNESOTA AVENUE
TUOLUMNE ROAD
TUOLUMNE ROAD
10%
1%
2%
5%
1%
2%
2%
1%
1%
1

PROJECT SITE ACCESS

There are a total of 6 campus access points. The principal entrance is on Monte Vista Avenue, at Dels Lane. Another major entrance is provided on Geer Road at Calaveras Way, and on Crowell Road at Ansel Adams Boulevard. Parking lot and campus access is also provided at Monte Vista Avenue / Theater Drive, Monte Vista Avenue / Andre Lane, and Mariposa Drive / Crowell Road. New access points planned for the future include a new entrance on Christofferson Parkway in the vicinity of two planned parking structures. This entrance is to be opened around 2010, and will be assumed under "Short Term" and "Year 2027" conditions.

SHORT TERM CONDITIONS

The analysis scenarios contained herein quantify projected increases in travel demand approximately 10 years from now. Traffic operations will be quantified at all 31 study locations both with and without project-related growth. Short Term analysis will include the following improvements in the roadway network:

- Installation of traffic signal at Calaveras Drive / Geer Road
- Opening of new CSU Stanislaus parking lot and driveway off of Geer Road, across from the existing Calaveras Way driveway
- Opening of new CSU Stanislaus campus driveway access off of Christofferson Parkway

The Short Term conditions intersection lane geometrics and control types are presented in Figure 5.

SHORT TERM NO MP GROWTH TRAFFIC OPERATIONS

Short Term No MP Growth Conditions have been simulated by retrieving traffic forecasts from the *City of Turlock* travel demand forecast model. The conditions present in this scenario represent projected traffic operations 10 years in the future, without any assumed increases in student population. None of the trips projected to be generated upon the partial buildout of the CSU Stanislaus Campus Physical Master Plan (Table 3) is included in this scenario. Individual intersection turning movements were derived using industry-standard methodologies. The resulting *Short Term No MP Growth Conditions* traffic volumes are presented in Figure 6. Table 4 presents the projected LOS operations for the *Short Term No MP Growth Conditions* scenario at all study intersections.

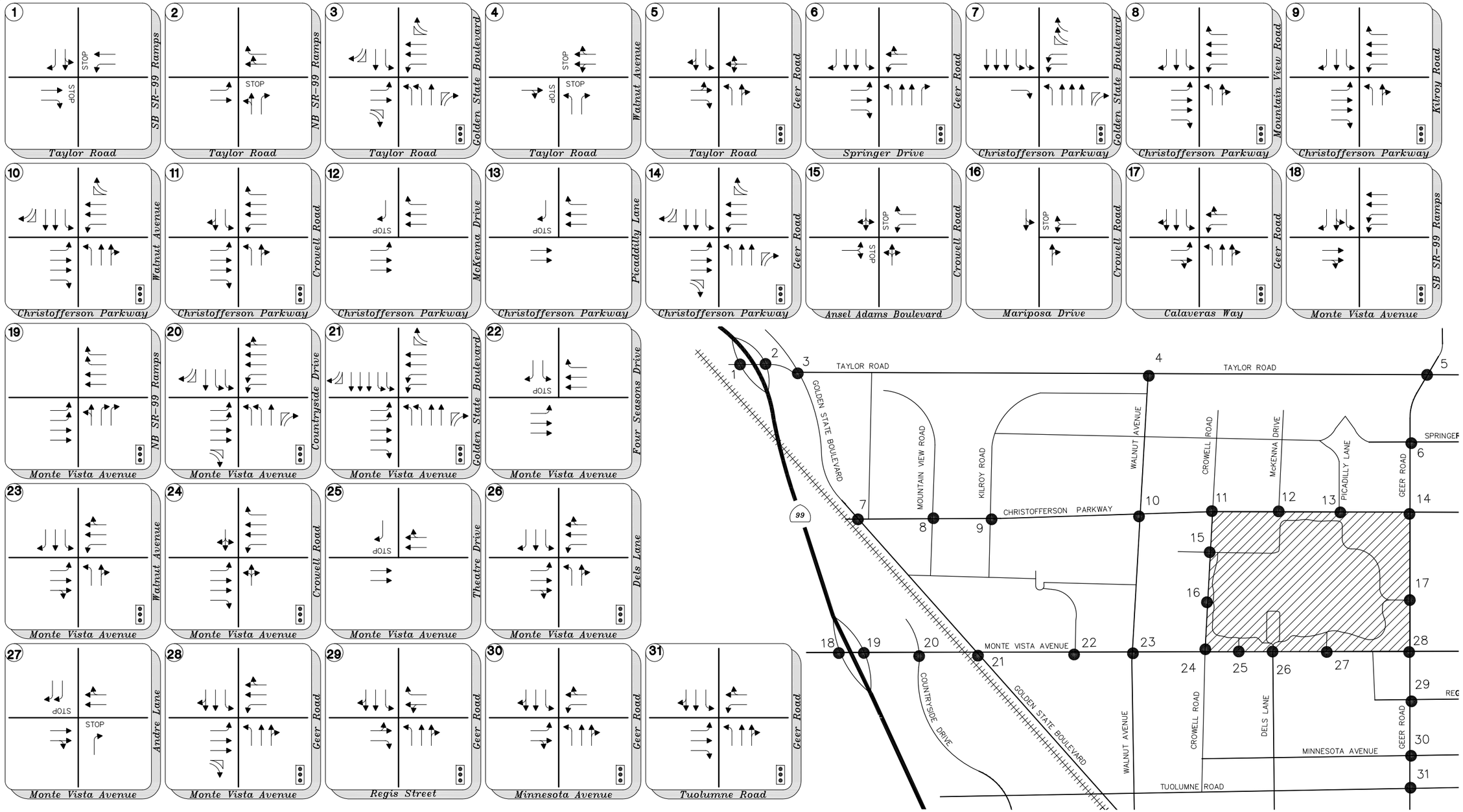


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Figure 5

Short Term Intersection Lane Geometrics and Control Types

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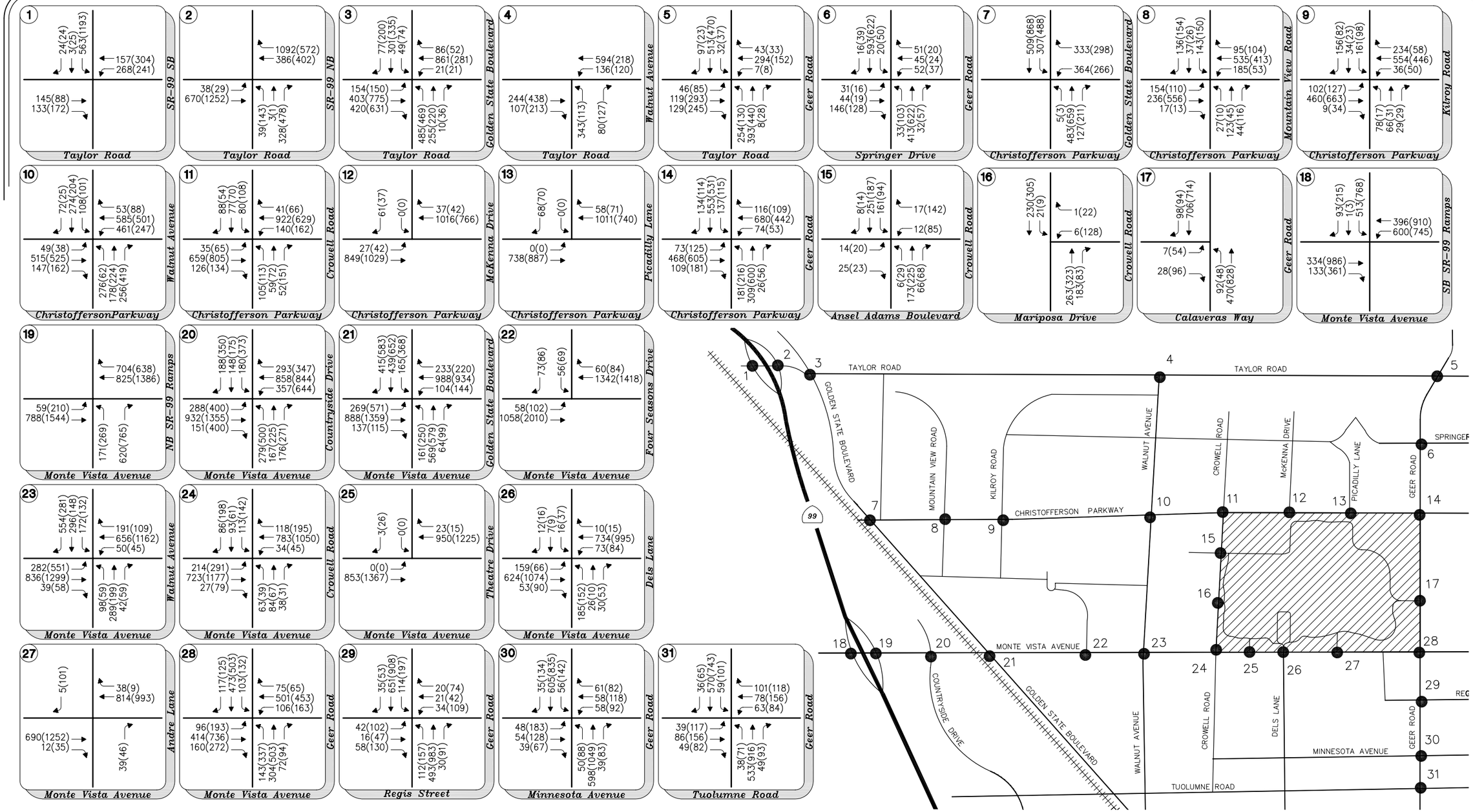

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Figure 6

Short Term No MP Growth Intersection Traffic Volumes

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Job No: 25-1620-05

TABLE 4
SHORT TERM NO MP GROWTH CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[3]	LOS	Warrant Met?[4]	Delay[3]	LOS	Warrant Met?[4]
1	**Taylor Road / SB SR 99 Ramps**	**TWSC**	**D**	**OVR**	**F**	**Yes**	**OVR**	**F**	**Yes**
2	**Taylor Road / NB SR 99 Ramps**	**TWSC**	**D**	**46.5**	**E**	**Yes**	**OVR**	**F**	**Yes**
3	Taylor Road / Golden State Boulevard	Signal	D	31.7	C	-	38.9	D	-
4	**Taylor Road / Walnut Avenue**	**AWSC**	**D**	**117.3**	**F**	**Yes**	**40.2**	**E**	**Yes**
5	**Taylor Road / Geer Road**	**Signal**	**D**	**62.9**	**E**	**-**	42.5	D	-
6	Springer Drive / Geer Road	Signal	D	13.8	B	-	14.1	B	-
7	Christofferson Parkway / Golden State Boulevard	Signal	D	9.5	A	-	9.5	A	-
8	Christofferson Parkway / Mountain View Road	Signal	D	24.8	C	-	19.4	B	-
9	Christofferson Parkway / Kilroy Avenue	Signal	D	19.9	B	-	18.3	B	-
10	Christofferson Parkway / Walnut Avenue	Signal	D	38.3	D	-	22.9	C	-
11	Christofferson Parkway / Crowell Road	Signal	D	20.9	C	-	22.9	C	-
12	Christofferson Parkway / McKenna Drive	TWSC	D	13.8	B	No	11.6	B	No
13	Christofferson Parkway / Picadilly Lane	TWSC	D	13.9	B	No	11.9	B	No
14	Christofferson Parkway / Geer Road	Signal	D	22.6	C	-	22.4	C	-
15	Ansel Adams Boulevard / Crowell Road	TWSC	D	14.6	B	No	17.6	C	No
16	Mariposa Drive / Crowell Road	TWSC	D	13.5	B	No	19.9	C	No
17	Calaveras Way / Geer Road	Signal	D	2.4	A	-	4.6	A	-
18	Monte Vista Avenue / SB SR 99 Ramps	Signal	D	22.2	C	-	54.7	D	-
19	Monte Vista Avenue / NB SR 99 Ramps	Signal	D	19.2	B	-	22.5	C	-
20	Monte Vista Avenue / Countryside Drive	Signal	D	24.8	C	-	54.8	D	-
21	Monte Vista Avenue / Golden State Boulevard	Signal	D	24.6	C	-	38.5	D	-
22	**Monte Vista Avenue / Four Seasons Drive**	**TWSC**	**D**	**36.1**	**E**	**No**	**123.2**	**F**	**Yes**
23	**Monte Vista Avenue / Walnut Avenue**	**Signal**	**D**	40.8	D	-	**73.9**	**E**	-
24	Monte Vista Avenue / Crowell Road	Signal	D	32.6	C	-	52.8	D	-
25	Monte Vista Avenue / Theater Drive	TWSC	D	10.4	B	No	11.7	B	No
26	Monte Vista Avenue / Dels Lane	Signal	D	24.9	C	-	20.7	C	-
27	Monte Vista Avenue / Andre Lane	TWSC	D	11.6	B	No	13.4	B	No
28	Monte Vista Avenue / Geer Road	Signal	D	23.3	C	-	39.2	D	-
29	Regis Street / Geer Road	Signal	D	17.6	B	-	33.7	C	-
30	Minnesota Avenue / Geer Road	Signal	D	15.3	B	-	32.5	C	-
31	Tuolumne Road / Geer Road	Signal	D	15.7	B	-	26.4	C	-

Notes:
1. TWSC = Two Way Stop Control; AWSC = All Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections
3. OVR = Denotes overflow conditions
4. Warrant = Based on California MUTCD Warrant 3

As presented in Table 4, the added traffic assumed under *Short Term No MP Growth Conditions* yields new delay-based deficiencies at the following study locations:

- Taylor Road / Geer Road
- Monte Vista Avenue / Four Seasons Drive

- Monte Vista Avenue / Walnut Avenue

The following previously identified deficiencies carry over from existing conditions into *Short Term No MP Growth Conditions*:

- Taylor Road / SB SR 99 Ramps
- Taylor Road / NB SR 99 Ramps
- Taylor Road / Walnut Road

All identified delay-based intersection deficiencies will be addressed in the concluding *Mitigated Conditions* section of this TIAR, along with proposed improvement measures to obtain acceptable LOS operations.

SHORT TERM PLUS 10 YEAR MP GROWTH TRAFFIC OPERATIONS

Short Term Plus 10 Year MP Growth Conditions traffic forecasts are obtained by estimating the trips generated by the projected increase in student population over 10 years, as provided by CSU Stanislaus. The trips generated are then distributed through study intersections and subsequently added to *Short Term No MP Growth* turning movements for analysis. The resulting *Short Term Plus 10 Year MP Growth Conditions* traffic volumes are presented in Figure 7. Table 5 presents the projected LOS operations for the *Short Term Plus 10 Year MP Growth Conditions* scenario at all study intersections.

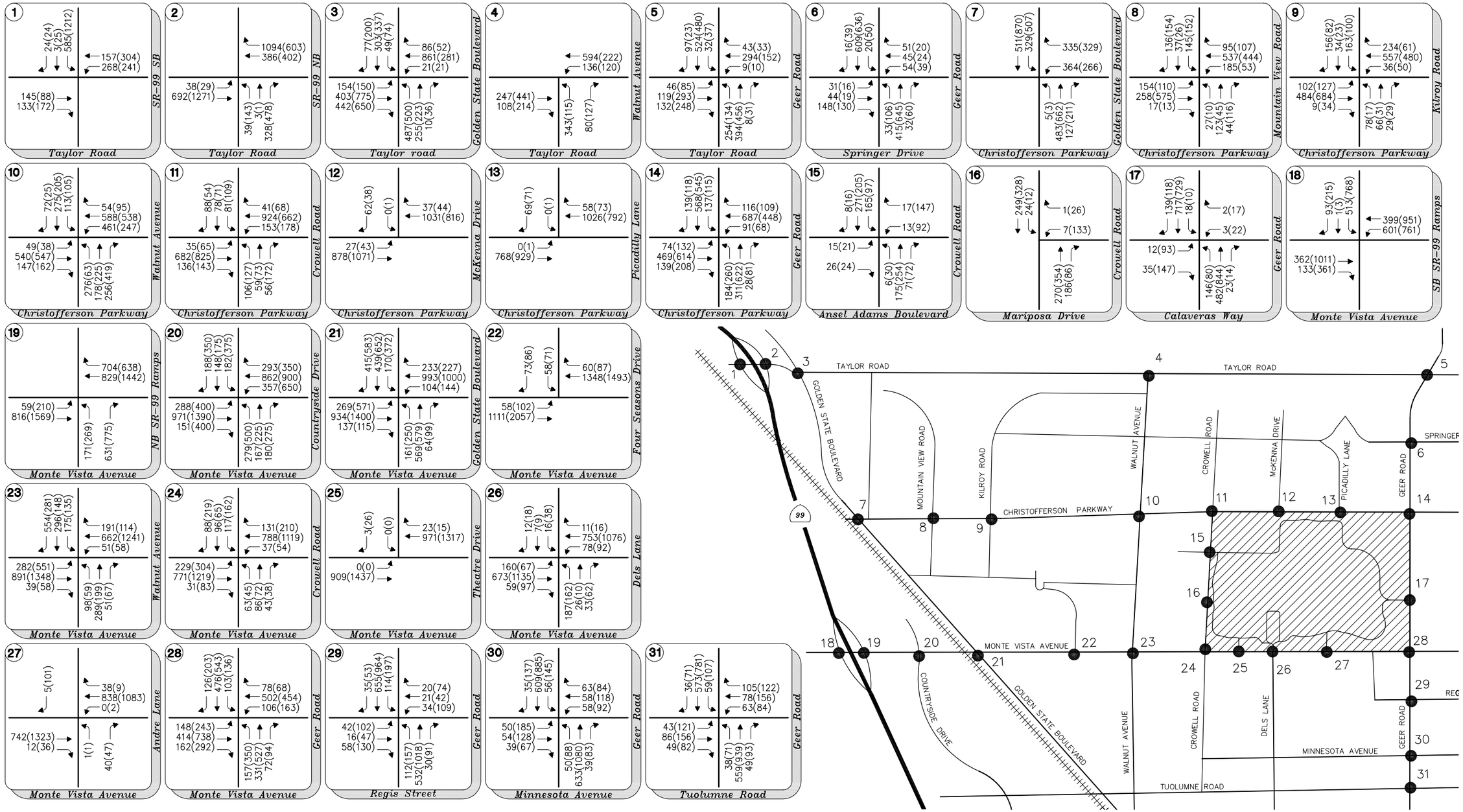

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Figure 7

Short Term Plus 10 Year MP Growth Intersection Traffic Volumes

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TABLE 5
SHORT TERM PLUS 10 YEAR MP GROWTH CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[3]	LOS	Warrant Met?[4]	Delay[3]	LOS	Warrant Met?[4]
1	**Taylor Road / SB SR 99 Ramps**	**TWSC**	**D**	**OVR**	**F**	**Yes**	**OVR**	**F**	**Yes**
2	**Taylor Road / NB SR 99 Ramps**	**TWSC**	**D**	**51.7**	**F**	**Yes**	**OVR**	**F**	**Yes**
3	Taylor Road / Golden State Boulevard	Signal	D	31.7	C	-	40.4	D	-
4	**Taylor Road / Walnut Avenue**	**AWSC**	**D**	**117.8**	**F**	**Yes**	**41.5**	**E**	**Yes**
5	**Taylor Road / Geer Road**	**Signal**	**D**	**64.2**	**E**	**-**	43.3	D	-
6	Springer Drive / Geer Road	Signal	D	13.8	B	-	14.1	B	-
7	Christofferson Parkway / Golden State Boulevard	Signal	D	9.6	A	-	9.5	A	-
8	Christofferson Parkway / Mountain View Road	Signal	D	24.8	C	-	19.5	B	-
9	Christofferson Parkway / Kilroy Avenue	Signal	D	19.9	B	-	18.3	B	-
10	Christofferson Parkway / Walnut Avenue	Signal	D	39.3	D	-	23.7	C	-
11	Christofferson Parkway / Crowell Road	Signal	D	21.3	C	-	23.6	C	-
12	Christofferson Parkway / McKenna Drive	TWSC	D	13.8	B	No	11.9	B	No
13	Christofferson Parkway / Picadilly Lane	TWSC	D	14.1	B	No	12.2	B	No
14	Christofferson Parkway / Geer Road	Signal	D	23.4	C	-	24.0	C	-
15	Ansel Adams Boulevard / Crowell Road	TWSC	D	14.8	B	No	18.3	C	No
16	Mariposa Drive / Crowell Road	TWSC	D	13.6	B	No	20.4	C	No
17	Calaveras Way / Geer Road	Signal	D	3.9	A	-	8.9	A	-
18	Monte Vista Avenue / SB SR 99 Ramps	Signal	D	22.4	C	-	53.8	D	-
19	Monte Vista Avenue / NB SR 99 Ramps	Signal	D	19.3	B	-	28.1	C	-
20	**Monte Vista Avenue / Countryside Drive**	**Signal**	**D**	25.1	C	-	**55.4**	**E**	-
21	Monte Vista Avenue / Golden State Boulevard	Signal	D	24.1	C	-	40.9	D	-
22	**Monte Vista Avenue / Four Seasons Drive**	**TWSC**	**D**	**38.8**	**E**	**No**	**156.1**	**F**	**Yes**
23	**Monte Vista Avenue / Walnut Avenue**	**Signal**	**D**	42.2	D	-	**82.1**	**F**	-
24	**Monte Vista Avenue / Crowell Road**	**Signal**	**D**	33.5	C	-	**59.0**	**E**	-
25	Monte Vista Avenue / Theater Drive	TWSC	D	10.4	B	No	23.9	C	No
26	Monte Vista Avenue / Dels Lane	Signal	D	24.8	C	-	22.0	C	-
27	Monte Vista Avenue / Andre Lane	TWSC	D	11.8	B	No	14.0	B	No
28	Monte Vista Avenue / Geer Road	Signal	D	25.5	C	-	44.4	D	-
29	Regis Street / Geer Road	Signal	D	17.6	B	-	34.5	C	-
30	Minnesota Avenue / Geer Road	Signal	D	15.3	B	-	33.2	C	-
31	Tuolumne Road / Geer Road	Signal	D	16.0	B	-	27.0	C	-

Notes:
1. TWSC = Two Way Stop Control; AWSC = All Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections
3. OVR = Denotes overflow conditions
4. Warrant = Based on California MUTCD Warrant 3

As presented in Table 5, one additional intersection is projected to operate deficiently with the inclusion of assumed 10 year student enrollment forecasts. The following intersection, found to be operating acceptably during *Short Term No MP Growth Conditions*, is projected to operate unacceptably with the addition of new student trips:

- Monte Vista Avenue / Crowell Road
- Monte Vista Avenue / Countryside Drive

The following previously projected deficiencies carry over from *Short Term No MP Growth Conditions* into *Short Term Plus 10 Year MP Growth Conditions*:

- Taylor Road / SB SR 99 Ramps
- Taylor Road / NB SR 99 Ramps
- Taylor Road / Walnut Road
- Taylor Road / Geer Road
- Monte Vista Avenue / Four Seasons Drive
- Monte Vista Avenue / Walnut Avenue

All identified delay-based intersection deficiencies will be addressed in the concluding *Mitigated Conditions* section of this TIAR, along with proposed improvement measures to obtain acceptable LOS operations. Impacts related to the Campus Physical Master Plan student population growth forecasts will be identified and proposed improvements will be identified for project mitigation purposes.

YEAR 2027 CONDITIONS

The analysis scenarios contained herein quantify projected increases in travel demand approximately 20 years from now. Traffic operations will be quantified at all 31 study locations both with and without project-related growth. Year 2027 analysis will include the following improvement in the roadway network:

- Opening of new Tuolumne Road over-crossing, spanning SR 99 to provide additional connectivity between developing areas east and west of the state highway.

These scenarios will assume the same geometrics as during Short Term conditions (Figure 5).

YEAR 2027 NO MP GROWTH TRAFFIC OPERATIONS

Short Term No MP Growth Conditions have been simulated by retrieving traffic forecasts from the *City of Turlock* travel demand forecast model. The conditions present in this scenario represent projected traffic operations 20 years in the future, without any assumed increases in student population. None of the trips projected to be generated upon the partial buildout of the CSU Stanislaus Campus Physical Master Plan (Table 3) is included in this scenario. Individual intersection turning movements were derived using industry-standard methodologies. The resulting *Year 2027 No MP Growth Conditions* traffic volumes are presented in Figure 8. Table 6 presents the projected LOS operations for the *Year 2027 No MP Growth Conditions* scenario at all study intersections.

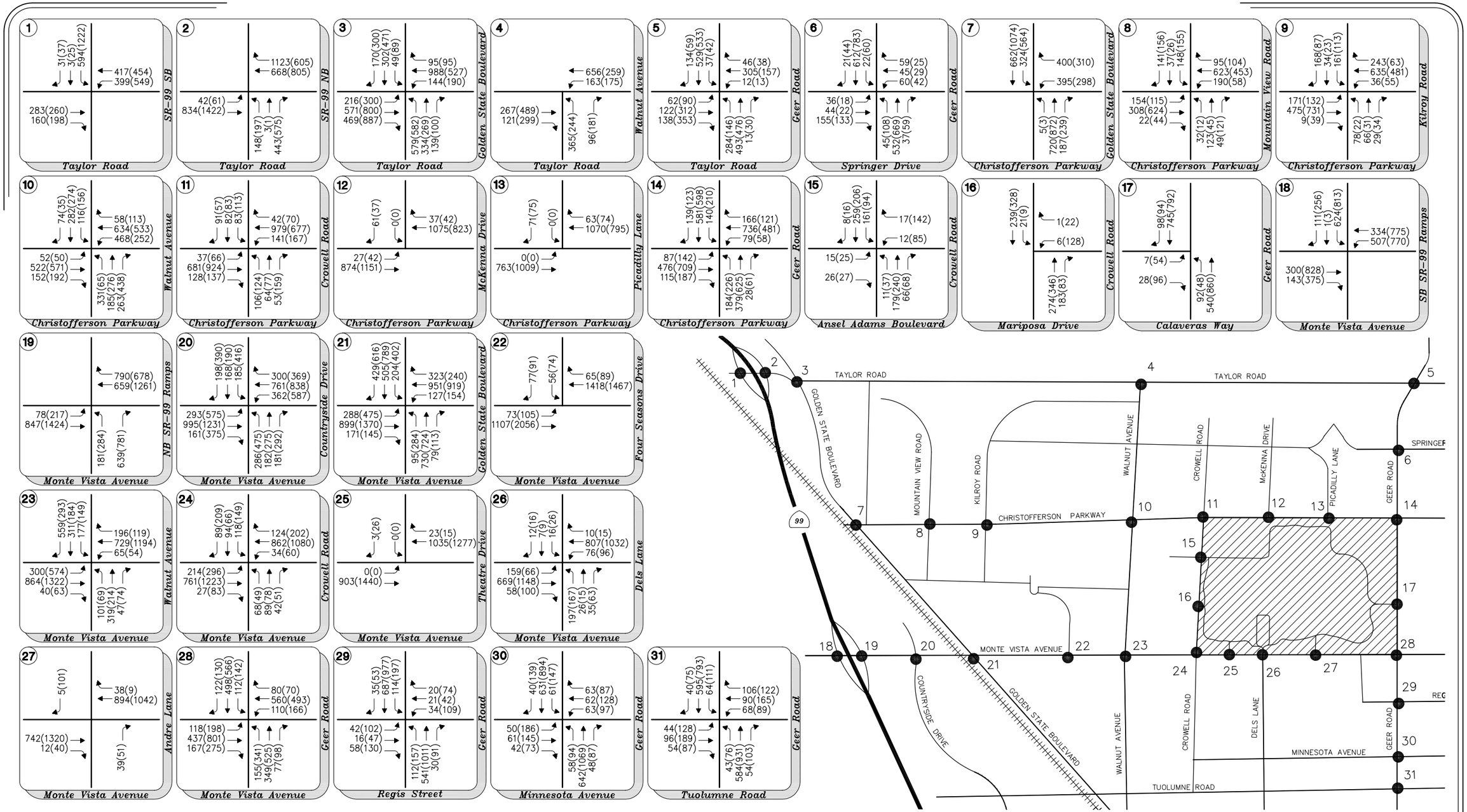

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Figure 8

Year 2027 No MP Growth Intersection Traffic Volumes

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Job No: 25-1620-05

TABLE 6
YEAR 2027 NO MP GROWTH CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[3]	LOS	Warrant Met?[4]	Delay[3]	LOS	Warrant Met?[4]
1	**Taylor Road / SB SR 99 Ramps**	**TWSC**	**D**	**OVR**	**F**	**Yes**	**OVR**	**F**	**Yes**
2	**Taylor Road / NB SR 99 Ramps**	**TWSC**	**D**	**OVR**	**F**	**Yes**	**OVR**	**F**	**Yes**
3	**Taylor Road / Golden State Boulevard**	**Signal**	**D**	48.0	D	-	**84.7**	**F**	-
4	**Taylor Road / Walnut Avenue**	**AWSC**	**D**	**171.0**	**F**	**Yes**	**124.9**	**F**	**Yes**
5	**Taylor Road / Geer Road**	**Signal**	**D**	**76.7**	**E**	-	55.0	D	-
6	Springer Drive / Geer Road	Signal	D	14.4	B	-	14.4	B	-
7	Christofferson Parkway / Golden State Boulevard	Signal	D	10.2	B	-	11.7	B	-
8	Christofferson Parkway / Mountain View Road	Signal	D	26.5	C	-	19.9	B	-
9	Christofferson Parkway / Kilroy Avenue	Signal	D	22.6	C	-	18.7	B	-
10	Christofferson Parkway / Walnut Avenue	Signal	D	45.2	D	-	27.1	C	-
11	Christofferson Parkway / Crowell Road	Signal	D	20.8	C	-	25.0	C	-
12	Christofferson Parkway / McKenna Drive	TWSC	D	14.3	B	No	11.9	B	No
13	Christofferson Parkway / Picadilly Lane	TWSC	D	14.5	B	No	12.3	B	No
14	Christofferson Parkway / Geer Road	Signal	D	23.9	C	-	27.3	C	-
15	Ansel Adams Boulevard / Crowell Road	TWSC	D	15.0	B	No	19.6	C	No
16	Mariposa Drive / Crowell Road	TWSC	D	13.8	B	No	21.6	C	No
17	Calaveras Way / Geer Road	Signal	D	2.3	A	-	4.7	A	-
18	Monte Vista Avenue / SB SR 99 Ramps	Signal	D	21.5	C	-	48.5	D	-
19	Monte Vista Avenue / NB SR 99 Ramps	Signal	D	20.0	B	-	21.9	C	-
20	Monte Vista Avenue / Countryside Drive	Signal	D	25.9	C	-	52.3	D	-
21	Monte Vista Avenue / Golden State Boulevard	Signal	D	26.7	C	-	44.7	D	-
22	**Monte Vista Avenue / Four Seasons Drive**	**TWSC**	**D**	**44.4**	**E**	**No**	**168.3**	**F**	**Yes**
23	**Monte Vista Avenue / Walnut Avenue**	**Signal**	**D**	48.7	D	-	**89.1**	**F**	-
24	**Monte Vista Avenue / Crowell Road**	**Signal**	**D**	35.9	D	-	**62.4**	**E**	-
25	Monte Vista Avenue / Theater Drive	TWSC	D	10.6	B	No	11.7	B	No
26	Monte Vista Avenue / Dels Lane	Signal	D	26.2	C	-	24.8	C	-
27	Monte Vista Avenue / Andre Lane	TWSC	D	12.1	B	No	13.8	B	No
28	Monte Vista Avenue / Geer Road	Signal	D	25.4	C	-	44.0	D	-
29	Regis Street / Geer Road	Signal	D	17.4	B	-	34.7	C	-
30	Minnesota Avenue / Geer Road	Signal	D	16.1	B	-	34.6	C	-
31	Tuolumne Road / Geer Road	Signal	D	17.2	B	-	28.6	C	-

Notes:
1. TWSC = Two Way Stop Control; AWSC = All Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections
3. OVR = Denotes overflow conditions
4. Warrant = Based on California MUTCD Warrant 3

As presented in Table 6, the added traffic assumed under *Year 2027 No MP Growth Conditions* yields new delay-based deficiencies at the following study locations which were not identified during *Short Term No MP Growth Conditions*:

- Taylor Road / Golden State Boulevard

- Monte Vista Avenue / Crowell Road

The following previously projected deficiencies carry over from *Short Term No MP Growth Conditions* into *Year 2027 No MP Growth Conditions*:

- Taylor Road / SB SR 99 Ramps
- Taylor Road / NB SR 99 Ramps
- Taylor Road / Walnut Road
- Taylor Road / Geer Road
- Monte Vista Avenue / Four Seasons Drive
- Monte Vista Avenue / Walnut Avenue

The deficiency previously identified at Monte Vista Avenue / Countryside Drive is no longer present in this condition, due to the new Tuolumne Road over-crossing structure. This new facility is projected to reroute trips from the Monte Vista Avenue vicinity that currently take a circuitous route to access either side of the currently discontinuous Tuolumne Road facility.

All identified delay-based intersection deficiencies will be addressed in the concluding *Mitigated Conditions* section of this TIAR, along with proposed improvement measures to obtain acceptable LOS operations.

YEAR 2027 PLUS 20 YEAR MP GROWTH TRAFFIC OPERATIONS

Short Term Plus 10 Year MP Growth Conditions traffic forecasts are obtained by estimating the trips generated by the projected increase in student population over 20 years, as provided by CSU Stanislaus. The trips generated are then distributed through study intersections and subsequently added to *Year 2027 No MP Growth* turning movements for analysis. The resulting *Year 2027 Plus 20 Year MP Growth Conditions* traffic volumes are presented in Figure 9. Table 7 presents the projected LOS operations for the *Year 2027 Plus 20 Year MP Growth Conditions* scenario at all study intersections.

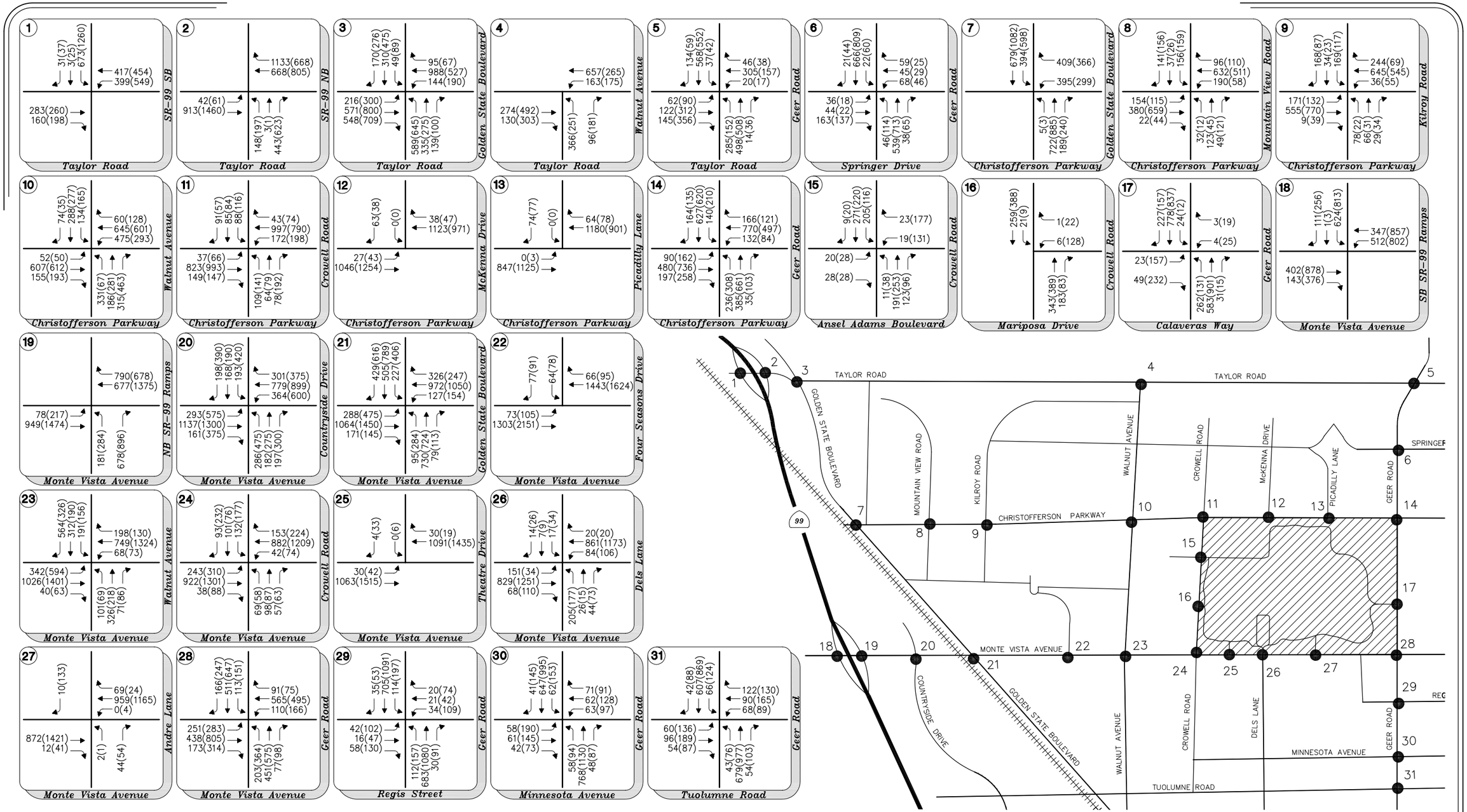

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Figure 9

Year 2027 Plus 20 Year MP Growth Intersection Traffic Volumes

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TABLE 7
YEAR 2027 PLUS 20 YEAR MP GROWTH CONDITIONS: INTERSECTION LEVELS OF SERVICE

#	Intersection	Control Type[1,2]	Target LOS	AM Peak Hour			PM Peak Hour		
				Delay[3]	LOS	Warrant Met?[4]	Delay[3]	LOS	Warrant Met?[4]
1	**Taylor Road / SB SR 99 Ramps**	**TWSC**	**D**	**OVR**	**F**	**Yes**	**OVR**	**F**	**Yes**
2	**Taylor Road / NB SR 99 Ramps**	**TWSC**	**D**	**OVR**	**F**	**Yes**	**OVR**	**F**	**Yes**
3	**Taylor Road / Golden State Boulevard**	**Signal**	**D**	48.2	D	-	**92.5**	**F**	-
4	**Taylor Road / Walnut Avenue**	**AWSC**	**D**	**173.9**	**F**	**Yes**	**130.2**	**F**	**Yes**
5	**Taylor Road / Geer Road**	**Signal**	**D**	**83.2**	**F**	-	**57.8**	**E**	-
6	Springer Drive / Geer Road	Signal	D	15.2	B	-	15.8	B	-
7	Christofferson Parkway / Golden State Boulevard	Signal	D	10.8	B	-	11.9	B	-
8	Christofferson Parkway / Mountain View Road	Signal	D	26.7	C	-	20.4	C	-
9	Christofferson Parkway / Kilroy Avenue	Signal	D	22.6	C	-	19.0	B	-
10	Christofferson Parkway / Walnut Avenue	Signal	D	46.5	D	-	29.2	C	-
11	Christofferson Parkway / Crowell Road	Signal	D	22.1	C	-	28.2	C	-
12	Christofferson Parkway / McKenna Drive	TWSC	D	14.8	B	No	12.9	B	No
13	Christofferson Parkway / Picadilly Lane	TWSC	D	15.7	C	No	13.2	B	No
14	Christofferson Parkway / Geer Road	Signal	D	28.2	C	-	30.4	C	-
15	Ansel Adams Boulevard / Crowell Road	TWSC	D	19.2	C	No	29.2	D	No
16	Mariposa Drive / Crowell Road	TWSC	D	15.0	B	No	26.6	D	No
17	Calaveras Way / Geer Road	Signal	D	5.7	A	-	11.9	B	-
18	Monte Vista Avenue / SB SR 99 Ramps	Signal	D	25.5	C	-	54.5	D	-
19	Monte Vista Avenue / NB SR 99 Ramps	Signal	D	18.2	B	-	28.0	C	-
20	Monte Vista Avenue / Countryside Drive	Signal	D	27.6	C	-	54.3	D	-
21	Monte Vista Avenue / Golden State Boulevard	Signal	D	28.3	C	-	49.9	D	-
22	**Monte Vista Avenue / Four Seasons Drive**	**TWSC**	**D**	**61.9**	**F**	**No**	**307.8**	**F**	**Yes**
23	**Monte Vista Avenue / Walnut Avenue**	**Signal**	**D**	**58.3**	**E**	-	**110.7**	**F**	-
24	**Monte Vista Avenue / Crowell Road**	**Signal**	**D**	43.2	D	-	**86.7**	**F**	-
25	Monte Vista Avenue / Theater Drive	TWSC	D	10.7	B	No	20.2	C	No
26	Monte Vista Avenue / Dels Lane	Signal	D	24.9	C	-	24.0	C	-
27	Monte Vista Avenue / Andre Lane	TWSC	D	12.7	B	No	31.2	D	No
28	**Monte Vista Avenue / Geer Road**	**Signal**	**D**	35.5	D	-	**62.3**	**E**	-
29	Regis Street / Geer Road	Signal	D	17.0	B	-	38.7	D	-
30	Minnesota Avenue / Geer Road	Signal	D	16.0	B	-	36.9	D	-
31	Tuolumne Road / Geer Road	Signal	D	17.8	B	-	32.0	C	-

Notes:
1. TWSC = Two Way Stop Control; AWSC = All Way Stop Control
2. LOS = Delay based on worst minor street approach for TWSC intersections
3. OVR = Denotes overflow conditions
4. Warrant = Based on California MUTCD Warrant 3

As presented in Table 7, one additional intersection is projected to operate deficiently with the inclusion of assumed 20 year student enrollment forecasts. The following intersection, found to be operating acceptably during *Year 2027 No MP Growth Conditions*, is projected to operate unacceptably with the addition of new student trips:

- Monte Vista Avenue / Geer Road

The following previously projected deficiencies carry over from *Year 2027 No MP Growth Conditions* into Y*ear 2027 Plus 20 Year MP Growth Conditions*:

- Taylor Road / SB SR 99 Ramps
- Taylor Road / NB SR 99 Ramps
- Taylor Road / Golden State Boulevard
- Taylor Road / Walnut Road
- Taylor Road / Geer Road
- Monte Vista Avenue / Four Seasons Drive
- Monte Vista Avenue / Walnut Avenue
- Monte Vista Avenue / Crowell Road

All identified delay-based intersection deficiencies will be addressed in the concluding *Mitigated Conditions* section of this TIAR, along with proposed improvement measures to obtain acceptable LOS operations. Impacts related to the Campus Physical Master Plan student population growth forecasts will be identified and proposed improvements will be identified for project mitigation purposes.

MITIGATIONS AND IMPROVEMENT RECOMMENDATIONS

The deficiencies identified in each analysis scenario are addressed in this section. Recommended base improvements and project-related mitigation measures are presented for each study intersection found to be operating at an unacceptable LOS.

Table 8 presents a summary of all improvements recommended for each intersection identified as deficient. Improvements are presented in columns corresponding to the analysis scenario in which the deficiency was identified.

Figure 10 presents the intersection lane geometrics and control types that are proposed at the time of the *Short Term Plus 10 Year MP Growth Conditions* analysis scenario. The improvements depicted in red represent what is proposed for acceptable LOS operations at study intersections approximately 10 years from now without any new student trips. Improvements required only with the addition of 10 year campus enrollment estimates are distinguished from those required without any campus growth and are identified in green.

Figure 11 presents the intersection lane geometrics and control types that are proposed at the time of the *Year 2027 Plus 20 Year MP Growth Conditions* analysis scenario. The improvements depicted in red represent what is proposed for acceptable LOS operations at study intersections approximately 20 years from now – without any additional student trips. Improvements required only with the addition of new student trips are identified in green.

Subsequently, the unimproved (before mitigation) and improved (after mitigation) study intersection LOS operations are presented in Table 9.

TABLE 8
IMPROVEMENTS AND MITIGATION MEASURES MATRIX

#	Intersection	Existing Conditions[1]	Short Term No MP Growth Conditions[1]	Short Term Plus 10 Year MP Growth Conditions[1]	Year 2027 No MP Growth Conditions[1]	Year 2027 Plus 20 Year MP Growth Conditions[1]
1 2	Taylor Road / SB SR 99 Ramps - AND - Taylor Road / NB SR 99 Ramps	Install actuated-coordinated traffic signal system.	Add southbound left turn pocket at Taylor Road / SB SR 99 Ramps. Add eastbound receiving lane for new turn lane and carry receiving lane through Taylor Road / NB SR 99 as additional eastbound through lane.[2]		Reconstruct Taylor Road / SR 99 interchange. East-west capacity should be increased in accordance with City plans to widen Taylor Road to a four-lane expressway.	
3	Taylor Road / Golden State Boulevard				Add second EBT lane in accordance with City plans to widen Taylor Road to a four-lane expressway. Alternatively, if it is deemed more desirable to route projected traffic increases south to Christofferson Parkway via Golden State Boulevard, a second eastbound right turn pocket could supplant the proposed through lane with the goal of making Taylor Road a less appealing path.	
4	Taylor Road / Walnut Avenue	Install actuacted-uncoordinated traffic signal.	Add eastbound right turn pocket.		Add westbound left turn pocket.	
5	Taylor Road / Geer Road		Add southbound right turn pocket.		Add westbound left turn pocket. Add eastbound left and right turn pockets. Change traffic signal phasing from split to protected.	
20	Monte Vista Avenue / Countryside Drive			No improvements recommended during this condition. LOS operations are projected to become acceptable upon completion of the planned Tuolumne Road over-pass structure.		
22	Monte Vista Avenue / Four Seasons Drive		Install actuacted-uncoordinated traffic signal.			
23	Monte Vista Avenue / Walnut Avenue		Add additional eastbound left turn lane.			Add northbound right turn pocket. This will require the elmination of some on-street parking in the vicinity.
24	Monte Vista Avenue / Crowell Road			Add southbound right turn pocket.		
28	Monte Vista Avenue / Geer Road					Add southbound right turn pocket.

Notes:
1. All improvements are assumed to carry forward from one preceding analysis scenario to the next unless explicitly noted otherwise.
2. For this "Short Term" condition improvement, widening should not be required. Sufficient roadway is present at the SR-99 underpass to stripe an additional east-west through lane.

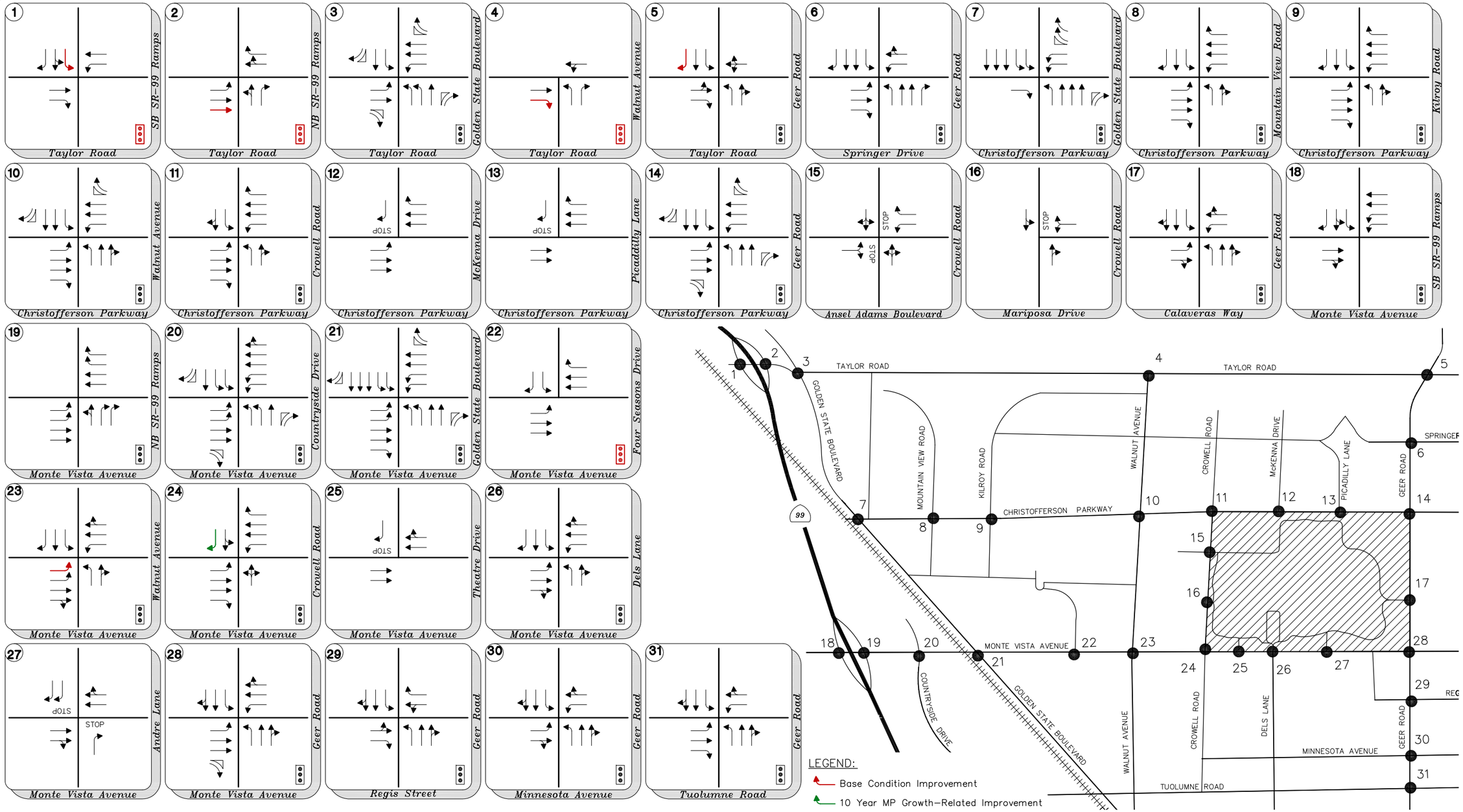

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Figure 10

Interim Proposed Improvements Intersection Lane Geometrics and Control Types

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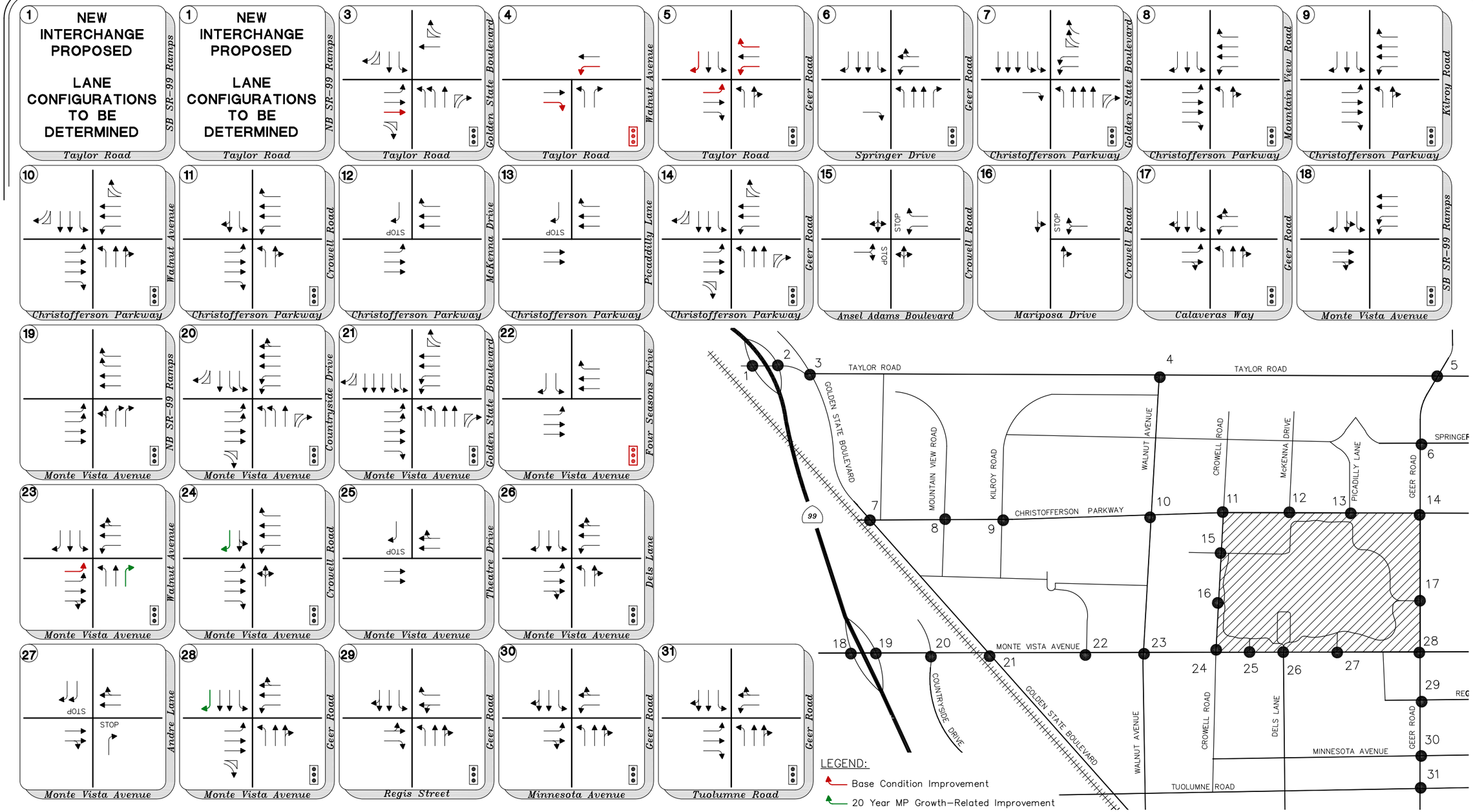

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Figure 11

Cumulative Proposed Improvements Intersection Lane Geometrics and Control Types

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TABLE 9
MITIGATED AND UNMITIGATED LOS MATRIX

	Taylor Road / SB SR 99 Rmaps		Taylor Road / NB SR 99 Ramps		Taylor Road / Golden State Boulevard		Taylor Road / Walnut Avenue		Taylor Road / Geer Road		Monte Vista Avenuwe / Countryside Drive		Monte Vista Avenue / Four Seasons Drive		Monte Vista Avenue / Walnut Avenue		Monte Vista Avenue / Crowell Road		Monte Vista Avenue / Geer Road	
AM PEAK	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Existing	319.3	F	16.4	C	19.5	B	44.3	E	41.5	D	15.6	B	17.4	C	23.8	C	27.8	C	20.4	C
With Mitigation	*15.6*	*B*					*34.4*	*C*												
Short Term No Project	OVR	F	46.5	E	31.7	C	117.3	F	62.9	E	24.8	C	36.1	E	40.8	D	32.6	C	23.3	C
With Mitigation	*21.9*	*C*	*19.7*	*B*			*44.5*	*D*	*52.6*	*D*			*8.7*	*A*						
Short Term Plus 10 Year Growth	OVR	F	51.7	F	31.7	C	117.8	F	64.2	E	25.1	C	38.8	E	42.2	D	33.5	C	25.5	C
With Mitigation	*21.9*	*C*	*19.6*	*B*			*44.6*	*D*	*51.6*	*D*			*8.7*	*A*						
Year 2027 No Project	OVR	F	OVR	F	48.0	D	171.0	F	76.7	E	25.9	C	44.4	E	48.7	D	35.9	D	25.4	C
With Mitigation	*24.6*	*C*	*18.9*	*B*			*39.1*	*D*	*43.9*	*D*			*9.1*	*A*						
Year 2027 Plus 20 Year Growth	OVR	F	OVR	F	48.2	D	173.9	F	83.2	F	27.6	C	61.9	F	58.3	E	43.2	D	35.5	D
With Mitigation	*26.7*	*C*	*17.9*	*B*			*39.6*	*D*	*47.0*	*D*			*9.2*	*A*	*50.9*	*D*				
PM PEAK	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Existing	OVR	F	50.7	F	24.1	C	18.7	C	27.8	C	25.6	C	22.0	C	23.5	C	37.2	D	31.8	C
With Mitigation	*24.4*	*C*	*6.9*	*A*																
Short Term No Project	OVR	F	OVR	F	38.9	D	40.2	E	42.5	D	54.8	D	123.2	F	73.9	E	52.8	D	39.2	D
With Mitigation	*22.0*	*C*	*19.4*	*B*			*20.7*	*C*					*10.6*	*B*	*46.4*	*D*				
Short Term Plus 10 Year Growth	OVR	F	OVR	F	40.4	D	41.5	E	43.3	D	55.4	E	156.1	F	82.1	F	59.0	E	44.4	D
With Mitigation	*22.1*	*D*	*19.3*	*D*			*20.9*	*D*					*10.7*	*D*	*48.8*	*D*	*37.3*	*D*		
Year 2027 No Project	OVR	F	OVR	F	84.7	F	124.9	F	55.0	D	52.3	D	168.3	F	89.1	F	62.4	E	44.0	D
With Mitigation	*50.5*	*D*	*20.3*	*C*	*47.3*	*D*	*22.7*	*C*					*10.9*	*B*	*53.2*	*D*	*39.2*	*D*		
Year 2027 Plus 20 Year Growth	OVR	F	OVR	F	92.5	F	130.2	F	57.8	E	54.3	D	307.8	F	110.7	F	86.7	F	62.3	E
With Mitigation	*54.6*	*D*	*20.2*	*C*	*53.6*	*D*	*23.2*	*C*	*31.9*	*C*			*12.0*	*B*	*54.1*	*D*	*50.8*	*D*	*47.3*	*D*

Note: Only intersections projected or observed to be operating at deficient LOS conditions are presented.