Appendix H

Vehicle Miles Traveled Analysis

Virginia Smith Charitable Trust (VST)

Vehicle Miles Traveled (VMT Analysis
April 14, 2023

Prepared by:
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Virginia Smith Charitable Trust (VST)
Transportation Impact Study

Study Team

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1.0 Introduction

This Vehicle Miles Traveled (VMT) Analysis has been prepared for the purpose of analyzing potential transportation impacts related to the proposed Virginia Smith Charitable Trust (VST) mixed-use project (the Project) located in Merced County south of the University of California Merced (UC Merced), as shown in Figures 1-1 and 1-2. The Project is located within Merced County's University Community Plan (UCP) area, and is within the City of Merced's SUDP and SOI. Since changes are being proposed to the UCP in conjunction with the Project, a VMT analysis is also provided for the amendment of the UCP.

Starting on July 1, 2020, per the requirements of SB 743, California Environmental Quality Act (CEQA) transportation analyses are to be conducted using VMT as the performance metric. SB 743 eliminates the use of automobile delay / Level of Service (LOS) and requires all transportation impact analysis to use VMT as a metric for the determination of transportation impacts under CEQA. Although level of service is no longer the performance measure for CEQA transportation studies, agencies such as Merced County and the City of Merced continue to require LOS analysis for land development projects in order to determine the appropriate level of roadway improvements needed to accommodate project traffic as part of the subdivision mapping process. That analysis is provided in a separate report.

1.1 Background Information and Project Description

Merced County previously evaluated the University Community Plan's traffic impacts under CEQA using an LOS-based transportation analysis prior to the enactment of SB 743. That review also included an air quality analysis that specifically considered and reported the number of total vehicle miles traveled (VMT) for the UCP and its subareas, and contained information to derive statistics on the residential VMT per capita and the VMT per employee for non-residential uses. Since 2004 when Merced County adopted the University Community Plan (UCP), the Virginia Smith Trust (VST) has proposed a specific plan which includes land use changes to the VST portion of the UCP warranting subsequent environmental review. The land use plan, circulation plan and selected development policies and standards will be amended as part of the project. That subsequent review will include a comparison of the approved 2004 UCP to the proposed amended UCP.

When an approved project is analyzed that was previously evaluated using an LOS-based analysis, and then the project requires a revision under the current VMT-based requirements, the relevant questions are the following:

- ✓ Would the proposed project generate more VMT than the previously approved project?
- ✓ Would the proposed project cause a significant impact based on current VMT significance thresholds?

If the answer to either or both of the questions above is no, the project would have a less than significant VMT impact.

The purpose of the VMT analysis for the project is to provide a meaningful analysis to demonstrate the Project's compliance with CEQA and SB 743. A number of environmental documents, including the EIR for the University Community Plan (SCH# 2001021056), and the EIR for the UC Merced and University Community Plan (SCH # 2008041009) evaluated the environmental impacts of the development of University Community Plan and the VST portion of the plan area. The approved and adopted UCP contains 11,616 dwelling units, 2,026,000 square feet of retail, office and business park uses, and reported an aggregate project/plan total VMT of 667,020 per day. By comparison, the proposed project (amended UCP) includes 9,680 dwelling units and 1,246,650 square feet of retail and office uses and is estimated to have total daily plan/project VMT of 178,427. The 2004 UCP did not report VMT per capita nor VMT per employee directly, but the data and methodology in Table 4.14-5 and Appendix C indicate that the daily residential VMT per capita was 13.72, the office/commercial VMT per employee was 19.12, and the office/business park VMT per employee was 19.49.

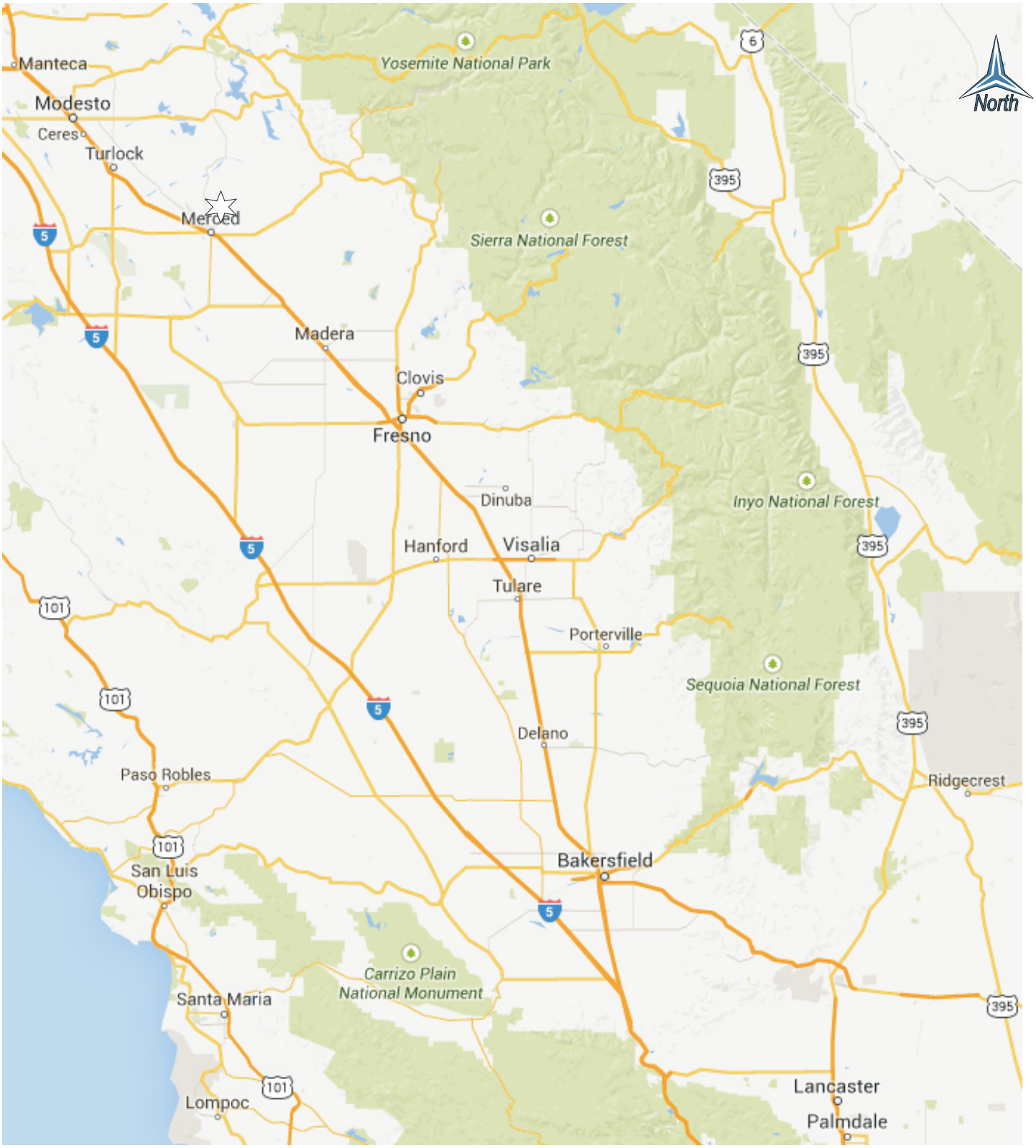
In the case of the VST project, an additional consideration is that the City of Merced intends to annex the project, as stated in Urban Expansion Policy 1.4 of the 2030 General Plan. The annexation would be a subsequent activity under the EIR. While Merced County was the lead agency for the previous CEQA approvals and will be the CEQA lead agency for the VST specific plan and the UCP Community Plan update, consideration was given to conforming with the VMT metrics that would apply to the project if it were located in the City of Merced.

One important consideration in the VMT analysis methodology is the question of the guidelines and thresholds to be used in conducting the VMT analysis. Neither Merced County nor the City of Merced has developed its own VMT analysis guidelines or thresholds. The preparation of countywide guidelines and thresholds are in the process of being developed as part of a project sponsored by the Merced County Association of Governments (MCAG), but it is unlikely that the MCAG thresholds and guidelines will be available in time for use on the VST project. In the absence of local guidelines and thresholds, the VMT analysis guidelines prepared by the Governor's Office of Planning and Research (OPR 2018, "OPR") were used as the basis of analysis. The County intends to adopt project-specific thresholds and guidelines based on the methodology and significance thresholds described in Chapter 2.

VST Specific Plan - VMT Analysis

Regional Location

Figure 1-1



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☆ Project Location

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VST Specific Plan - VMT Analysis

Project Site Plan

Figure 1-2

2.0 VMT Analysis Methodology and Thresholds

In OPR's guidance on the methodologies used to analyze VMT and the metrics to be used to determine the level of significance are based on whether or not the methodologies and metrics support the three statutory goals contained the Public Resources Code § 21099, namely that they result in "the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." In order for a selected metric or methodology to promote and support all three, lead agencies are to select a significance threshold that aligns with state law on all three.

OPR's recommendations on methodology vary by the type of project, the diversity of uses in the project, and the scale of the project. For projects including residential and office land uses, tour- and trip-based approaches are recommended. When available, a tour-based methodology is recommended because it captures travel behavior more comprehensively. But where tour-based tools or data are not available for all components of an analysis, a trip-based assessment of VMT serves as a reasonable proxy.

In either case (tour-based or trip-based), use of a regional travel demand is the preferred methodology for VMT analysis wherever a regional travel demand model is available and appropriate for use in VMT analysis of the project. The Three-County traffic model that is used in Merced County and maintained by the Merced County Association of Governments (MCAG) is a trip-based model that would be the best available comprehensive model available for this purpose. VRPA Technologies, in consultation with MCAG, considered use of the Three-County traffic model for this VMT analysis, but its use was rejected for the following reasons:

- ✓ Regional travel demand models rely heavily on surveys of existing travel to forecast future travel patterns. This works well when the regional development patterns of the future are similar to regional development patterns of the future. In the case of development patterns in Merced County, the implementation of the VST project and the UCP will represent a vastly different development pattern than the existing condition. A great deal of residential and commercial development will be available in close proximity to the UC Merced campus that does not exist today. This will greatly affect travel behavior for the UC Merced campus and nearby developments.

- ✓ Regional travel models typically rely on travel distance to determine the attractiveness of trips between various origins and destinations, but they also typically use adjustments known as K-factors to account for unusual travel patterns between certain origins and destinations. The K-factors are determined based on existing travel patterns and then used in future travel forecasting. In the case of the UC Merced campus and the nearby developments that are planned for the future, it is likely that K-factors would be needed to adjust for the strong relationship between UC Merced and the nearby development that is intended to serve the university. There is no way to develop these K-factors

because there are no existing developments serving the university that could be used as a basis to survey existing travel patterns.

Where possible and appropriate, OPR recommends using efficiency metrics of VMT per capita for residential projects and VMT per employee for office and employment generating projects. OPR recommends that retail projects, or retail components of projects, be evaluated separately. Many retail components of projects may be considered strictly "local-serving" and be captured in the evaluation of the residential home-based shopping trips analysis. Retail projects that are "regional-serving" may have the effect of redistributing existing shopping trips. For this reason, OPR recommends using total VMT as the appropriate metric for retail and transportation projects. By design and direction from the UCP, the Project and UCP no longer have any regional-serving land uses (research and development, business parks, regional retail, etc.) and the commercial and office land uses contained within each area are those that are necessary to directly serve the resident population.

Overall, OPR recommends that land uses not be combined (e.g., summing to total trips and multiplying by an average trip length) to analyze VMT since different land uses generate different amounts of VMT, so the outcome of such an analysis could depend more on the mix of uses than on their travel efficiency. OPR recommends analyzing each use separately, or simply focusing analysis on the dominant use, and comparing each result to the appropriate threshold. Recommendations for methods of analysis and thresholds are provided below. In the analysis of each use, a mixed-use project should take credit for internal capture as determined by the NHCRP Internal Capture Estimation Tool. This approach complies with OPR's guidelines.

OPR has specifically considered the appropriate methodologies and metrics for land use plans, general plans, community plans and larger-scale mixed-use projects, like the VST Specific Plan and the UCP Amendment. Where a project tiers from a previously approved and certified EIR pursuant to CEQA Guidelines sections 15152 and 15166, the lead agency is to focus on the environmental impacts that are specific to the later project that were not analyzed in the prior EIR. Thus, in analyzing a later project with a supplemental or subsequent environmental document, the lead agency should focus on the VMT impacts that were not adequately addressed in the prior EIR, such as VMT efficiency metrics. In the subsequent or supplemental environmental document, the lead agency should apply the following thresholds:

- ✓ Mixed Use Projects: OPR recommends analyzing each use separately, or simply focusing analysis on the dominant use, and comparing each result to the appropriate threshold. In the analysis of each use, a mixed-use project should take credit for internal capture. The VMT metrics stated below should be used to determine whether or not there is a significant impact.

- ✓ Residential Uses (or the Residential Component of Mixed-Use Projects/Plans): Per OPR's guidance, the evaluation of a residential project should take into account nearby local serving and internal non-residential land uses and determine an internal capture rate

using the NHCRP Internal Capture Estimating Tool or a regional traffic model. If the proposed project exceeds a level of 15 percent below both county and city VMT averages, there may be a significant transportation impact.

- ✓ Office/Employment Uses (or Office/Employment Components of a Mixed-Use Plan): Per OPR's guidance, the significant of VMT impacts for the office/employment component of a mixed-use project shall be determined if the project exceeds a level of 15 percent below existing regional VMT per employee.

- ✓ Local-Serving Retail Uses (or Local- Serving Retail Components of Mixed-Use Projects): Per OPR's guidance, local-serving retail projects may be presumed to have a less than significant VMT impact.

- ✓ Regional Retail Uses (or Regional Retail Components of Mixed-Use Projects): Per OPR's guidance, a retail project will have a significant impact if it results in a net increase in regional VMT.

Although the non-residential land uses in the Project and UCP could be considered local-serving, this analysis has assumed that they are not in order to provide a more conservative analysis. If the assumption was made that the non-residential uses were, in fact, local serving, the calculation of VMT would be lower than that provided herein. Since retail uses typically have a large number of trips and a low number of employees, the resulting VMT per employee values represent a conservative result.

Due to lack of an appropriate regional travel model, a manual analysis of VMT was used based on the following approach:

- ✓ Determine the trip generation of the Project based on the Traffic Impact Study Assumptions/Methodology. See Appendix A.

- ✓ Determine the trip distribution of the new project based on the Traffic Impact Study Assumptions/Methodology.

- ✓ Estimate a trip length for all project trips based on the trip generation and trip distribution characteristics.

- ✓ Determine the project VMT for the new project by multiplying the number of trips by the estimated trip lengths

- ✓ Compare the expected VMT per capita and VMT per employee values for the Project to regional averages, as recommended by OPR. For the residential portion of the project, the project's VMT impact will be less than significant if its VMT per capita is 15% below the regional average VMT per capita. For the office/employment portion of the project,

the project's VMT impact will be less than significant if its VMT per employee is 15% below the regional average VMT/employee.

3.0 VMT Analysis

This chapter provides a VMT analysis of the VST Project and the UCP amendment based on the methodology described in Chapter 2.

Based on Chapter 1, when an approved project is analyzed that was previously evaluated using an LOS-based analysis, and then the project requires a revision under the current VMT-based requirements, the relevant questions are the following:

- ✓ Would the proposed project generate more VMT than the previously approved project?
- ✓ Would the proposed project cause a significant impact based on current VMT significance thresholds?

If the answer to either or both of the questions above is no, the project would have a less than significant VMT impact.

In the case of the VST Project and the University Community Plan amendment, the analysis described below showed a less than significant impact based on current VMT significance thresholds. Comparisons to the previously approved projects were not considered necessary.

3.1 VST Project

VMT analysis for the VST project is shown in Table 3-1. Key results include the following:

- ✓ The VST Project has a VMT/capita value of 3.72.
- ✓ The VST Project has a VMT/employee value of 8.77.

It is important to note the overall context in which the VMT calculations shown in Table 3-1 were considered. The UC Merced area currently has few residential developments or amenities and much of the existing travel to and from the University oriented toward the City of Merced. The purpose of the VST project is to provide residential units, office space, and retail developments that will serve the University community at a much closer distance, resulting in shorter trip lengths. In addition, the VST project itself is a mixed-use development where a substantial number of employment and shopping trips can be made within the project site, with relatively short trip lengths and a low level of VMT. It should also be noted that the average trip lengths shown in Table 3-1 include consideration of trips made outside Merced County.

3.2 University Community Plan Amendment

VMT analysis for the UCP amendment is shown in Table 3-2. Key results include the following:

- ✓ The UCP amendment has a VMT/capita value of 4.90.
- ✓ The VST amendment has a VMT/employee value of 12.47.

The comments regarding the context for VMT calculations for the VST project described in Section 3.1 also apply to the VMT calculations for the UCP amendment.

3.3 Analysis of Significance

Table 3-3 compares the results described above to relevant Merced County averages. Key results include the following:

- ✓ The VST Project has a VMT/capita value of 3.72 compared to a County average of 15.93 and a significance threshold (15% below County average) of 13.54. This results in a less than significant VMT impact. For comparison purposes, the VST Project has a VMT/capita value of 3.72 compared to a City average of 9.89 and a significance threshold (15% below City average) of 8.41.
- ✓ The VST Project has a VMT/employee value of 8.77 compared to a County average of 40.54 and a significance threshold (15% below County average) of 34.46. This results in a less than significant VMT impact. For comparison purposes, the VST Project has a VMT/employee value of 8.77 compared to a City average of 37.89 and a significance threshold (15% below County average) of 32.21.
- ✓ The UCP amendment has a VMT/capita value of 4.90 compared to a County average of 15.93 and a significance threshold (15% below County average) of 13.54. This results in a less than significant VMT impact. For comparison purposes, the UCP amendment has a VMT/capita value of 4.90 compared to a City average of 9.89 and a significance threshold (15% below City average) of 8.41.
- ✓ The UCP amendment has a VMT/employee value of 12.47 compared to a County average of 40.54 and a significance threshold (15% below County average) of 34.46. This results in a less than significant VMT impact. For comparison purposes, the UCP amendment has a VMT/employee value of 12.47 compared to a City average of 37.89 and a significance threshold (15% below City average) of 32.21.

Table 3-1
VMT Analysis - VST Specific Plan

	Total					Residential				Retail/Office			
LAND USE	**Quantity**	**DAILY TRIP ENDS**	**(ADT)**			**PPH**	**Population**	**Residential**		**Square Feet per Employee**	**Employment**	**Retail/Office**	
		RATE	**VOLUME**										
R-1 Residential (220)	1277	7.32	9,348			3.18	4,061						
R-4 Student Residential (225)	894	4.12	3,683			4.00	3,576						
R-2 Cluster Residential	480	7.32	3,514			2.51	1,205						
R-2, R-3, & R-4 Market (220)	1098	7.32	8,037			1.88	2,064						
Town Center Mixed Use Residential (231)	108	3.44	372			1.88	203						
Retail Mixed (875)	308	22.88	7,036							300	1,025		
NC/Retail and Community Commercial (875)	275	22.88	6,292							300	917		
Hotel/Office (710)	275	9.74	2,679							300	917		
Elementary School (520) (local serving only)	950	1.89	1,796							20	48		
Parks (411) (local serving only)	75	3.12	234										
Total			42,989				11,109				2,906		
		Project Trip Generation	**42,755**	**Trip Length (miles)**	**VMT**	**Project Trip Generation**	**24,953**	**Trip Length (miles)**	**VMT**	**Project Trip Generation**	**17,802**	**Trip Length (miles)**	**VMT**
Internal Trips (NCHRP Internal Trip Capture Estimation Tool)	**26.9%**		**11,498**			**35.0%**	**8,734**			**15.5%**	**2,764**		
Bike	20.0%		2,300	-			1,747				553		
Peds	10.0%		1,150	-			873				276		
Transit	0.0%		-	-			-				-		
Vehicle	70.0%		8,049	0.75	6,036		6,114	0.75	4,585		1,935	0.75	1,451
External Trips			**31,257**		-		**16,220**	-	-		**15,037**	-	
Bike Trips	20.0%		6,251	-	-		3,244	-	-		3,007	-	-
Pedestrian Trips	10.0%		3,126	-	-		1,622	-	-		1,504	-	-
Transit Trips	5.0%		1,563	-	-		811	-	-		752	-	-
External VT to UC (45% of total external)	45.0%		9,143	1.75	16,000		4,744	1.75	8,302		4,398	1.75	7,697
External VT Other (55% of Total External)	55.0%				-			-	-			-	-
Shopping (TL per CTDM for TAZ 2235)	21.0%		4,063	3.38	13,735	21.0%	1,218	4.54	5,528	64.7%	2,846	4.54	12,920
Work (TL per CTDM for TAZ 2235)	35.8%		2,793	6.82	19,047	35.8%	2,076	9.95	20,655	16.3%	717	7.83	5,614
Other (TL per CTDM for TAX 2235)	43.2%		3,341	2.78	9,287	43.2%	2,505	3.42	8,567	19.0%	836	2.78	2,323
Passby Trip Length Reduction	5.00%		2,138	(5.07)	(10,838)		1,248	(5.07)	(6,326)		890	(5.07)	(4,513)
				VMT/Day	**53,266**			**VMT/Day**	**41,312**			**VMT/Day**	**25,492**
				Site Population	**14,015**			**Residents**	**11,109**			**Employees**	2,906
								VMT/Resident	**3.72**			VMT/Employee	8.77
			Average Vehicle Trip Length		**1.94**		**Average Vehicle Trip Length**		**2.48**		**Average Vehicle Trip Length**		2.38
			Countywide VMT/Capita per CTDM		15.93								
			City of Merced VMT/capita per CTDM		9.89								
			Residential Trip Percent		58.4%								

Table 3-2

VMT Analysis - University Community Plan Update

	Total					Residential				Retail/Office			
LAND USE	Quantity	DAILY TRIP ENDS RATE	(ADT) VOLUME			PPH	Population	Residential		Square Feet per Employee	Employment	Retail/Office	
R-1 Residential (220)	5,786	7.32	42,354			3.18	18,399						
R-4 Student Residential (225)		4.12	0			4.00	-						
R-2 Cluster Residential		7.32	0			2.51	-						
R-2, R-3, & R-4 Market (220)	3,786	7.32	27,714			1.88	7,118						
Town Center Mixed Use Residential (231)	108	3.44	372			1.88	203						
Retail Mixed (875)	308.000	22.88	7,047							300	1,027		
NC/Retail and Community Commercial (875)	523.650	22.88	11,981							300	1,746		
Hotel/Office (710)	415.000	9.74	4,042							300	1,383		
Elementary School (520) (local serving only)	3,900	1.89	7,371							20	48		
Parks (411) (local serving only)	248	3.12	774										
Total			101,654				25,720				4,203		
		Project Trip Generation	100,880	Trip Length (miles)	VMT	Project Trip Generation	70,439	Trip Length (miles)	VMT	Project Trip Generation	30,441	Trip Length (miles)	VMT
Internal Trips (NCHRP Internal Trip Capture Estimation Tool)	**28.3%**		**28,538**			**35.0%**	**24,653**			**12.8%**	**3,885**		
Bike	20.0%		5,708	-			4,931				777		
Peds	10.0%		2,854	-			2,465				388		
Transit	0.0%		-	-			-				-		
Vehicle	70.0%		19,977	0.75	14,982		17,257	0.75	12,943		2,719	0.75	2,039
External Trips			**72,342**		-		**45,785**	-	-		**26,557**	-	
Bike Trips	20.0%		14,468	-	-		9,157	-	-		5,311	-	-
Pedestrian Trips	10.0%		7,234	-	-		4,579	-	-		2,656	-	-
Transit Trips	5.0%		3,617	-	-		2,289	-	-		1,328	-	-
External VT to UC (45% of total external)	45.0%		21,160	1.75	37,030		13,392	1.75	23,436		7,768	1.75	13,594
External VT Other (55% of Total External)	55.0%				-			-	-			-	-
Shopping (TL per CTDM for TAZ 2235)	21.0%		8,463	3.38	28,605	21.0%	3,437	4.54	15,605	64.7%	5,026	4.54	22,817
Work (TL per CTDM for TAZ 2235)	35.8%		7,126	6.82	48,599	35.8%	5,860	9.95	58,305	16.3%	1,266	9.95	12,598
Other (TL per CTDM for TAX 2235)	43.2%		8,547	2.78	23,760	43.2%	7,071	3.42	24,183	19.0%	1,476	3.42	5,048
Passby Trip Length Reduction	2.37%		2,395	(5.07)	(12,142)		1,672	(5.07)	(8,478)		723	(5.07)	(3,664)
				VMT/Day	**178,427**			**VMT/Day**	**125,995**			**VMT/Day**	**52,432**
				Site Population	**29,923**			**Residents**	**25,720**			**Employees**	4,203
								VMT/Resident	**4.90**			VMT/Employee	12.47
			Average Vehicle Trip Length		**2.73**		**Average Vehicle Trip Length**		**2.68**		**Average Vehicle Trip Length**		2.87
			Countywide VMT/Capita per CTDM		15.93								
			City of Merced VMT/capita per CTDM		9.89								
			Residential Trip Percent		69.8%								

Table 3-3
VMT Significance Analysis

	Merced County VMT Data		City of Merced VMT Data (For Comparison Purposes)		Project VMT Data			
Threshold	Average Value	Threshod Value (15% Below Average)	Average Value	15% Below Average	VST Project	Significant Impact (Y/N)	University Communit Plan Amendment	Significant Impact (Y/N)
VMT/Capita	15.93	13.54	9.89	8.41	3.72	N	4.90	N
VMT/Employee	40.54	34.46	37.89	32.21	8.77	N	12.47	N

4.0 Mitigation

Based on the results of Chapter 3, both the VST Project and the UCP Amendment have a less than significant VMT impact. No mitigation measures are needed.

APPENDIX A

Traffic Impact Study Assumptions/Methodology Memorandum

June 16, 2020

Mr. Steve Maxey, Deputy Director
County of Merced Planning & Community Development Department
2222 M Street
Merced CA 95340

Re: Traffic Impact Study Assumptions/Methodology for the Virginia Smith Trust Property Planning Project

Dear Mr. Maxey:

VRPA Technologies, Inc. (VRPA) has prepared the following Traffic Impact Study/Methodology, which includes trip generation and trip distribution for the Virginia Smith Trust (VST) Property Project ("Project"). The Project location along with proposed study area intersections are provided in Figure 1, 2, and 3. Figure 3 includes the proposed study intersections to be evaluated in the traffic analysis and is consistent with the study intersections included in the UC Merced 2020 LRDP Transportation Impact Analysis, as well as the traffic impact analysis prepared for the 2005 University Community Plan EIR and associated traffic impact study. This scoping document is intended to be used by all appropriate reviewing agencies in approving a final scope of work for the required Project traffic analysis.

The trip generation and trip distribution estimates are broken down into Phase 1 totals and Project totals. Phase 1 estimates represent the land uses and areas that are covered by the "project-level" entitlements, including the tentative map. The Phase 1 totals and estimates will be used to inform the level of improvements and offsite mitigations that are associated with the Project. The Total Project impacts are considered more programmatic and will require some form of additional analysis and monitoring to confirm the level of the actual traffic generation and impacts.

TRIP GENERATION METHODOLOGY

To assess the impacts that the Project may have on the surrounding roadway network, the first step is to determine Project trip generation. Project trip generation was determined using trip generation rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition), the ITE Trip Generation Handbook (3rd Edition), and engineering judgement. The analysis of trip generation also considered the trip generation analysis contained in the 2005 University Community Plan EIR and associated traffic impact analysis. This analysis also considered the likely number of "internal" trips based on the diversity of land uses, and guidance from the Transportation Research Board's National Cooperative Highway Research Program (NCHRP) Report 684: "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments", and the likely mode split for internal and external trips based on the proximity of to major trip ends such as shopping and work. Based on this methodology, presented in Tables 1 and 2, there are 9,660 internal trips associated with Phase 1, and 11,498 internal trips associated with Phase 2. The fraction of total trips that are internally captured (29%) is similar to those estimated in the Table 4.14-5 for the UCP project in the UCP EIR (32%).

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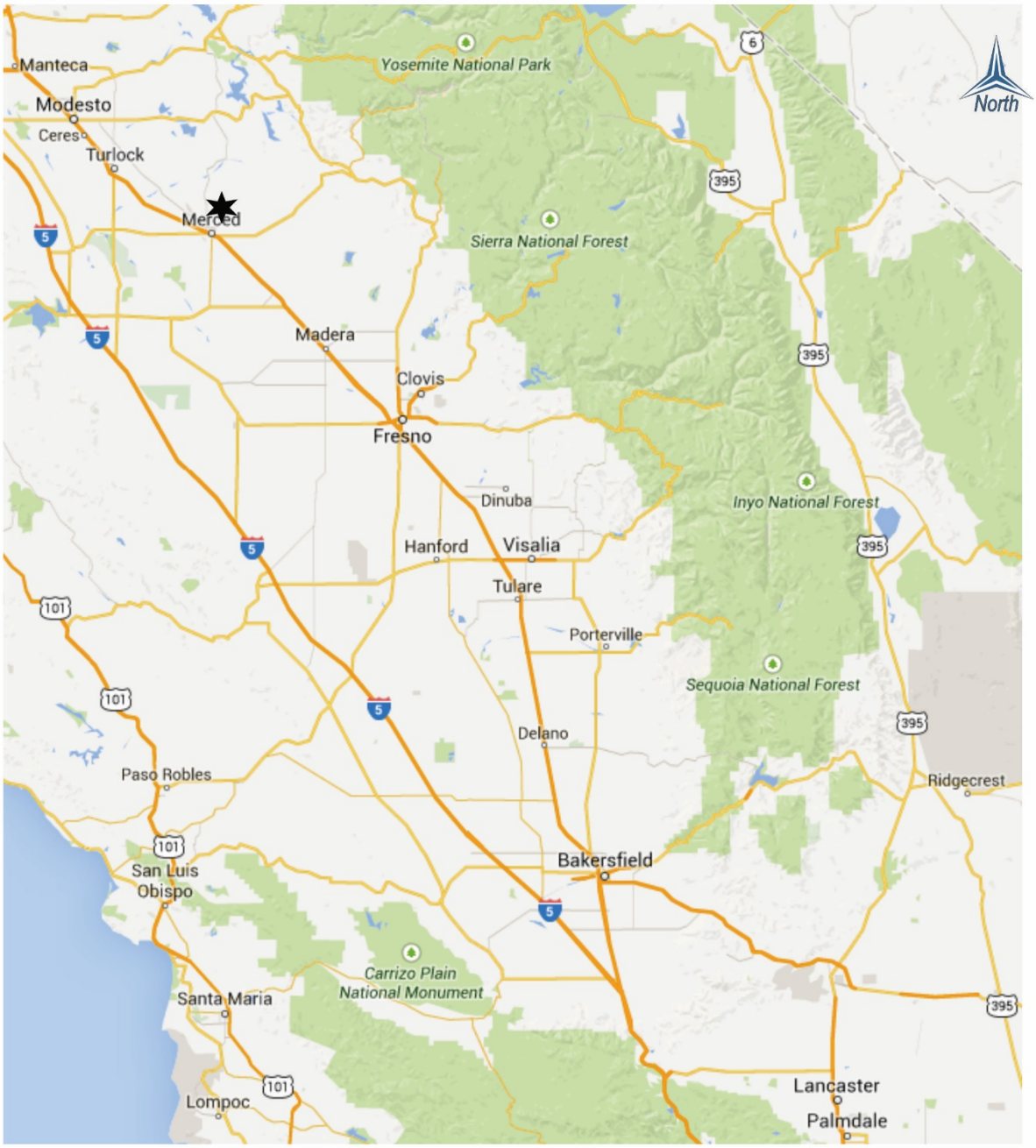
VST Specific Plan
Regional Location

Figure 1



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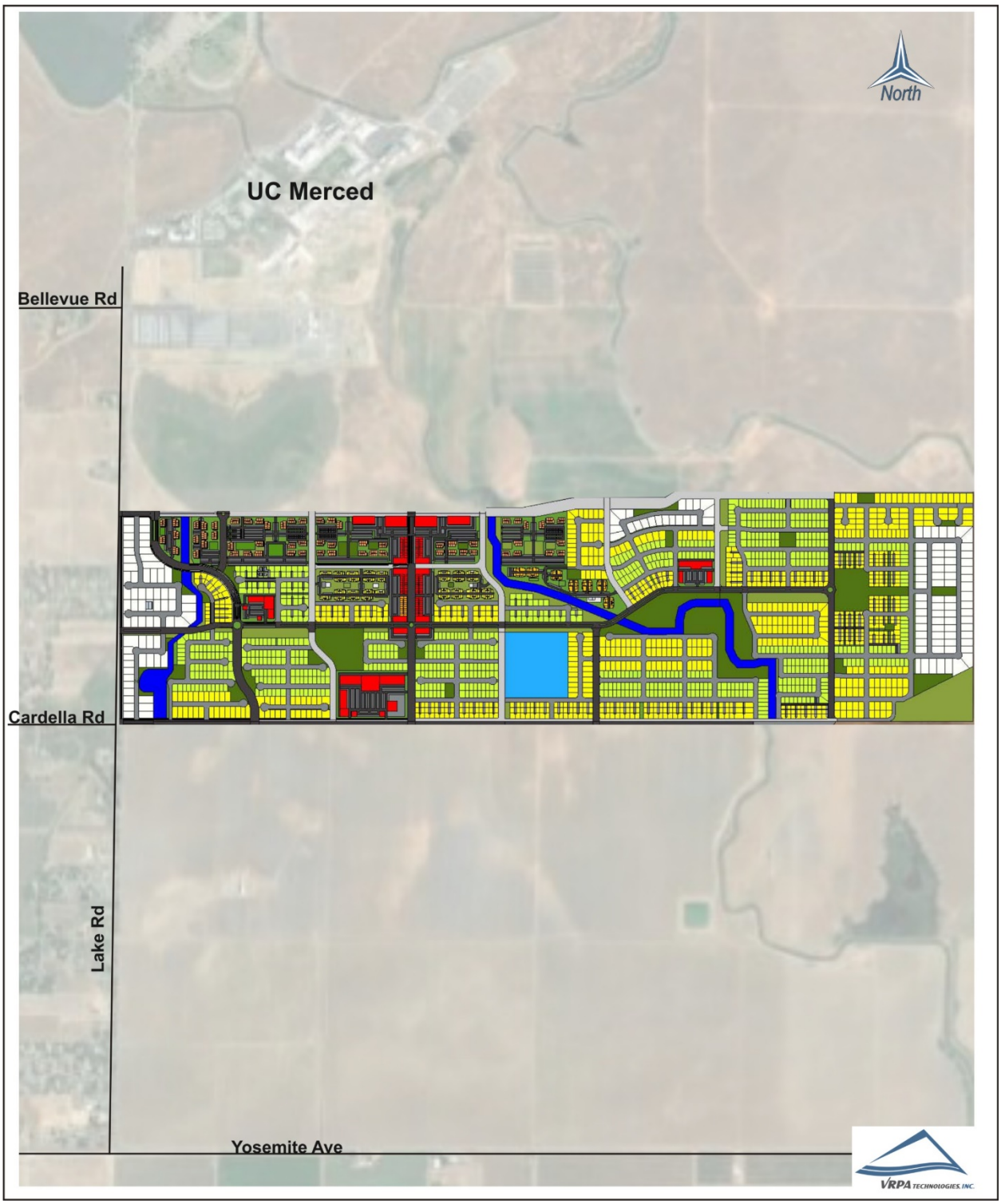
★ Project Location

VRPA TECHNOLOGIES, INC.

VST Specific Plan
Project Site Layout

Figure 2



VST Specific Plan
Study Area Intersections

Figure 3

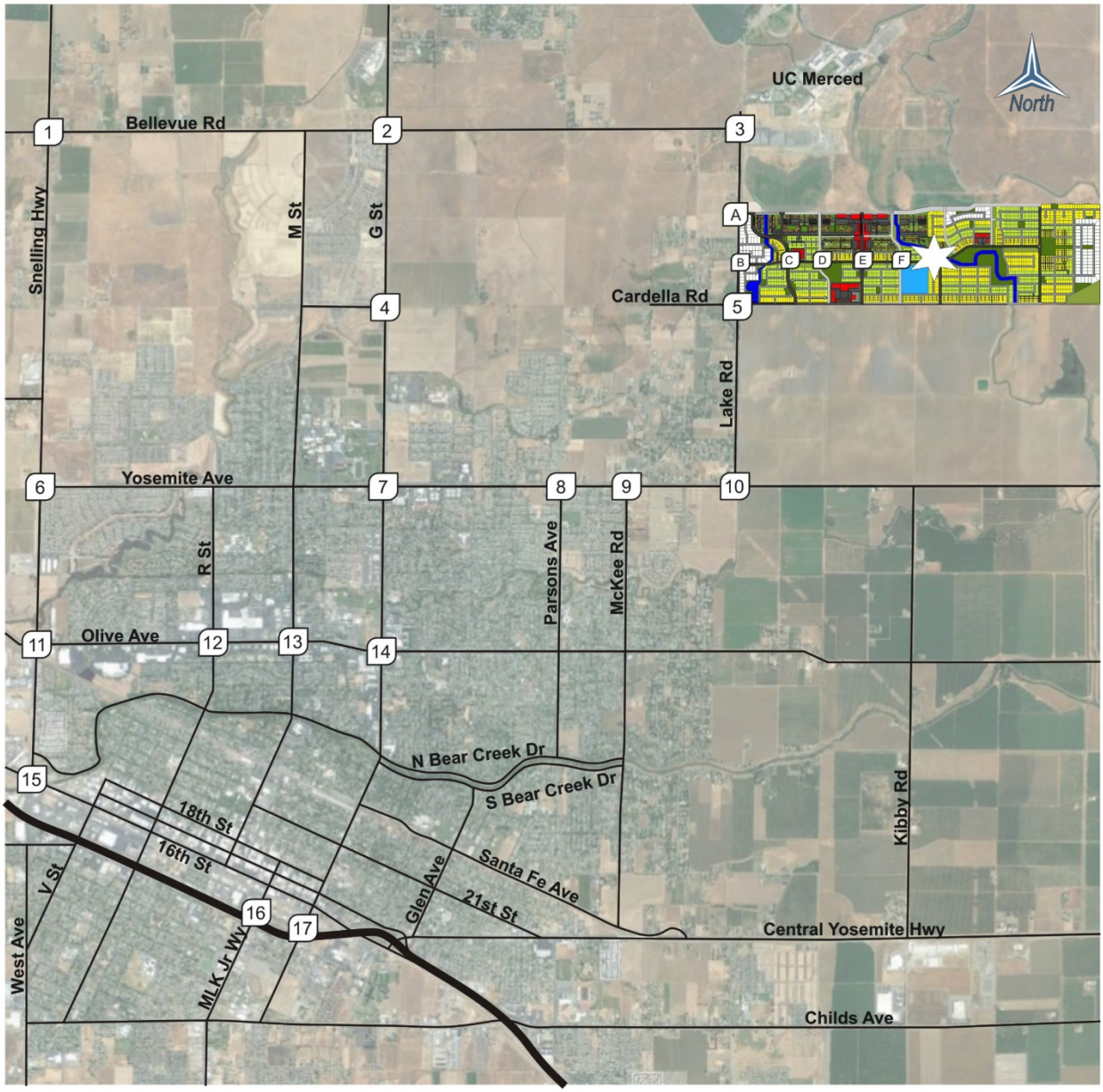


Table 1
Phase 1 Project Trip Generation

LAND USE	Quantity	DAILY TRIP ENDS	(ADT)	WEEKDAY AM PEAK HOUR					WEEKDAY PM PEAK HOUR				
		RATE	VOLUME	RATE	IN:OUT SPLIT	VOLUME			RATE	IN:OUT SPLIT	VOLUME		
						IN	OUT	TOTAL			IN	OUT	TOTAL
R-1 Residential (220)	674 D.U.	7.32	4,934	0.43	23:77	67	225	292	0.48	63:37	203	120	323
R-4 Student Residential (225)	692 D.U.	4.12	2,851	0.17	28:72	33	85	118	0.31	52:48	112	103	215
R-2, R-3, & R-4 Market (220)	1,085 D.U.	7.32	7,942	0.43	23:77	106	354	460	0.45	63:37	311	182	493
Town Center Mixed Use (231)	108 D.U.	3.44	372	0.30	28:72	9	23	32	0.36	70:30	27	12	39
Retail Mixed (875)	307,500 s.f	22.88	7,036	0.58	64:36	114	64	178	1.95	50:50	300	300	600
NC/Retail and Community Commercial (875)	225,000 s.f	22.88	5,148	0.58	64:36	84	47	131	1.95	50:50	219	220	439
Hotel/Office (710)	275,000 s.f	9.74	2,679	1.16	86:14	274	45	319	1.08	16:84	48	250	298
Elementary School (520)	600 Students	1.89	1,134	0.67	54:46	217	185	402	0.17	48:52	49	53	102
Parks (411)	35.86 acres	3.12	112	0.02	59:41	1	0	1	0.7	55:45	14	11	25
SUBTOTAL TRIP GENERATION			**32,208**			**905**	**1,028**	**1,933**			**1,283**	**1,251**	**2534**
Internal Trips (NCHRP Internal Trip Capture Estimation Tool) [1]			**9,660**			**304**	**278**	**582**			**379**	**381**	**760**
Internal Bike Trips (20%)			**1,932**			**61**	**56**	**116**			**76**	**76**	**152**
Internal Pedestrian Trips (10%)			**966**			**30**	**28**	**58**			**38**	**38**	**76**
Internal Vehicle Trips (70%)			**6,762**			**213**	**195**	**407**			**265**	**267**	**532**
Bike Trips (20%)			**4,510**			**120**	**150**	**270**			**181**	**174**	**355**
Pedestrian Trips (10%)			**2,255**			**60**	**75**	**135**			**90**	**87**	**177**
Transit Trips (5%)			**1,127**			**30**	**38**	**68**			**45**	**44**	**89**
SUBTOTAL EXTERNAL VEHICLE TRIP GENERATION			**14,656**			**391**	**488**	**878**			**588**	**566**	**1,153**
Pass-By Trips (5%)			**732.81**			**20**	**24**	**44**			**29**	**28**	**58**
TOTAL EXTERNAL EXTERNAL TRIP GENERATION			**13,923**			**371**	**463**	**834**			**558**	**537**	**1095**

Source: Generation factors from ITE Trip Generation Manual, 10th Edition.

Trip ends are one-way traffic movements, entering or leaving.

The numbers in parenthesis are ITE land use codes.

1. Daily internal trip capture rate basued upon PM peak results from the NCHRP Internal Trip Capture Estimation Tool. 90% of trips associated with the elementary school were assumed to be internal trips since the school will serve residents of the VST site. 100% of Park trips are internal trips.

Table 2
Full Project Trip Generation

LAND USE	Quantity	DAILY TRIP ENDS (ADT)		WEEKDAY AM PEAK HOUR					WEEKDAY PM PEAK HOUR				
		RATE	VOLUME	RATE	IN:OUT SPLIT	VOLUME			RATE	IN:OUT SPLIT	VOLUME		
						IN	OUT	TOTAL			IN	OUT	TOTAL
R-1 Residential (220)	1,298 D.U.	7.32	9,502	0.42	23:77	125	420	545	0.45	63:37	365	214	579
R-4 Student Residential (225)	894 D.U.	4.12	3,684	0.17	28:72	43	109	152	0.31	52:48	145	133	278
R-2, R-3, & R-4 Market (220)	1,617 D.U.	7.32	11,837	0.42	23:77	155	517	672	0.44	63:37	444	260	704
Town Center Mixed Use (231)	108 D.U.	3.44	372	0.30	28:72	9	23	32	0.36	70:30	27	12	39
Retail Mixed (875)	307,500 s.f	22.88	7,036	0.58	64:36	114	64	178	1.95	50:50	300	300	600
NC/Retail and Community Commercial (875)	279,500 s.f	22.88	6,395	0.58	64:36	104	59	163	1.95	50:50	273	273	546
Hotel/Office (710)	275,000 s.f	9.74	2,679	1.16	86:14	274	45	319	1.08	16:84	48	250	298
Elementary School (520)	600 Students	1.89	1,134	0.67	54:46	217	185	402	0.17	48:52	49	53	102
Parks (411)	67.74 acres	1.95	132	0.02	59:41	1	1	2	0.40	55:45	15	12	27
SUBTOTAL TRIP GENERATION			**42,771**			**1,042**	**1,423**	**2,465**			**1,666**	**1,507**	**3173**
Internal Trips (NCHRP Internal Trip Capture Estimation Tool) [1]			**11,498**			**350**	**318**	**668**			**426**	**427**	**853**
Internal Bike Trips (20%)			**2,300**			**70**	**64**	**134**			**85**	**85**	**171**
Internal Pedestrian Trips (10%)			**1,150**			**35**	**32**	**67**			**43**	**43**	**85**
Internal Vehicle Trips (70%)			**8,049**			**245**	**223**	**468**			**298**	**299**	**597**
Bike Trips (20%)			**6,255**			**138**	**221**	**359**			**248**	**216**	**464**
Pedestrian Trips (10%)			**3,127**			**69**	**111**	**180**			**124**	**108**	**232**
Transit Trips (5%)			**1,564**			**35**	**55**	**90**			**62**	**54**	**116**
TOTAL EXTERNAL VEHICLE TRIP GENERATION			**20,327**			**450**	**718**	**1,168**			**806**	**702**	**1,508**
Pass-By Trips (5%)			**1016**			**22**	**36**	**58**			**40**	**35**	**75**
TOTAL EXTERNAL VEHICLE TRIP GENERATION			**19,311**			**427**	**682**	**1110**			**766**	**667**	**1433**

Source: Generation factors from ITE Trip Generation Manual, 10th Editior

Trip ends are one-way traffic movements, entering or leaving.

The numbers in parenthesis are ITE land use codes.

1. Daily internal trip capture rate basued upon PM peak results from the NCHRP Internal Trip Capture Estimation Tool. 90% of trips associated with the elementary school were assumed to be internal trips since the school will serve residents of the VST site. 100% of Park trips are internal trips.

The methodology also considered whether or not to allow for a significant pass-by factor to reflect the relocation of current commuters to the Project site. Although arguments can be made that a significant portion of Project trips will be from existing commuters, the analysis assumes that these will be minimal and are estimated at 5% in Tables 1 and 2. Similarly, the commercial and office trip generation is not assumed to include any diverted trips from existing destinations (for example shopping trips by those rural residential units, UC on-campus students, and UC staff) that are already on the road.

The trip generation analysis was also informed by previous traffic studies including the 2020 UC Merced Long Range Development Plan ("2020 LRDP"), the 2004 University Community Plan, and the 2009 UC Merced Long Range Development Plan (2009 LRDP). As noted in the 2009 LRDP as in this one, the amount of daily vehicle traffic expected to be generated by the Project was validated using data gathered within Merced County for the Statewide Travel Survey. Adjustments were made for the mix and size of commercial units in each commercial center. Because of the mix and proximity of land uses trip generation rates for residential uses are approximately 20 to 25 percent lower for the University Community based on MCAG model rates than standard ITE rates. The use of these lower rates is consistent with recommended practice, as stated in the ITE Trip Generation Handbook, which states that "if available, properly collected and validated local rates should be considered in addition to the national data base."

The trip generation and mode split estimates contained in this and previous studies reflects the fact that a significant number of trips from the Campus and the University Community are expected to remain within the Project site (campus and University Community sites combined), due to the relative proximity of the University Community to the Campus, as well as the expectation that the Project will attract campus students and staff. This expectation is supported by the fact that 56 percent of UC Santa Cruz's faculty, staff, and commuting students, live within 3 miles of the UC Santa Cruz campus, and an additional 23 percent (79 percent total) live within 5 miles. Similarly, UC Davis indicates that approximately half of the faculty and staff live in Davis, as do a very high proportion of commuting students. The Project applicants expect to meet these capture rates, and possibly more, because of preferences and financial incentives that will be extended to Campus staff.

In comparison to the 2004 UCP EIR, the Project is estimated to generate 42,771 total trips compared to 89,469 total trips for the UCP North in Table 4.13-7 of the UCP EIR; the Project is also expected to generate 19,311 external vehicle trips compared to the 25,793 external vehicle trips estimated in the UCP EIR.

The travel mode was also given special consideration in this study. The mode of travel (especially the non-vehicular travel modes) are substantially influenced by the proximity of work and shopping destinations to the residential units, and the diversity of land uses.

In the case of the VST project UC-supporting multifamily and town center commercial uses are located closest to UC (and will eventually be physically adjacent); commercial shopping areas are distributed so that 90 percent of the residential units are located within one-quarter mile or less of commercial areas that provide daily and weekly shopping goods and services; a public park and/or open space is located within walking distance (no farther than 660 feet from any residential unit); and, all arterial and collector level streets have Class I or Class IV bike facilities to encourage bicycled usage for internal and external trips. Based on these factors, the estimates in Table 3 are presented to reflect mode split for the various types of Project trips

Table 3
Internal and External Project Mode Split Trip Factors

Internal Trips	
Bike Trips	20%
Pedestrian Trips	10%
Transit Trips	0%
Vehicle Trips	70%
External Trips	
Bike Trips	20%
Pedestrian Trips	10%
Transit Trips	5%
Vehicle Trips	**65%**

TRIP DISTRIBUTION

Project trip distribution is shown in Figure 4 and is based upon engineering judgement, prevailing traffic patterns in the study area, major routes, and population centers. Using the Merced County Association of Governments (MCAG) Travel Model in this undeveloped rural area would not result in accurate model forecasts since the model is not accurate in areas where the TAZ structure is large (greater than ½ mile square) or is not dense enough to provide accurate trip assignments such as in the City of Merced.

The information shown in Table 4 was also used in determining the project trip distribution. This table is a summary of the amount of commercial space that is attributable to onsite UC staff and students, and the fraction of each housing product type that is expected to be directly associated with the University. Based on this table, 48.7% of projects trips will be oriented toward the UC Campus. Subtracting trips made by bicycle, walking, and transit leads to a conclusion that 45% of the Project vehicle trips will be oriented toward the University.

VST Specific Plan
Trip Distribution

Figure 4

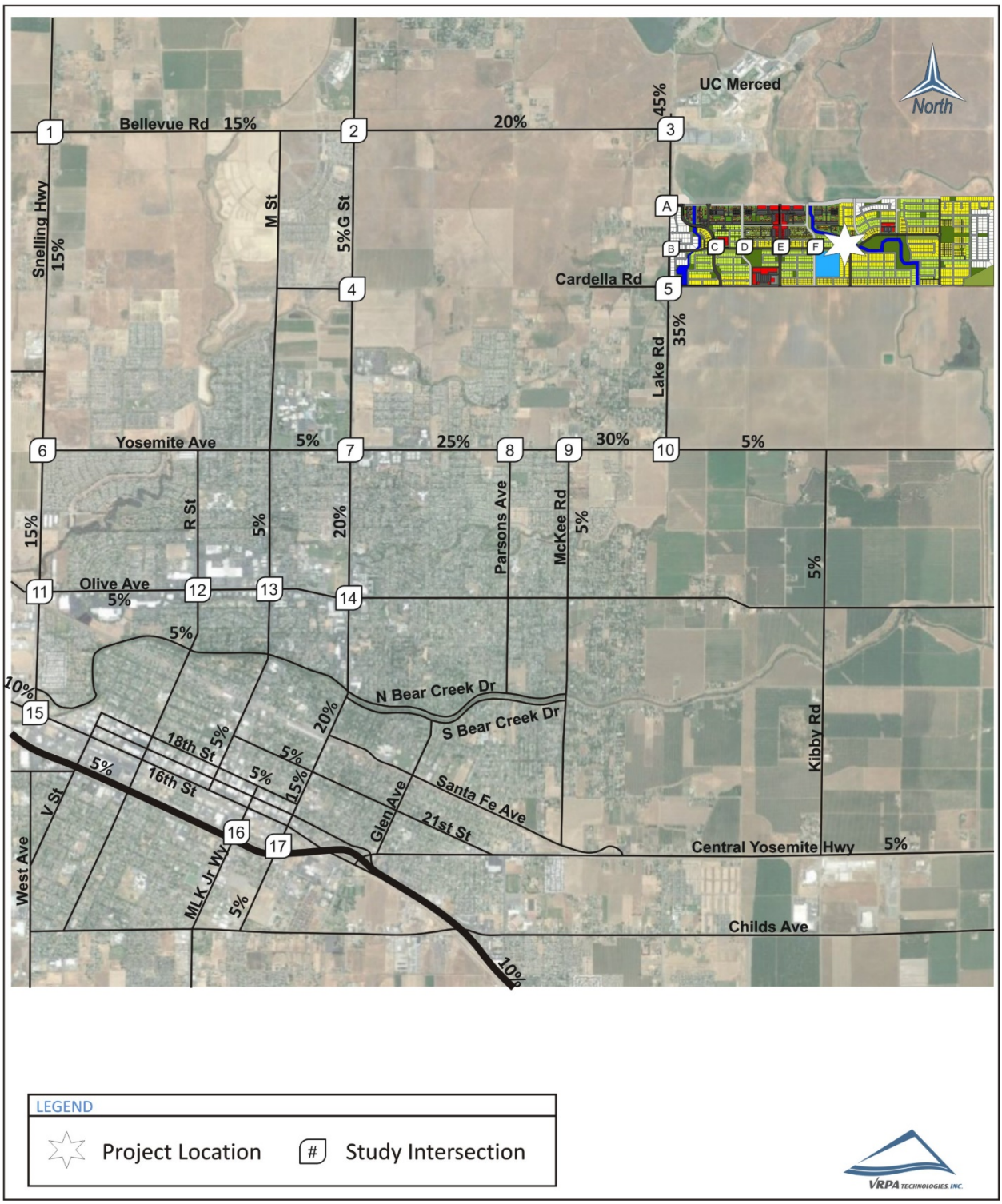


Table 4Relationship Between UC Merced and VST Project – ER: See the PDF table called “UC Associated

Table 4
Trip Distribution Calculations

Square Fee for Store Type	UCM North/VST	UC Merced (existing)	UC Merced (Future Growth)	Subtotal VST+UCM	UCM South (50%)	Total	Provided Per Land Plan-Phase 1	Provided Per Land Plan-Phase 2	Total Provided
Food Store	32,213	8,400	4,200	**44,813**	25,606	**70,418**			
General Retail:	138,121	36,540	18,270	**192,931**	124,252	**317,183**			
Restaurants:	38,948	23,966	16,074	**78,987**	28,344	**107,332**			
Personal	20,577	19,200	9,600	**49,377**	17,621	**66,999**			
Total Retail/Commercial	**229,858**	**88,106**	**48,144**	**366,108**	**195,824**	**561,932**	**532,500**	**54,500**	**587,000**
General Office @ 15 SF/Capita	**161,124**			**161,124**	**146,028**	**307,152**	**275,000**	**-**	**275,000**
Total Medical	**26,236**	**-**	**-**	**26,236**	**26,461**	**52,697**		**-**	**-**
Total	**417,218**	**88,106**	**48,144**	**553,467**	**368,313**	**921,780**	**807,500**	**54,500**	**862,000**
	45.3%	9.6%	5.2%	60.0%	40.0%	100.0%			
	Units						Trip Rate	ADT	Percent
Percent of Commercial Trips To/From UC		88,106	48,144			136,250		3,117	
Percent of Residential Trips To/From UC									
R-1 Low (12,500)	156	35%				55	7.32	400	
R-1 Low-Medium (7000)	358	35%				125	7.32	917	
R-1 Medium (5000)	703	35%				246	7.32	1,801	
R-1 Medium (5000, Cluster/Alley)	81	35%				28	7.32	208	
R-2 (Cluster)	491	35%				172	7.32	1,258	
R-3 For Sale	244	50%				122	7.32	893	
R-3 For Rent	288	50%				144	7.32	1,054	
R-4 Student (60%)	894	100%				894	4.12	3,683	
R-4 Market (40%)	594	50%				297	7.32	2,174	
Town Center Mixed Use	108	75%				54	3.44	186	
					Total UC Derived Trips			15,691	48.7%
					Total ADT Per Traffic Study			32,208	

TRAFFIC ANALYSIS SCENARIOS

The study time periods for the traffic analysis will include the weekday AM and PM peak hours determined between 7:00 and 9:00 AM and between 4:00 and 6:00 PM. Level of service analysis for the AM and PM peak hours will be analyzed for the following scenarios:

- ✓ Existing Conditions
- ✓ Existing Plus Project
- ✓ Near-Term Plus Project
- ✓ Cumulative Year 2042 Without Project
- ✓ Cumulative Year 2042 Plus Project

NETWORK ALTERNATIVES

For the Existing Plus Project and Near-Term Plus Project scenarios, all existing streets and roads are assumed to be part of the network. For the Cumulative Year 2042 Without Project, the initial assumption will be that the only new roadway will be the extension of Campus Parkway to Yosemite Avenue as shown in Figure 5. The future extension of Campus Parkway through the Project site to the UC Campus will be considered as an alternative if needed to relieve expected traffic congestion on Lake Drive.

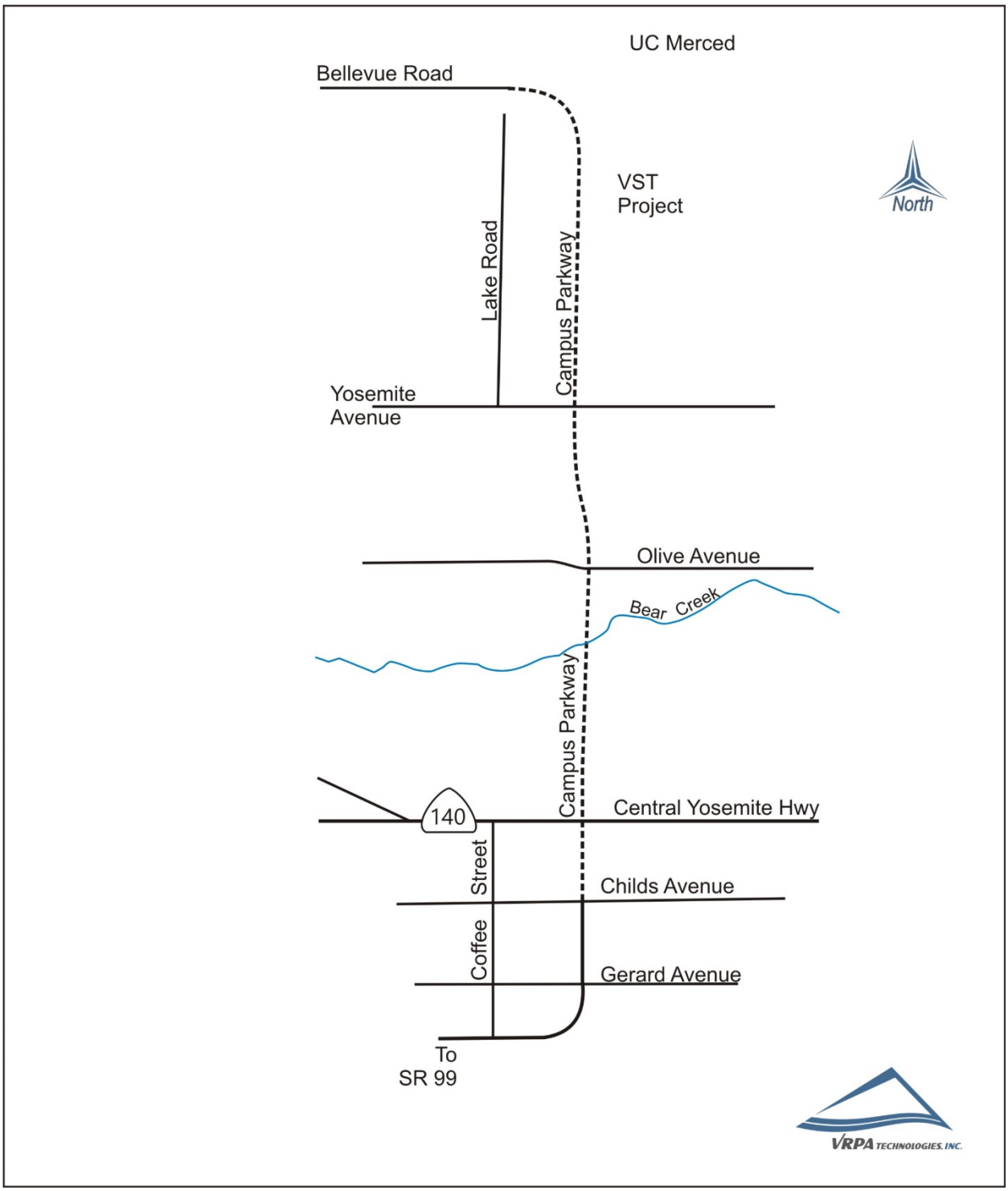
INTERSECTION ANALYSIS

All intersection LOS analyses will be estimated using Synchro 10 Software. The following inputs and parameters will be applied to accurately determine the travel delay and LOS for each study intersection:

- ✓ VRPA will conduct a field study of the specified intersections and segments to verify lane geometry and intersection control as well as to obtain other pertinent data such as signal timing and phasing, where applicable.
- ✓ Peak hour factors (PHF) for each intersection approach will be obtained from existing traffic counts and utilized for Existing Conditions, Existing Plus Project, and Near-term (Opening Year 2022) Conditions. For all future scenarios, a PHF of 0.92 will be applied
- ✓ Existing left- and right-turn storage pockets will be measured from aerial photography and incorporated into the synchro analysis
- ✓ Roadway link speed limits will be observed in the field and input into the Synchro network to determine roadway link speeds
- ✓ Heavy vehicle percentages will be applied based on the Highway Capacity Manual (HCM) default of 3%
- ✓ HCM 6th Edition outputs for delay and level of service will be utilized in the results
- ✓ Queuing conditions for left and right-turn lanes at all study intersections will be based upon Synchro outputs or Section 400 of Caltrans' Highway Design Manual. Synchro provides 95th percentile maximum queue lengths in feet which represents the maximum back of queue with 95th percentile traffic volumes

VST Specific Plan & Traffic Impact Study
Proposed Alignment for Campus Parkway

Figure 5



SB 743 ANALYSIS

In the fall of 2013, Senate Bill 743 (SB 743) was passed by the legislature and signed into law by the governor. Starting Jul 1, 2020, this legislation will change the way that transportation studies are conducted for environmental documents. Vehicle miles traveled (VMT) will be the new CEQA performance measure. There will be a comparison of the VMT that was projected to be generated by the UCP North area in the University Community Plan EIR to that from the proposed Project.

ROADWAY IMPROVEMENTS/SIGNIFICANCE CRITERIA

Roadway improvements will be generally be recommended wherever traffic operations worse than level of service D (LOS D) are expected in the PM peak hours. If requested by local agencies or Caltrans, consideration will be given to using a different threshold for roadway improvements (i.e. LOS C or LOS E). Following is background information regarding this issue. It should be noted that with the implementation of SB 743 on July 1, roadway congestion will no longer result in a significant impact under CEQA, but it is assumed that analysis of traffic congestion and roadway improvements will continue to be conducted as has been done previously.

An important goal is to maintain acceptable levels of service along the highway, street, and road network. To accomplish this, Merced County, the City of Merced, and Caltrans adopt minimum levels of service to control congestion that may result as new development occurs.

The 2030 Merced County General Plan establishes measures of performance for the county roadway systems. The General Plan identifies LOS 'D' during weekday peak hours in urban area and for rural connectors between urban areas (including freeways) and LOS 'C' for other rural roadways.

The City of Merced considers levels of service 'D' or better to be acceptable, while levels of service 'E' and 'F' are considered unacceptable. At unsignalized intersections where a substandard level of service exists, traffic signals would only be recommended if warrants for traffic signals are satisfied. The satisfaction of a traffic signal warrant does not, in and of itself, require the installation of a traffic signal. Safety and/or the overall operation of the intersection should be the basis of the installation of a traffic signal. Other improvements, such as the installation of dedicated left/right turning movements, should also be considered for the purpose of alleviating substandard levels of service at an intersection.

Based on guidance from Caltrans, the LOS for operating State highway facilities is based on Measures of Effectiveness (MOE) identified in the Highway Capacity Manual (HCM). 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 always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than this target LOS, the existing MOE should be maintained. In general, the region-wide goal for an acceptable LOS on all freeways, roadways segments, and intersections is "D". For undeveloped or not densely developed locations, the goal may be to achieve LOS "C".

If you have any questions or require further information, please contact Erik Ruehr or me. Erik can be reached at eruehr@vrpatechnologies.com or 858/361-7151. I can be reached at gvivian@vrpatechnologies.com or 559/259-9257.

Sincerely,

Georgiena M. Vivian
President

Attachment

ATTACHMENT

INTERNAL TRIP GENERATION CALCULATIONS

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	VST Project	**Organization:**	
Project Location:	Merced	**Performed By:**	VRPA Technologies, Inc.
Scenario Description:	Phase 1	**Date:**	3/30/2020
Analysis Year:	2025	**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	275,000	sf GFA	319	274	45
Retail	875	426,000	sf GFA	247	158	89
Restaurant	875	106,500	sf GFA	62	40	22
Cinema/Entertainment				0		
Residential	220, 225, 231	2,559	D.U.	902	215	687
Hotel				0		
All Other Land Uses[2]				0		
Total				1530	687	843

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.67			1.67		
Retail	1.67			1.67		
Restaurant	1.67			1.67		
Cinema/Entertainment						
Residential	1.67			1.67		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		250	250		500	
Retail					250	
Restaurant					250	
Cinema/Entertainment						
Residential		250	250			
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	1	0	2	0
Retail	3		19	0	39	0
Restaurant	1	15		0	7	0
Cinema/Entertainment	0	0	0		0	0
Residential	46	26	9	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,556	1,148	1,408
Internal Capture Percentage	14%	16%	13%
External Vehicle-Trips[3]	1,311	578	733
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	11%	24%
Retail	21%	41%
Restaurant	43%	62%
Cinema/Entertainment	N/A	N/A
Residential	13%	7%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	VST Project
Analysis Period:	**AM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.67	274	458	1.67	45	75
Retail	1.67	174	291	1.67	98	164
Restaurant	1.67	44	73	1.67	25	42
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.67	332	554	1.67	1069	1785
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		15	3	0	2	0
Retail	3		48	7	43	8
Restaurant	1	17		3	8	3
Cinema/Entertainment	0	0	0		0	0
Residential	71	738	369	0		54
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		23	1	0	22	0
Retail	142		21	0	255	0
Restaurant	137	146		0	89	0
Cinema/Entertainment	27	12	2		22	0
Residential	261	29	10	0		0
Hotel	0	6	4	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	75	383	458	229	0	0
Retail	61	230	291	138	0	0
Restaurant	32	41	73	25	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	53	501	554	300	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	18	57	75	34	0	0
Retail	67	97	164	58	0	0
Restaurant	26	16	42	10	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	110	1675	1785	1003	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	VST Project	**Organization:**	
Project Location:	Merced	**Performed By:**	VRPA Technologies, Inc.
Scenario Description:	Phase 1	**Date:**	3/30/2020
Analysis Year:	2025	**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	275,000	sf GFA	298	48	250
Retail	875	426,000	sf GFA	831	415	416
Restaurant	875	106,500	sf GFA	208	104	104
Cinema/Entertainment				0		
Residential	220, 225, 231	2,559	D.U.	1070	653	417
Hotel				0		
All Other Land Uses[2]				0		
Total				2407	1220	1187

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.67			1.67		
Retail	1.67			1.67		
Restaurant	1.67			1.67		
Cinema/Entertainment						
Residential	1.67			1.67		
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		250	250		500	
Retail					250	
Restaurant					250	
Cinema/Entertainment						
Residential		250	250			
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		55	3	0	8	0
Retail	14		50	0	181	0
Restaurant	5	71		0	31	0
Cinema/Entertainment	0	0	0		0	0
Residential	28	68	24	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	4,021	2,038	1,983
Internal Capture Percentage	27%	26%	27%
External Vehicle-Trips[3]	1,764	899	865
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	59%	16%
Retail	28%	35%
Restaurant	44%	61%
Cinema/Entertainment	N/A	N/A
Residential	20%	17%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	VST Project
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.67	48	80	1.67	250	418
Retail	1.67	458	765	1.67	458	765
Restaurant	1.67	115	192	1.67	115	192
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.67	981	1638	1.67	619	1034
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		82	16	0	8	0
Retail	15		222	31	199	38
Restaurant	6	79		15	35	13
Cinema/Entertainment	0	0	0		0	0
Residential	41	428	214	0		31
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		60	4	0	66	0
Retail	25		56	0	753	0
Restaurant	24	383		0	262	0
Cinema/Entertainment	5	31	6		66	0
Residential	46	75	26	0		0
Hotel	0	15	10	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	62	18	80	11	0	0
Retail	214	551	765	330	0	0
Restaurant	86	106	192	63	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	242	1396	1638	836	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	72	346	418	207	0	0
Retail	270	495	765	296	0	0
Restaurant	120	72	192	43	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	142	892	1034	534	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.