

VEHICLE MILES TRAVELED STUDY
**MISSION SAN MARCOS INDUSTRIAL PROJECT
(SDP22-0009)**
San Marcos, California
May 1, 2024

LLG Ref. 3-23-3760

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1.0 INTRODUCTION

Linscott, Law & Greenspan, Engineers (LLG) has prepared this Vehicle Miles Traveled (VMT) study to determine the potential VMT impacts for the San Marcos Industrial Project (hereafter referred to as “Project”). The Project proposes to redevelop the current site to construct 132,810 SF of warehouse use at 528 East Mission Road in the City of San Marcos.

The VMT analysis presented in this report includes the following:

- Project Description
- Vehicle Miles Traveled: Overview and Background
- VMT Significance Criteria and Methodology
- Project VMT Screening Assessment
- VMT Analysis

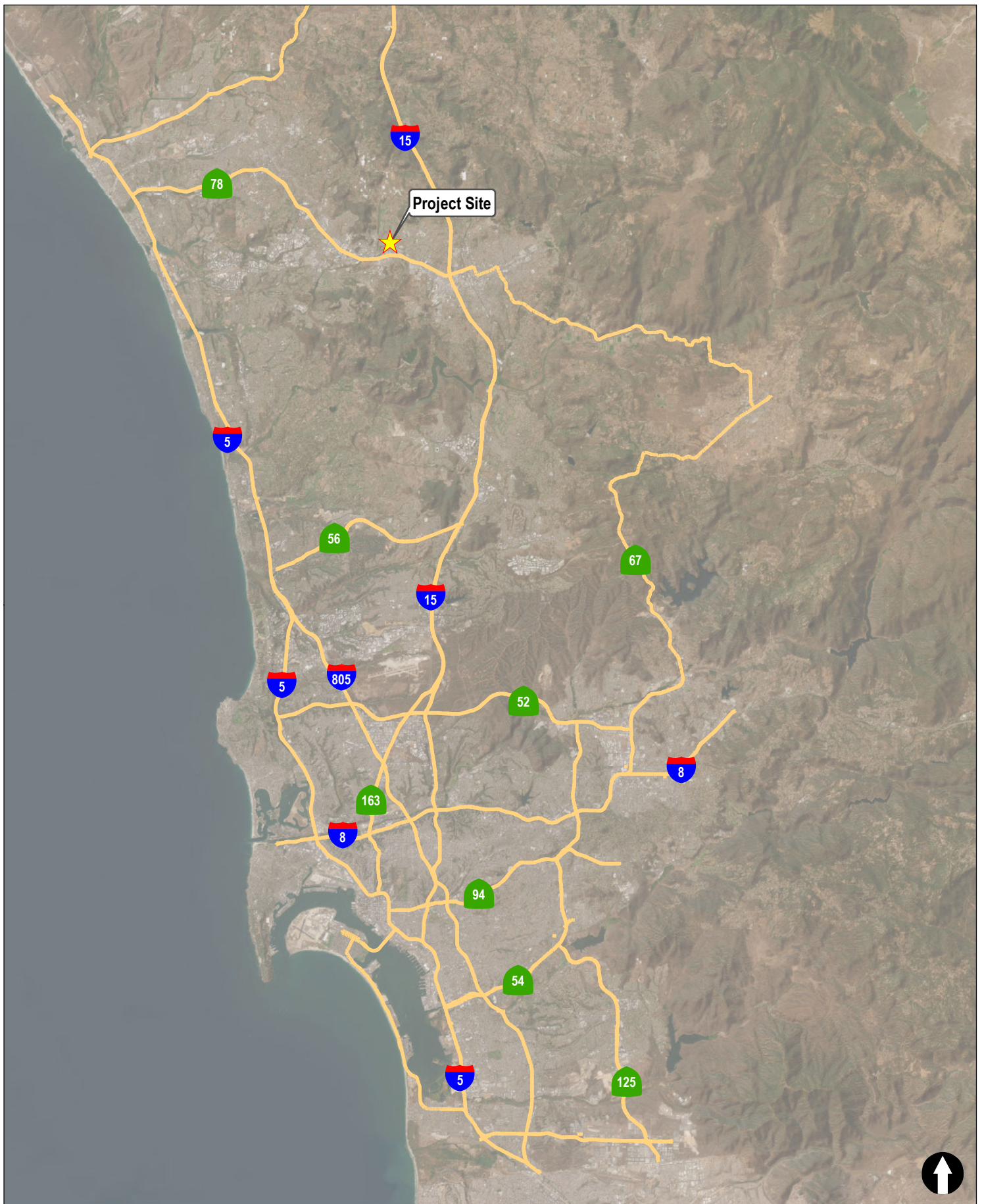
2.0 PROJECT DESCRIPTION

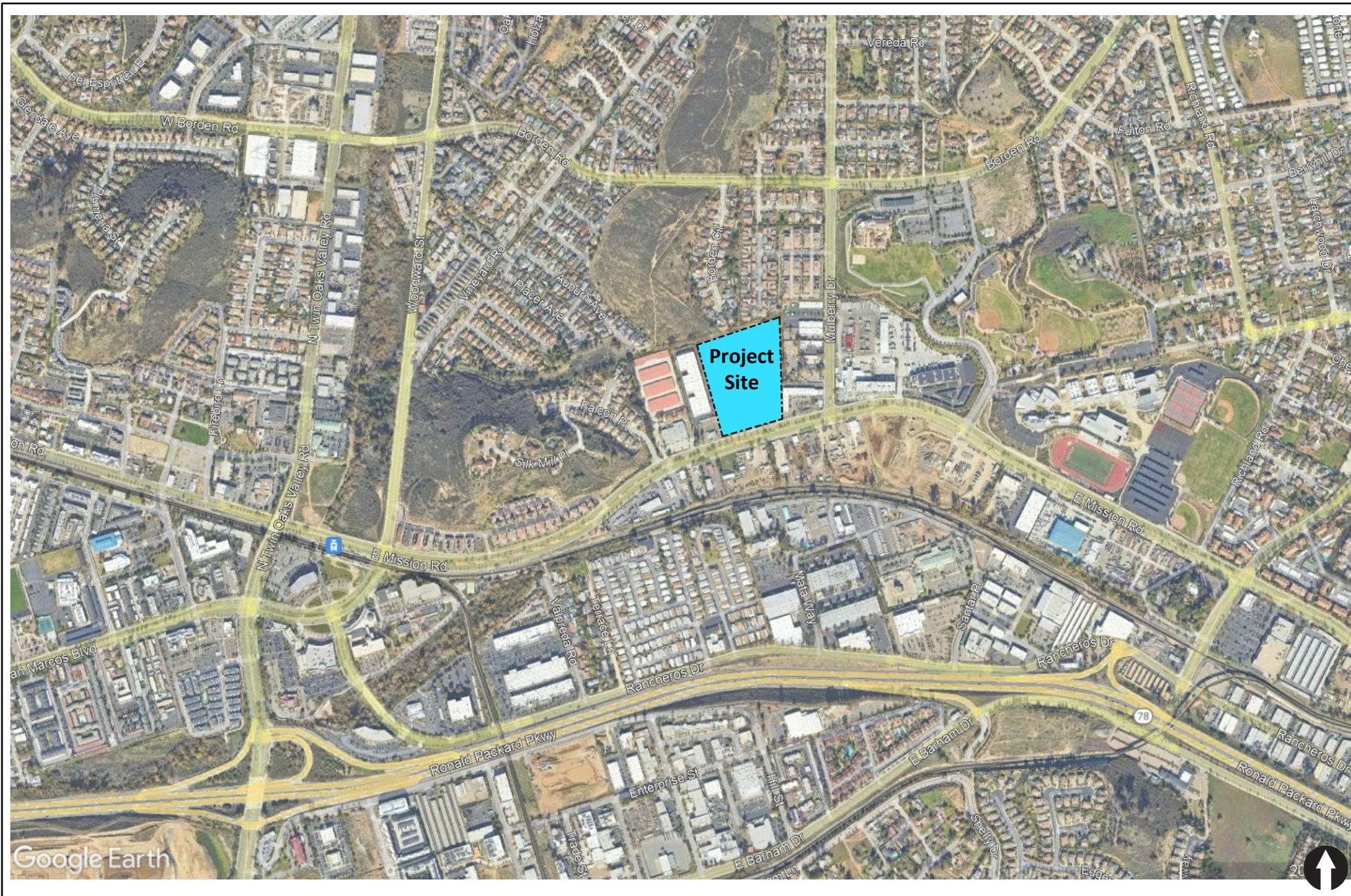
The Project is proposed on an approximately 10.8-acre site located at 528 East Mission Road in the eastern portion of the City of San Marcos on the northern side of East Mission Road between Falcon Place and Mulberry Drive. The Project site is currently developed with two buildings containing storage, workshop, and office space for a contractor business. Undeveloped open space remains in the northwestern portion of the site. The Project proposes the demolition of the two existing structures and their associated improvements and development of three warehouse buildings. The existing building to the west is approximately 55,765 SF and the building to the east is 46,529 SF, totaling 102,294 SF. The three proposed warehouse buildings would total approximately 132,810 SF and would include a total of 14 loading docks.

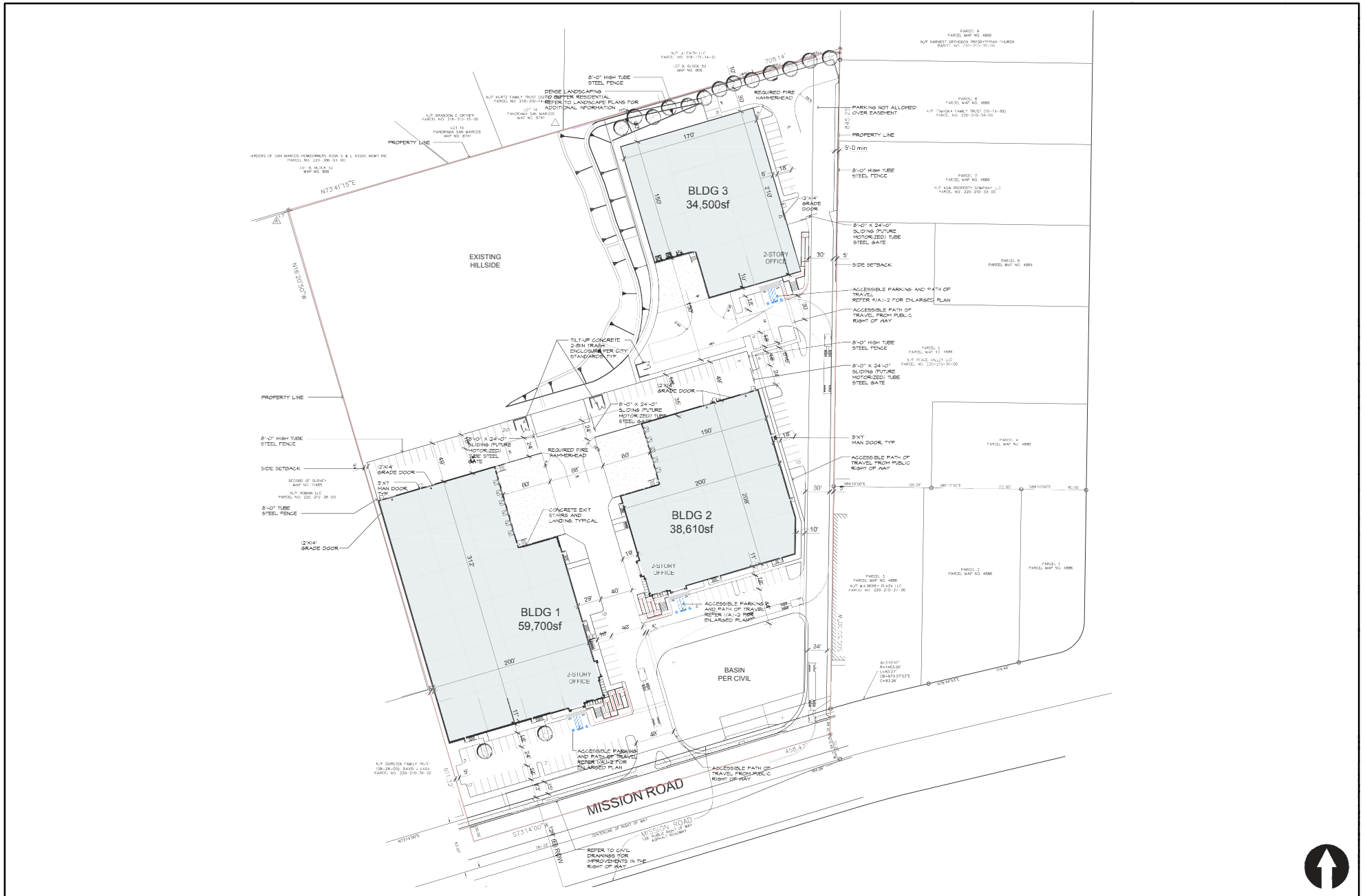
Vehicular circulation to and from the Project site would be provided via two driveways on East Mission Road, one at the eastern edge of this frontage and one in the central portion of the frontage. The central driveway would provide the only ingress to the Project site and would be divided with a median for ingress and egress. This driveway would be restricted to right-in, right-out only access given the existing median within East Mission Road in front of the Project site. The eastern driveway would be egress, right-out only and would terminate from a drive aisle along the entire eastern boundary of the Project site primarily providing access from Building 3. Parking for the Project would be provided in 141 parking stalls surrounding each of the three buildings.

The existing General Plan land use designation for the Project site is Neighborhood Commercial on the southeastern corner and Light Industrial across the remainder of the site. The site is zoned within the transitional zone for Light Industrial to Light Industrial and Neighborhood Commercial on the majority of the site and the transitional zone for Light Industrial to Neighborhood Commercial within the southeastern corner. No change to the existing land use or zoning designations for the site is proposed.

Figure 2–1 shows the Project vicinity. **Figure 2–2** shows a more detailed Project area map. **Figure 2–3** shows the Project site plan.







3.0 VEHICLE MILES TRAVELED: OVERVIEW AND BACKGROUND

This section presents background on an evaluation of potential transportation impacts of the Project per the California Governor's Office of Planning and Research (OPR) to implement California State Law Senate Bill (S.B.) 743 and the City's adopted *Transportation Impact Analysis (TIA) Guidelines* (dated November 16, 2020).

3.1 VMT Background

VMT is a measurement of miles traveled by vehicles within a specified region and for a specified time period. VMT measures the efficiency of the transportation network. VMT is calculated based on individual vehicle trips generated and their associated trip lengths. VMT accounts for two-way (round trip) travel and is often estimated for a typical weekday to measure transportation impacts.

3.2 Senate Bill 743

In September 2013, the Governor's Office signed SB 743 into law, starting a process that fundamentally changes the way transportation impact analysis is conducted under CEQA. These changes include the elimination of auto delay, level of service (LOS), and similar measurements of vehicular roadway capacity and traffic congestion as the basis for determining significant impacts. The guidance identifies VMT as the most appropriate CEQA transportation metric, along with the elimination of Auto Delay/LOS for CEQA purposes statewide. The justification for this paradigm shift is that Auto Delay/LOS impacts lead to improvements that increase roadway capacity and therefore induce more traffic and greenhouse gas emissions.

In December 2018, after over five years of stakeholder-driven development, the California Natural Resource Agency certified and adopted the CEQA Statute. As of July 1, 2020, the VMT guidelines are applicable statewide.

4.0 VMT SIGNIFICANCE CRITERIA & METHODOLOGY

4.1 Local / Regional Agency Transition to SB743

The City of San Marcos has adopted the TIA Guidelines that provides significance determination thresholds for VMT and VMT analysis methodologies. The City's TIA Guidelines were utilized as the basis for this VMT analysis.

4.2 Screening Criteria

Based on the TIA Guidelines, the requirement to prepare a detailed transportation VMT analysis applies to all land development projects except for those that meet at least one of the provided screening criteria. A project that meets at least one of the screening criteria listed below would be considered to have a less-than-significant impact due to some aspect of the project.

- Small Projects (less than 110 daily vehicle trips)
- Affordable Housing (100% deed restricted)
- Local Serving Retail and Public Facilities (50,000 square feet gross floor area or less)
- Adjacency to High-Quality Transit. A high-quality transit area is defined as the one-half mile walkshed around either of the following:
 - An existing major transit stop, defined as a site containing an existing rail transit station or the intersection of two or more bus routes with a combined frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods. In addition, a rail transit station must be within 0.25 miles of bus stops serving at least one bus route with individual service intervals no longer than 30 minutes during peak commute periods per route in order to qualify as a high-quality transit area.
 - An existing stop along a high-quality transit corridor, defined as a corridor with fixed route bus service with combined service intervals (gaps between buses serving the corridor) no longer than 15 minutes during peak commute hours.

However, this presumption does not apply if the project:

1. has a floor area ratio (FAR) of less than 0.75;
 2. includes more parking for use by residents, customers, or employees of the project than required by the City;
 3. is consistent with the City's current General Plan, as determined by the City; or, replaces affordable residential units with a smaller number of moderate- or high-income residential units.
- Map-Based Screening (projects located in VMT efficient areas): Residential and employment projects that are proposed in areas that generate VMT below adopted City thresholds can be presumed to have a less-than-significant transportation impact and would not require a detailed VMT analysis. This determination must be made using the San Diego Association of Governments (SANDAG) online residential and employment VMT maps, which show

census tracts in the city where the VMT is below the regional average. The following types of projects could be screened out using this approach:

- Residential projects proposed in census tracts with residential VMT per capita below the City's threshold of exceeding 85 percent of the SANDAG regional average
- Employment projects (including industrial) proposed in census tracts with work VMT per employee below the City's threshold of exceeding 85 percent of the SANDAG regional average

4.3 Mitigation Measures and Strategies for VMT Reduction

If a project is not presumed to have a less than significant VMT impact due to some aspect of the project, then it is considered to have a significant impact and will require mitigation measures and strategies.

5.0 PROJECT VMT SCREENING ASSESSMENT

Based on the screening criteria described in *Section 4.2*, the Project is not screened out from performing a VMT analysis. **Table 5–1** summarizes the Project applicability of the TSM screening criteria.

TABLE 5–1
VMT SCREENING CRITERIA – PROJECT APPLICABILITY

Screening Criteria	Applicable to the Project?	Project Screens Out?
1. Small Project	No	–
2. Affordable Housing	No	–
3. Local-Serving Retail or Public Facility	No	–
4. Located in a High-Quality Transit Area	No	–
5. Located in Low VMT Area	Yes	No

General Notes:

1. Source: City of San Marcos TIA Guidelines, November 16, 2020.

Screening Criteria 5:

Located in Low VMT Area: Employment projects proposed in census tracts with work VMT per employee below the City's threshold of exceeding 85 percent of the SANDAG regional average would be screened out of further analysis.

The Project is not located in a VMT efficient area (15% or more below the base year average household VMT/employee) based on the applicable location-based screening map produced by SANDAG. The San Diego average regional VMT/employee is 18.9 (and 15% below 18.9 would equate to 16.0) per SANDAG Series 14 (Year 2016) data.

Using the SANDAG screening map for employee projects, the Project is located in census tract 200.23 and would be expected to generate 17.2 VMT/employee. This equates to 91.0% of the regional average VMT/employee. Hence, the Project would have a significant VMT impact. **Table 5–2** shows the VMT analysis results. As shown in *Table 5–2*, the Project is 6.98% over the City's VMT threshold. **Appendix A** includes the result of the SANDAG map.

**TABLE 5-2
VMT ANALYSIS RESULTS**

VMT per Employee		
Geography	VMT per Employee	Exceeds Threshold?
San Diego Region	18.9	—
<i>Significance Threshold (85% of Regional Average VMT)</i>	16.0	—
Project Site		
Project Site	17.2	Yes
% Over / VMT Over	6.98%	

Source: SANDAG San Diego Region SB743 VMT Maps

6.0 VMT ANALYSIS

As mentioned in *Section 4.2*, if the project average exceeds 85% of the regional average, mitigation measures to avoid or reduce the impact are required and discussed below.

The City's TIA Guidelines contain Attachment C: VMT Mitigation, which present several quantifiable VMT reduction strategies that can be used to reduce a project's VMT impacts. The VMT reduction strategies are quantified using methodologies described in the *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* published by the California Air Pollution Control Offices Association (CAPCOA) in December 2021.

Upon review of the various strategies, the "Increase Site Density" under the Project Tier: Land Use and Location category was identified for the Project to implement to reduce the Project VMT/employee to below a level significance.

Appendix B contains Attachment C of the City's TIA Guidelines and excerpts from the CAPCOA handbook.

Project Tier: Land Use and Location – Increase Site Density

Using *Table 1: Applicable VMT Reduction Strategies* in the City's TIA Guidelines, a reduction of up to 30.0% can be presumed when implementing the "Increase Site Density" VMT reduction strategy under the "Project Tier: Land Use and Location" category. Per this mitigation measure, a VMT reduction is achieved by a project that is designed with a higher density of employment per acre for the project site over what is currently present.

As mentioned in *Section 2.0*, the Project proposes to construct three warehouse buildings for a total of approximately 132,810 SF. The Project site is currently developed with two buildings containing storage, workshop, and office space for a contractor business. The Project proposes the demolition of the two existing structures and their associated improvements. The existing building to the west is approximately 55,765 SF and the building to the east is 46,529 SF, totaling 102,294 SF.

The Project VMT reduction for the increase site density is shown in **Table 6–2**. Using the inputs shown in *Table 6–2* and the formula for CAPCOA Measure T-2 (GHG Reduction Formula: $A = [(B - C) / C] \times D$), the calculation shown below equates to a Project VMT reduction of 25.46%.

Peak hour traffic counts were conducted at the existing driveway during the AM (7:30 – 8:30 AM) and PM (4:45 – 5:45 PM) peak hours on Tuesday, December 5, 2023. The counted volumes were lower than calculated volumes for a warehouse land use of the same size. Therefore, in order to apply adequate variable values in the CAPCOA formula and determine the appropriate VMT reduction, job density adjustments were made as shown below.

VMT REDUCTION CALCULATIONS

Job Density Calculations

Proposed Development

Development Density: $132,810 \text{ SF} / 10.8 \text{ acres} = 12,297.22 \text{ SF/acre}$

Job Density (B): $[(12,297.22 \text{ SF/acre}) / (300 \text{ SF/emp})] \times 1.0 \text{ SF/acre} = \underline{40.99} \text{ emp/acre}$

- Where the job density is based on the calculated density of a development with a floor-area ratio of 1.0 and 300 SF of building space per employee.

Existing (to be demolished)

Unadjusted

Existing Density: $102,294 \text{ SF} / 10.8 \text{ acres} = 9,471.67 \text{ SF/acre}$

Job Density (C): $[(9,471.67 \text{ SF/acre}) / (300 \text{ SF/emp})] \times 1.0 \text{ SF/acre} = 31.57 \text{ emp/acre}$

Adjusted (to account for low existing usage of buildings)

Observed Peak Hour Volume = 9 vehicles (AM Peak Hour, see *Table 6-1*)

Calculated AM Peak Hour Volume If Full Usage = 66 vehicles

- Existing usage is approximately 14% of full usage warehouse (9 vehicles / 66 vehicles)
- Therefore, applying the 14% to 31.57 emp/acre would equate to 4.42 emp/acre. To be conservative, this value was doubled equaling to 8.84 emp/acre.

VMT Reduction

$A = [(B - C) / C] \times D = [(40.99 - 8.84) / 8.84] \times -0.07 = \underline{-25.46\%}$

- Where D is the elasticity of VMT with respect to job density constant of -0.07.

**TABLE 6-1
PROJECT TRIP GENERATION**

Land Use	Size	Daily Trip Ends (ADTs)		AM Peak Hour					PM Peak Hour				
		Rate ^a	Volume	% of ADT	In:Out Split	Volume			% of ADT	In:Out Split	Volume		
						In	Out	Total			In	Out	Total
Proposed													
Warehousing	132,810 SF	5/KSF ^b	664	13%	70:30	60	26	86	15%	40:60	40	60	100
Existing (to be demolished)													
Industrial / Warehousing	102,294 SF	— ^c	38	— ^c		5	4	9	— ^c		0	1	1
Net Total			626			55	22	77			40	59	99

Footnotes:

- Rate is based on SANDAG's (Not So) Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002
- Based on warehousing rate of 5/1,000 SF
- Conducted AM (7:30 – 8:30 AM) and PM (4:45 – 5:45 PM) peak hour counts at the existing driveway on Tuesday, December 5, 2023. ADT was calculated assuming the average AM and PM peak hour percent for industrial land use of 13%.

**TABLE 6-2
VMT REDUCTION MEASURE T-2. INCREASE JOB DENSITY**

ID	Variable	Value	Source
Output			
A	Percent reduction in GHG emissions from project VMT in study area	-30.0%	calculated
User Inputs			
B	Job density of project development	40.99	user input
Constants, Assumptions, and Available Defaults			
C	Job density of typical development	8.84	site-specific
D	Elasticity of VMT with respect to job density	-0.07	Stevens 2016

Further explanation of key variables:

- (A) – GHG Reduction Formula: $A = [(B - C) / C] \times D$
- (B) – Job density of project development. The job density is based on the calculated density of a development with a floor-area ratio of 1.0 and 300 SF of building space per employee.
- (C) – Baseline job density.
- (D) – A meta-regression analysis of two studies that controlled for self-selection found that a 0.07 percent decrease in VMT occurs for every 1 percent increase in job density (Stevens 2016).

General Note:

- Source: CAPCOA (2021).

Applying the discussed VMT reduction strategy would result in the Project's calculated VMT per employee to reduce to 12.82 as shown in **Table 6-3**, falling below the threshold of significance, and resulting in a less than significant CEQA VMT impact.

**TABLE 6-3
VMT REDUCTION CALCULATIONS**

Reduction Measure	Range of Effectiveness	VMT Reduction Used
<i>VMT Reduction Strategy</i>		
Project Tier: Land Use and Location – Increase Site Density	Up to 30.0%	25.46%
Results		
Regional Average VMT per Employee ^a		18.9
Threshold of Significance (85% of Regional Average VMT per Employee) ^a		16.0
Project VMT per Employee (pre-VMT reduction measures) ^a		17.2
Project VMT per Employee (post-VMT reduction measures) (17.2 x [1-25.46%])		12.82
Above Level of Significance?		No

Footnotes:

a. See Table 5-1.

TECHNICAL APPENDICES
MISSION SAN MARCOS INDUSTRIAL PROJECT
(SDP22-0009)
San Marcos, California
May 1, 2024

LLG Ref. 3-23-3760

APPENDICES

APPENDIX

- A. SANDAG VMT Screening Map
- B. City of San Marcos TIA Guidelines Attachment C: VMT Mitigation; Excerpts from CAPCOA's Handbook

APPENDIX A

SANDAG VMT SCREENING MAP

Find address or place



Filter

San Diego Region SB743 VMT Maps ☒

Forecast / ABM Version is
ABM2+ / 2021 RP

Residents/Employees is
Employees

Geography is
Census Tract

Year is
2016

2016 VMT Per Employee by Census Tract

Geography	Census Tract
Name	200.23
Residents/Employees	Employees
Persons	4,819
VMT per Capita	17.2
Percent of Mean	91.0%

[Zoom to](#) ***

Map Legend / Disclaimer

Map Legend

Percent of Mean

- More than 125% of Regional Mean
- 100% to 125% of Regional Mean
- 85% to 100% of Regional Mean
- 50% to 85% of Regional Mean
- Less than 50% of Regional Mean
- No Data
- Not Enough Data

Current Data

- 2016 - ABM2+ / 2021 RP (Scenario ID 458)**
Regional Mean = 18.9 VMT per Resident
Regional Mean = 18.9 VMT per Employee
- 2025 - ABM2+ / 2021 RP (Scenario ID 462)**
Regional Mean = 17.7 VMT per Resident
Regional Mean = 17.0 VMT per Employee
- 2035 - ABM2+ / 2021 RP (Scenario ID 475)**
Regional Mean = 16.6 VMT per Resident
Regional Mean = 15.3 VMT per Employee
- 2050 - ABM2+ / 2021 RP (Scenario ID 459)**
Regional Mean = 16.0 VMT per Resident
Regional Mean = 14.3 VMT per Employee

Archived Data

- 2016 - ABM2 / 2019 RTP (Scenario ID 434)**
Regional Mean = 19.0 VMT per Resident
Regional Mean = 27.2 VMT per Employee

Disclaimer

The maps provided by SANDAG are an interpretation of the Senate Bill 743 Technical Advisory guidelines published by the California Office of Planning and Research and are provided as a resource to the jurisdictions in the San Diego region to use as they see fit. Users of the data should exercise their professional judgment in reviewing, evaluating and analyzing VMT reduction estimate results from the tool. Each agency

2.1.3. VMT Methodology, Metrics, and Significant Impact Thresholds

For new land use developments which do not meet any of the screening criteria, the City has adopted quantitative VMT thresholds. The significance thresholds and specific VMT metrics used to indicate a significant transportation are described by land use type in Table 2 and detailed in this section.

Table 2: Impact Thresholds by Land Use Type

Land Use Type	Impact Threshold
Residential Uses	A significant impact will occur if the project generates VMT per resident exceeding a level of 15 percent below the existing countywide average.
Employment Projects (including office and industrial)	A significant impact will occur if the project generates VMT per employee exceeding a level of 15 percent below the existing countywide average.
Retail Uses	A significant impact will occur if the project would result in a net increase in existing total citywide VMT.
Mixed-Use Projects	Evaluate each component of a mixed-use project independently and apply the significance threshold for each land use type, incorporating internalization reductions.
Redevelopment Projects (replaces existing uses)	If the project results in a net increase in VMT, apply the appropriate significance threshold for the project land use type(s).

While residential, office, and retail projects tend to be the most common land use projects requiring a VMT analysis, land use projects consisting of other uses may require a VMT analysis. Guidance for other land uses is listed below:

- ▶ Hotel: Use employment project threshold
- ▶ Medical Office: Use employment project threshold
- ▶ School³/College: Use retail threshold
- ▶ Large event centers, arenas, convention centers, and similar uses: Use retail threshold
- ▶ Recreational Facilities: Use retail threshold
- ▶ Churches and Other Religious Institutions: Use retail threshold

When considering metrics and thresholds for other land uses not listed above, the project applicant shall consult with City staff. For these other uses, the City will make the final determination on a case-by-case basis on the appropriate metric(s) and threshold(s). The City will require analyzing the

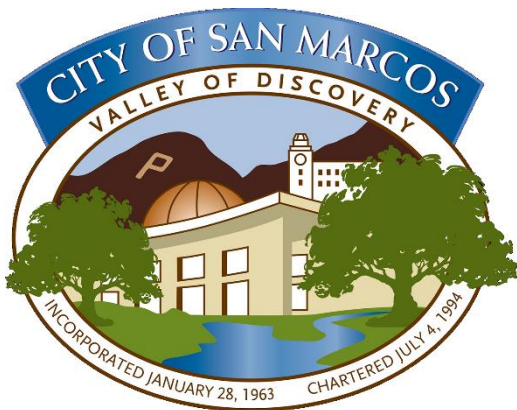
³ Note, local-serving neighborhood public schools would be screened out per Section 2.1.2.3.

APPENDIX B

CITY OF SAN MARCOS TIA GUIDELINES ATTACHMENT C: VMT MITIGATION; EXCERPTS FROM CAPCOA'S HANDBOOK

TRANSPORTATION IMPACT ANALYSIS GUIDELINES

City of San Marcos, CA



November 16, 2020

Attachment C: VMT Mitigation

Table 1: Applicable VMT Reduction Strategies

Tier and Category	Mitigation Measure	Description	Maximum VMT Reduction	Land Use Applicability	Implementation Body/Method	Source
Project Tier: Land Use and Location	Increase Site Density	This measure increases the density of households and employment per acre for the project site over what was used in the initial project VMT estimation. Density can be measured in terms of jobs, residents, employees, or dwelling units per unit area. Floor area ratio may be used as a proxy for employment, when employment is not known, or when considering non-office commercial developments.	Up to 30%	Residential, Office, Retail	Developer, City	CAPCOA (1.1)
	Increase Site Diversity	This measure involves improving the mix of uses and jobs/housing balance within a project or a planning area, incorporating a range of complementary land uses that provide a balanced development approach relative to the surrounding neighborhood and encourage shorter trips and transportation alternatives.	Up to 30%	Residential, Office, Retail	Developer, City	SANDAG (2B)
	Major Transit Center Accessibility	This measure locates a project within half a mile or a ten minute walk of a major transit center, defined as a rail transit station or a bus rapid transit station, but can be any transit stop with frequent service (5 to 15 minute headways) and significant transfer opportunities to other transit routes. Residential and commercial centers designed around rail and bus stations are known as Transit-Oriented Development and contain bike and pedestrian access.	Up to 14.4%	Residential, Office, Retail	Developer, City	SANDAG (2A)
	Integrate Affordable Housing	This measure incorporates a higher proportion of affordable housing within the residential portion of a project, subdivision, or a planning area. Income has a statistically significant effect on whether someone will drive a single-occupant vehicle to work or for other trip purposes.	Up to 32.5% of home VMT	Residential, Office, Retail	Developer, City	San Jose (PC-003)
Project Tier: Commute Demand Management Strategies	Voluntary Employer Commute Program	This measure consists of a variety of measures to reduce single-occupant vehicle commuting through an employer, such as carpool/vanpool programs, subsidized transit passes, preferential carpool parking, bicycle facilities, and flexible work schedules. Unlike a mandatory program, this strategy does not require monitoring, reporting, or performance standards. Note, this measure cannot be analyzed in combination with a mandatory employer commute program. In addition, separate commute demand management measures should not be analyzed if already included under this measure.	Up to 6.2% of work VMT	Office, Retail	Tenant	SANDAG (1A)

Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity

Designed for Local Governments, Communities, and Project Developers



T-2. Increase Job Density



GHG Mitigation Potential



Up to 30.0% of GHG emissions from project VMT in the study area

Co-Benefits (icon key on pg. 34)



Climate Resilience

Increased density can put people closer to resources they may need to access during an extreme weather event. Increased density can also shorten commutes, decreasing the amount of time people are on the road and exposed to hazards such as extreme heat or flooding.

Health and Equity Considerations

Increased job density may increase nearby housing prices. Jurisdictions should consider the jobs-housing balance and consider measures to reduce displacement and increase affordable housing.

Measure Description

This measure accounts for the VMT reduction achieved by a project that is designed with a higher density of jobs compared to the average job density in the U.S. Increased densities affect the distance people travel and provide greater options for the mode of travel they choose. Increasing job density results in shorter and fewer trips by single-occupancy vehicles and thus a reduction in GHG emissions.

Subsector

Land Use

Locational Context

Urban, suburban

Scale of Application

Project/Site

Implementation Requirements

This measure is most accurately quantified when applied to larger developments and/or developments where the density is somewhat similar to the surrounding neighborhood.

Cost Considerations

Areas with increased job density generally have higher economic gross metropolitan product (GMP) and job growth. Prosperity, measured as GMP per job, also grows faster in areas with increased job density. Decreased commute times and car use may also generate funds for public transit and reduce the need for infrastructure spending on road maintenance.

Expanded Mitigation Options

When paired with Measure T-1, *Increase Residential Density*, the cumulative densification from these measures can result in a highly walkable and bikeable area, yielding increased co-benefits in VMT reductions, improved public health, and social equity.





GHG Reduction Formula

$$A = \frac{B - C}{C} \times D$$

GHG Calculation Variables

ID	Variable	Value	Unit	Source
Output				
A	Percent reduction in GHG emissions from project VMT in study area	0–30.0	%	calculated
User Inputs				
B	Job density of project development	[]	jobs per acre	user input
Constants, Assumptions, and Available Defaults				
C	Job density of typical development	145	jobs per acre	ITE 2020
D	Elasticity of VMT with respect to job density	-0.07	unitless	Stevens 2016

Further explanation of key variables:

- (C) – The jobs density is based on the calculated density of a development with a floor-area ratio of 1.0 and 300 square feet (sf) of building space per employee:

$$\frac{43,560 \frac{\text{sf}}{\text{acre}}}{300 \frac{\text{sf}}{\text{employee}}} \times 1.0 \frac{\text{sf}}{\text{acre}} = 145 \frac{\text{employees}}{\text{acre}}$$

If reductions are being calculated from a specific baseline derived from a travel demand forecasting model, the job density of the relevant transportation analysis zone should be used for this variable instead of the default value presented above.

- (D) – A meta-regression analysis of two studies that controlled for self-selection found that a 0.07 percent decrease in VMT occurs for every 1 percent increase in job density (Stevens 2016).

GHG Calculation Caps or Maximums

Measure Maximum

(A_{max}) The percent reduction in GHG emissions (A) is capped at 30 percent. The purpose for the 30 percent cap is to limit the influence of any single built environmental factor (such as density). Projects that implement multiple land use strategies (e.g., density, design, diversity) will show more of a reduction than relying on improvements from a single built environment factor.



Subsector Maximum

($\sum A_{\text{maxT-1 through T-4}} \leq 65\%$) This measure is in the Land Use subsector. This subcategory includes Measures T-1 through T-4. The VMT reduction from the combined implementation of all measures within this subsector is capped at 65 percent.

Example GHG Reduction Quantification

The user reduces VMT by increasing the job density of the project study area. In this example, the project's job density would be 400 jobs per acre (B), which would reduce GHG emissions from project VMT by 12.3 percent.

$$A = \frac{400 \frac{\text{job}}{\text{acre}} - 145 \frac{\text{job}}{\text{acre}}}{145 \frac{\text{job}}{\text{acre}}} \times -0.07 = -12.3\%$$

Quantified Co-Benefits



Improved Local Air Quality

The percent reduction in GHG emissions (A) would be the same as the percent reduction in NO_x, CO, NO₂, SO₂, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.



Energy and Fuel Savings

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).



VMT Reductions

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A).

Sources

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