APPENDIX L-1
VEHICLE MILES TRAVELED ANALYSIS

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CITY OF ENCINITAS
Marea Village Mixed-Use
(Hotel, Residential, Commercial)
1900 N. Coast Highway 101
May 26, 2022

Vehicle Miles Traveled Analysis

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1.0 Introduction

A Vehicle Miles Traveled (VMT) analysis is required to satisfy the California Environmental Quality Act (CEQA) guidelines that utilize VMT as the measure of mobility effectiveness for determining transportation impacts.

The proposed mixed-use project includes a 34-room resort hotel, 94 multi-family units, and 18,261 square feet of commercial/retail space. The project is located on the westside of North Coast Highway 101 approximately 500 feet south of La Costa Avenue, in the City of Encinitas, California. The project will replace existing commercial/retail land uses. The regional location of the project is shown in **Figure 1**. A site plan is shown in **Figure 2.**

This report describes the VMT analysis methodology, significant criteria, and potential mitigation measures. The format of this study includes the following chapters:

1.0 Introduction
2.0 Vehicle Miles Traveled Methodology
3.0 Project Description and Setting
4.0 VMT Analysis
5.0 VMT Mitigation Measures
6.0 Conclusions

Figure 1: Project Location

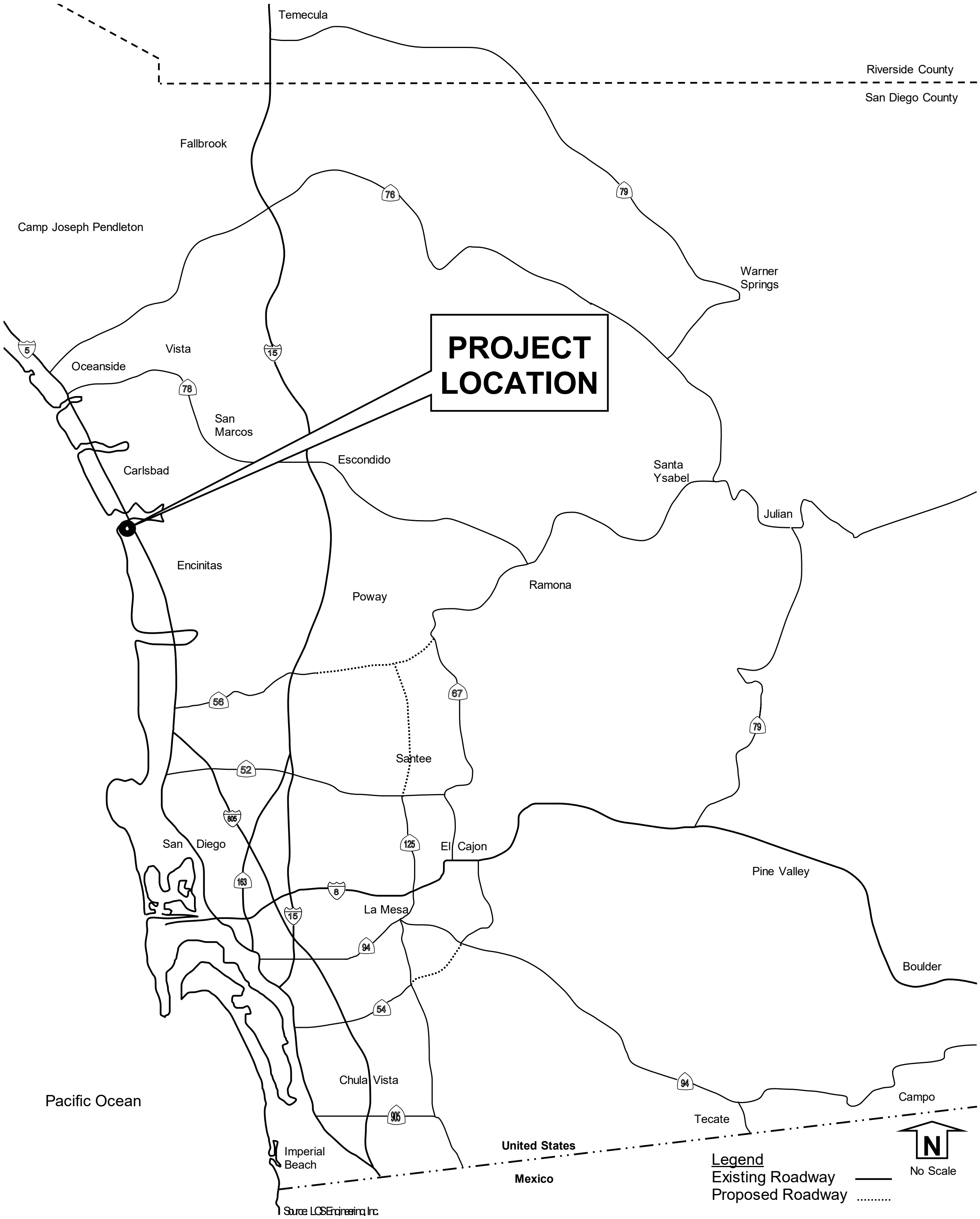
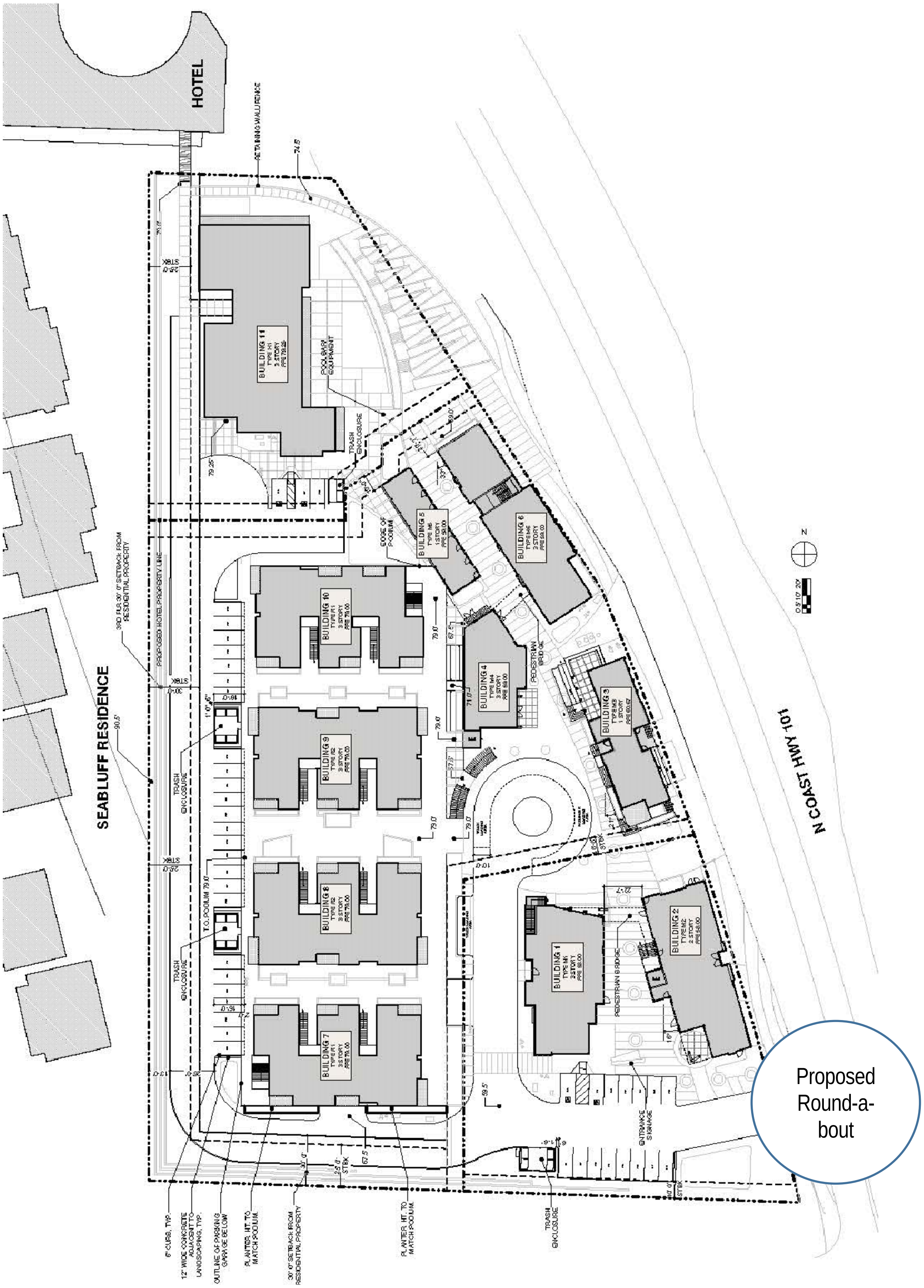


Figure 2: Site Plan



Source: Stephen Dalton Architects

2.0 Vehicle Miles Traveled Methodology

The California Governor's Office of Planning and Research (OPR) Technical Advisory developed guidance on implementing Senate Bill 743 (SB 743) to determine if a project may result in a transportation impact.

The OPR *Transportation Technical Advisory on Evaluating Transportation Impacts in CEQA*, December 2018 states on page 8 "As noted above, lead agencies have the discretion to set or apply their own thresholds of significance". The OPR Technical Advisory is included in **Appendix A**.

City of Encinitas Engineering Staff have requested the VMT analysis to be based on the local San Diego Institute of Transportation Engineers (ITE) *Guidelines for Traffic Impact Studies in the San Diego Region*, May 2019. The ITE Guidelines are included in **Appendix B**.

2.1 San Diego ITE VMT Guidelines and Significance Criteria

The San Diego ITE Guidelines use VMT per capita and VMT per employee to define a significant transportation impact when a project exceeds a level of 85% of the regional mean. The ITE Guidelines state on page 4-4:

> "It is recommended that if the project average is lower than either 85% of the regional average or 85% of the average for the city or community in which the project is located, the VMT impacts of the project can be presumed to be less than significant."

2.2 Analysis Metrics

The San Diego ITE Guidelines recommend that VMT thresholds for SB 743 analysis use VMT/capita (for residential projects) and/or VMT/employee (for employment projects) to determine transportation related impact. The following definitions are from the San Diego Association of Governments (SANDAG):

1) VMT/Capita represents the average amount of personal, non-commercial, vehicle travel made on an average weekday by each resident who lives within a geographic boundary.

2) VMT/Employee represents the average amount of personal, non-commercial, vehicle travel made on an average weekday by each resident employee whose employment/work location is within a geographic boundary and it includes all travel made by the employee, not just community to work, and includes those individuals who telecommute to their work location.

2.3 CEQA Analysis Methodology

The San Diego ITE Guidelines outline screening criteria and thresholds for determining the required level of VMT analysis.

1) Projects inconsistent with the General Plan or Community Plan that generate up to 500 Average Daily Trips (ADT) are not required to prepare a VMT Analysis and the VMT impacts are presumed to be less than significant.

2) Projects consistent with the General Plan or Community Plan that generate up to 1,000 ADT are not required to prepare a VMT Analysis and the VMT Impacts are presumed to be less than significant.

3) Projects that generate between 1,000 ADT and 2,400 ADT are required to prepare a VMT analysis using the San Diego Association of Governments (SANDAG) San Diego Region SB743 maps.

4) Projects that generate greater than 2,400 ADT are required to prepare a VMT analysis using the SANDAG Regional Model.

3.0 Project Description and Setting

The proposed mixed-use project includes a 34-room resort hotel, 94 multi-family units, and 18,261 square feet of commercial/retail space. The project will replace active commercial/retail land uses that include Roberto's fast-food restaurant (1,202 SF of building and outdoor seating areas), and three retail businesses (2,249 SF of buildings).

3.1 Project Trip Generation

Project traffic generation was calculated using the San Diego Association of Governments (SANDAG) trip rates from the *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region*, April 2002. The project site has active uses creating traffic; therefore, a traffic credit was applied because the existing uses will be replaced by the project. Additionally, the existing and proposed project have pass-by trips already on the study roadways. The project is calculated to generate a net increase of 1,173 ADT as shown in **Table 1**.

TABLE 1: PROJECT TRAFFIC GENERATION

Land Uses	Rate		Size & Units		ADT
Proposed project					
Resort Hotel	10	/Room	34	Rooms	340
Multi-Family (>20 du/acre)	6	/DU	94	DU	564
Specialty Retail/Strip Commercial	40	/KSF	8,584	SF	343
Restaurant (sit down high turnover)	160	/KSF	3,905	SF	625
Restaurant (quality)	100	/KSF	2,134	SF	213
Office	20	/KSF	3,638	SF	73
Project Driveway Trips:					**2,158**
Pass-By Trips per SANDAG rates (Existing trips already on Coast Hwy)					
Specialty Retail (Pass-By=15% ADT & AM; 10% PM):					-52
Restaurant High Turnover (Pass-By=12% ADT & AM; 20% PM):					-75
Restaurant Quality (Pass-By=12% ADT & AM; 10% PM):					-26
Office (Pass-By=4% ADT, AM & PM):					-3
Project Primary & Diverted Trips:					*2,003*
Existing use to be removed					
Restaurant (Roberto's fast food)	700	/KSF	1,202	SF	841
Specialty Retail/Strip Commercial	40	/KSF	2,249	SF	90
Credit For Existing Use Driveway Trips:					*931*
Pass-By Trips per SANDAG rates (Existing trips already on Coast Hwy)					
Restaurant Fast Food (Pass-By=12% ADT&AM, 40%PM):					-101
Credit For Existing Use Primary & Diverted Trips:					*830*
Net Change in Primary & Diverted Trips (project - credit):					***1,173***

Source: SANDAG *Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region,* April 2002. SF - Square Feet.
ADT - Average Daily Traffic. Split-percent inbound and outbound. Spreadsheet rounding may result in ±1 to the above numbers.

3.2 Project Setting

The project will be served by adjacent bus stops, pedestrian points of access, adjacent bike lane/route, and a roundabout on N. Coast Highway 101 for vehicular access.

3.2.1 Transit

The North County Transit District has bus stops adjacent to the project for Bus Route 101 that runs from the Oceanside Transit Center down to the University Town Center in San Diego. The project is located approximately 2.5 miles from NCTD's Encinitas coaster station that can be reached using Route 101 service. The SANDAG May 2016 Smart Growth Concept Map identifies a year 2050 rapid transit service line on Coast Highway adjacent to the project.

3.2.2 Pedestrian

As part of the project, a sidewalk will be constructed/re-constructed along the project frontage that will provide multiple pedestrian access points for the project. Additionally, an on-site pedestrian connection will be included between the project and the hotel located immediately north of the site.

3.2.3 Bike

Adjacent to the project, there is currently a northbound Class II bike lane and southbound intermittent bike "Sharrow" markings. The City's Streetscape improvement project along N. Coast Hwy 101 will provide bikes lanes in both direction along the project frontage.

3.2.4 Vehicle

Project traffic will utilize the surrounding roadways, which include:

Carlsbad Boulevard from Avenida Encinas to La Costa Ave is mostly constructed as a four (4) lane divided roadway with two travel lanes in each direction. There are no sidewalks on this segment. The posted speed limit is 50 Miles Per Hour (MPH).

La Costa Avenue from North Coast Highway 101 to I-5 is currently constructed as a two (2) lane roadway with one travel lane in each direction. Bike lanes are provided on both sides of the roadway. There are no sidewalks on this segment. The posted speed limit is 40 MPH.

North Coast Highway 101 from the City of Carlsbad limits to La Costa Avenue is constructed as a four (4) lane divided roadway. North Coast Highway 101 from La Costa Avenue to approximately 600 feet south of La Costa Avenue is generally built as a four (4) lane divided roadway with bike lanes in each direction. North Coast Highway 101 from approximately 600 feet south of La Costa Avenue to Leucadia Blvd is generally built as a three (3) lane divided roadway with 1 northbound and 2 southbound lanes. Parking is generally permitted. The posted speed limit is 35 MPH.

4.0 VMT Analysis

According to the San Diego ITE Guidelines, the project with a net change in trip generation of 1,173 ADT is required to prepare a VMT analysis using the San Diego Association of Governments (SANDAG) San Diego Region SB 743 maps.

The project includes both residential and employment uses; therefore, an analysis of VMT/Capita and VMT/Employee is required.

4.1 Project Analysis

The project is located within Census Tract 177.01. The project is considered to have a significant transportation VMT impact because the VMT/Capita and VMT/Employee of the project land use exceed 85% of the regional mean as shown in **Table 2**.

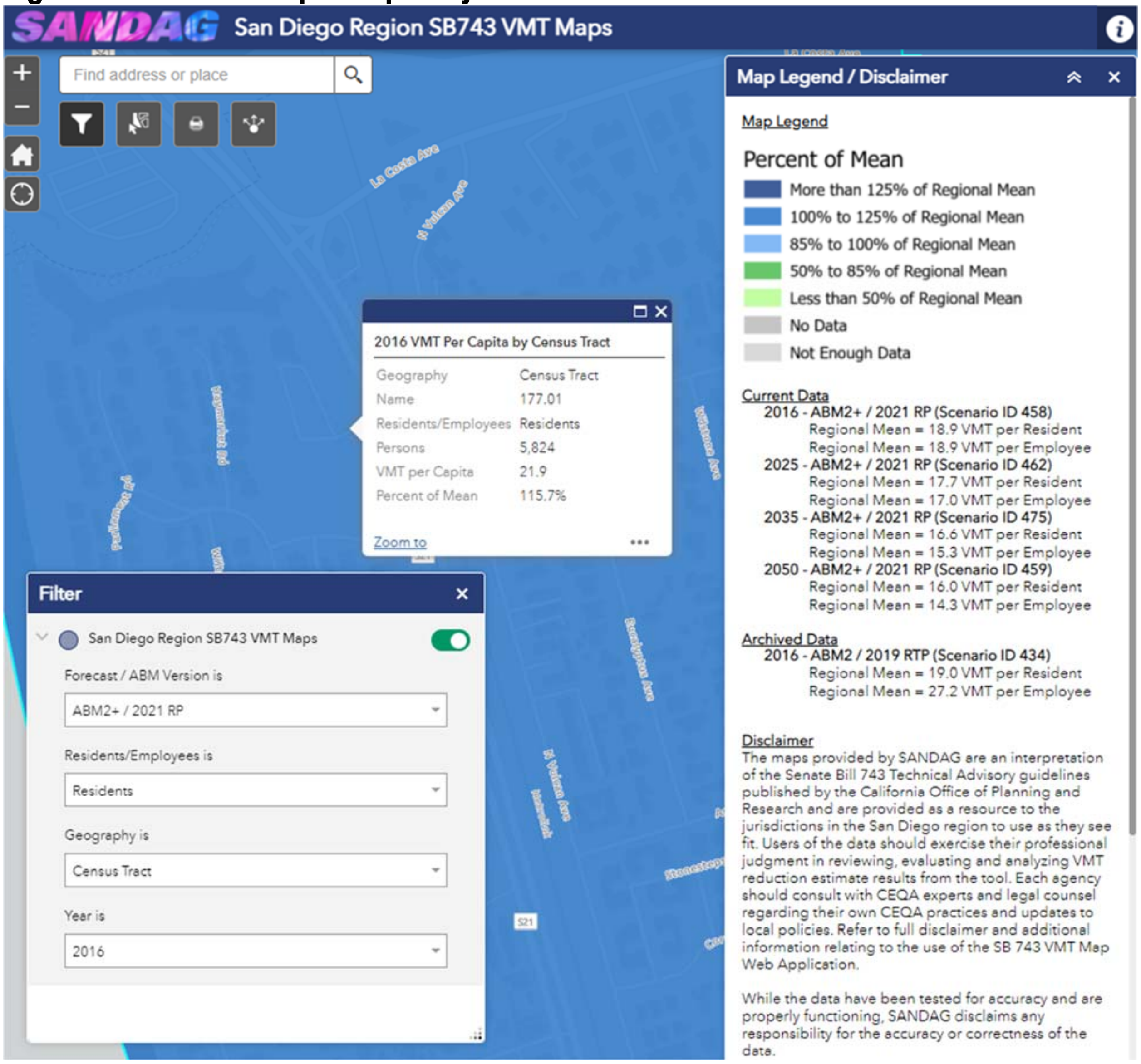
TABLE 2: PROJECT VMT PERCENTAGE OF REGIONAL MEAN AND IMPACT SUMMARY

VMT Analysis	Percent of Regional Mean	Percent Above/ Below 85%	Significant Impact?
VMV/Capita by Census Tract 177.01	115.7%	30.7%	Yes
VMV/Capita by City/CPA	116.8%	31.8%	Yes
VMV/Employee by Census Tract 177.01	90.7%	5.7%	Yes
VMV/Employee by City/CPA	112.7%	27.7%	Yes

The individual SANDAG San Diego Region SB743 ABM2+ VMT Maps by Capita and Employee are included below.

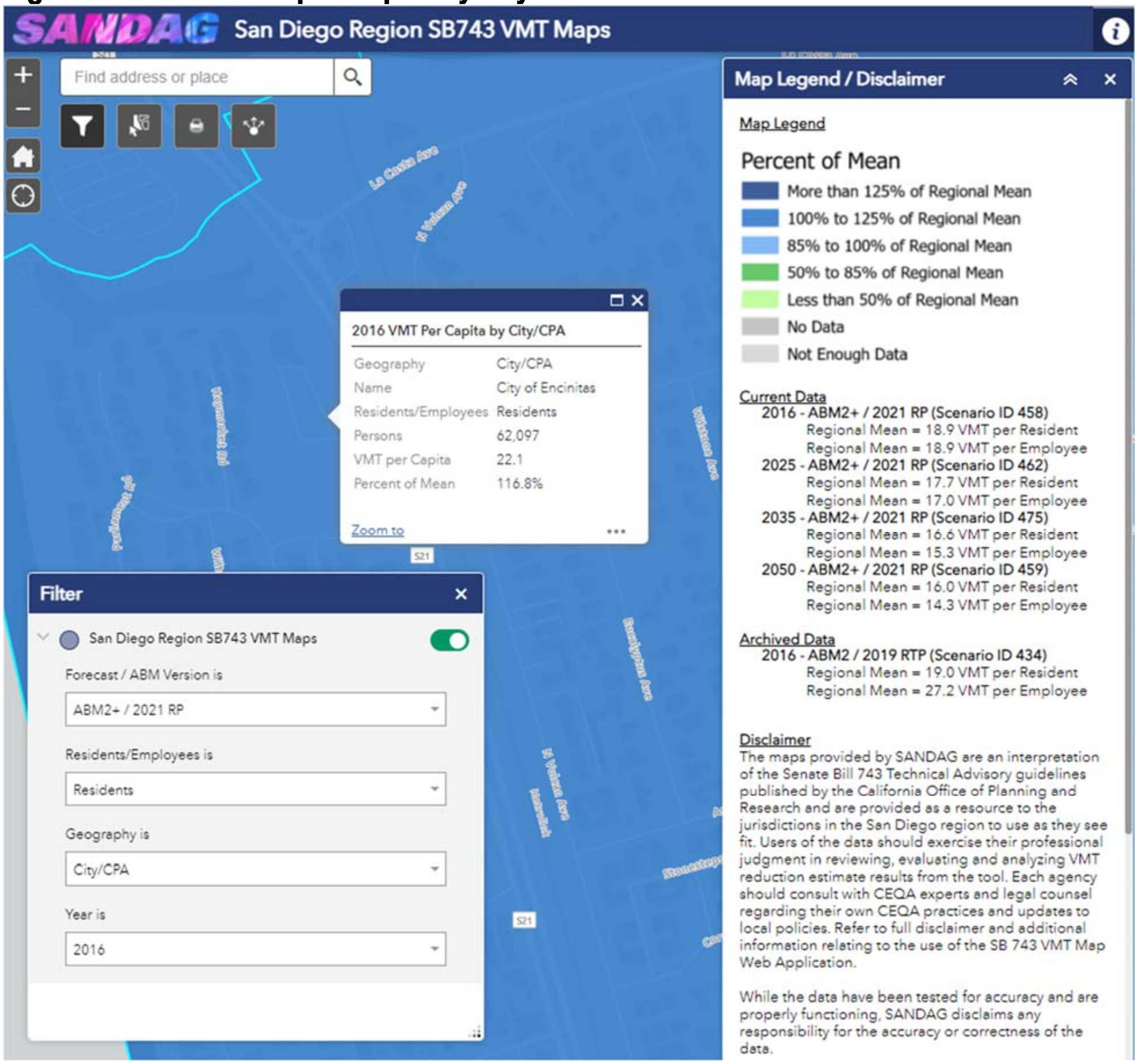
The project location for residential VMT per Capita by Census Tract is at 115.7% of the regional mean; therefore, the project exceeds 85% of the regional mean and is considered to have a significant transportation VMT impact as shown in **Figure 3**.

Figure 3: SANDAG VMT per Capita by Census Tract



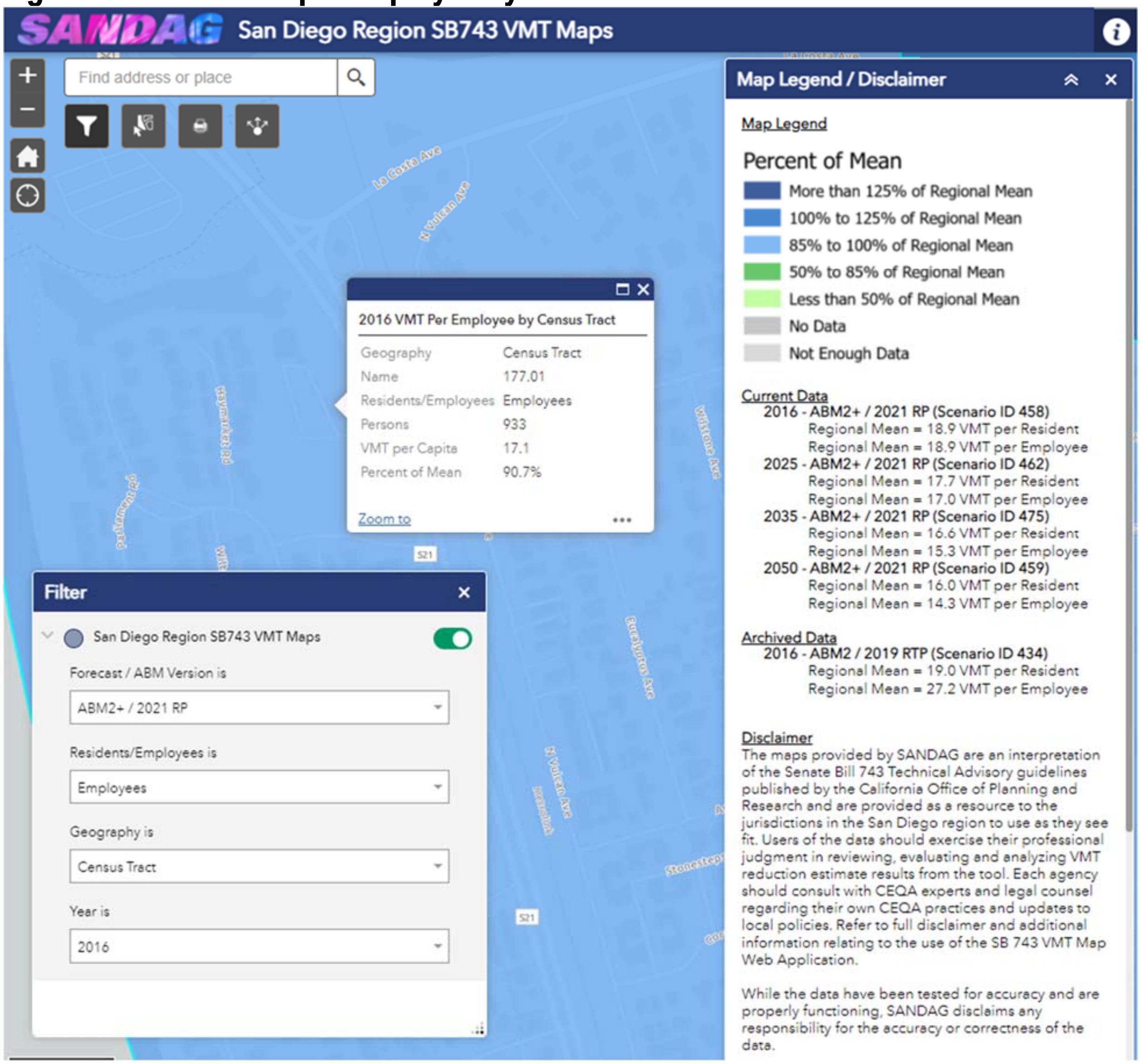
The project location for residential VMT per Capita by City/CPA is at 116.8% of the regional mean; therefore, the project exceeds 85% of the regional mean and is considered to have a significant transportation VMT impact as shown in **Figure 4**.

Figure 4: SANDAG VMT per Capita by City/CPA



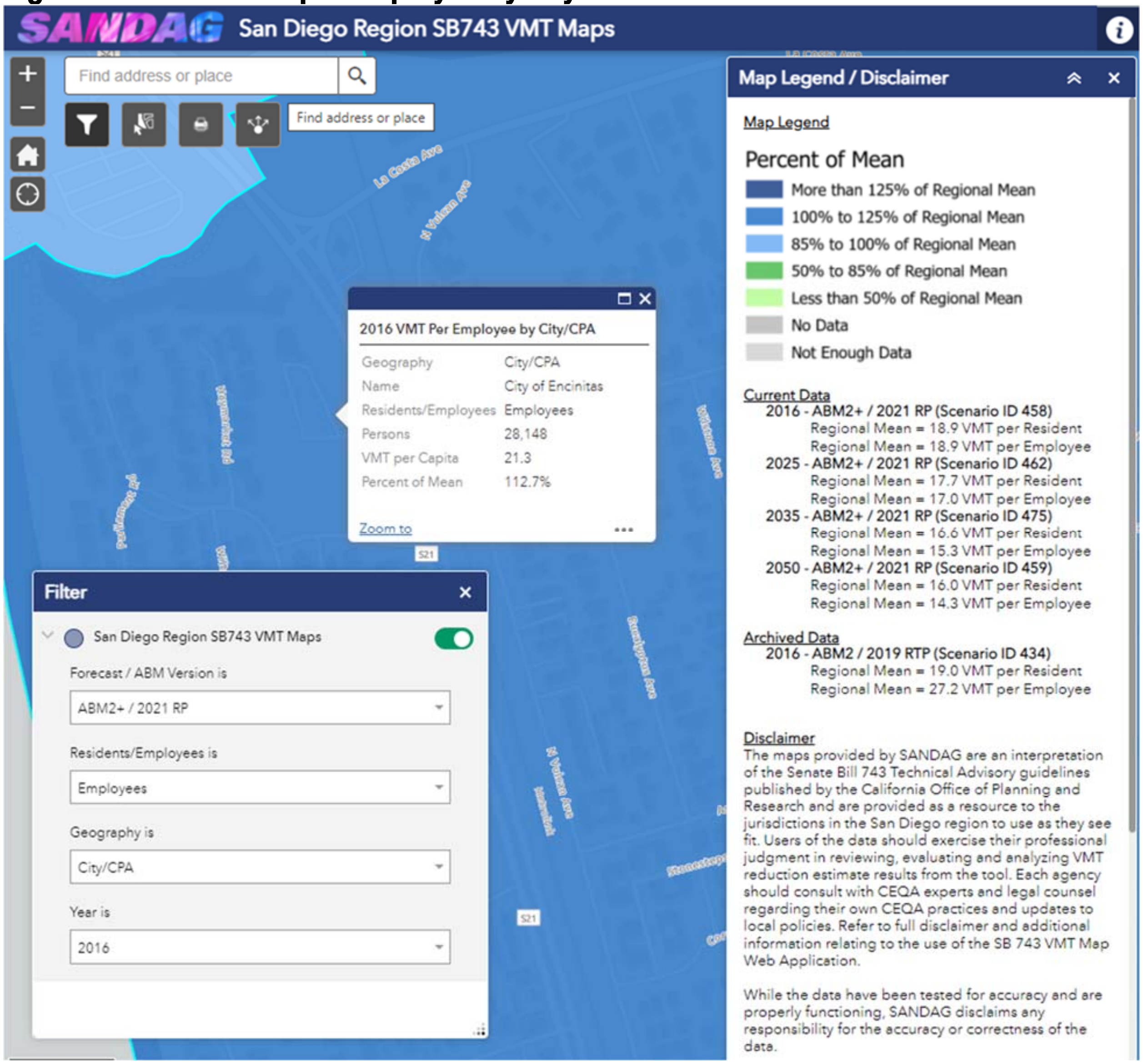
The project location for VMT per Employee by Census Tract is at 90.7% of the regional mean; therefore, the project exceeds 85% of the regional mean and is considered to have a significant transportation VMT impact as shown in **Figure 5**.

Figure 5: SANDAG VMT per Employee by Census Tract



The project location for VMT per Employee by City/CPA is at 112.7% of the regional mean; therefore, the project exceeds 85% of the regional mean and is considered to have a significant transportation VMT impact as shown in **Figure 6**.

Figure 6: SANDAG VMT per Employee by City/CPA



4.2 Cumulative Analysis

The OPR *Transportation Technical Advisory on Evaluating Transportation Impacts in CEQA*, December 2018 states on page 6:

> A project's cumulative impacts are based on an assessment of whether the "incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (Pub. Resources Code, § 21083, subd. (b)(2); see CEQA Guidelines, § 15064, subd. (h)(1).) When using an absolute VMT metric, i.e., total VMT (as recommended below for retail and transportation projects), analyzing the combined impacts for a cumulative impacts analysis may be appropriate. However, metrics such as VMT per capita or VMT per employee, i.e., metrics framed in terms of efficiency (as recommended below for use on residential and office projects), cannot be summed because they employ a denominator. A project that falls below an efficiency-based threshold that is aligned with long-term environmental goals and relevant plans would have no cumulative impact distinct from the project impact. Accordingly, a finding of a less-than-significant project impact would imply a less than significant cumulative impact, and vice versa. This is similar to the analysis typically conducted for greenhouse gas emissions, air quality impacts, and impacts that utilize plan compliance as a threshold of significance. (See *Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 62 Cal.4th 204, 219, 223; CEQA Guidelines, § 15064, subd. (h)(3).)

As outlined above, OPR states that cumulative impacts are not distinct from the project impacts; therefore, a cumulative analysis is not provided.

5.0 VMT Mitigation Measures

The project is considered to have a significant transportation VMT impact based on the SANDAG's San Diego Region SB743 maps. According to the *California Air Pollution Control Officers Association (CAPCOA)* "Quantifying Greenhouse Gas Mitigation Measures" August 2010, there are five potential categories of transportation mitigation measures. The categories include:

1) Land Use / Location
2) Neighborhood / Site Enhancement
3) Parking Policy / Pricing
4) Transit System Improvements
5) Commute Trip Reduction

Transportation mitigation measures can be implemented through Transportation Demand Management (TDM) strategies.

5.1 Transportation Demand Management Strategies

The project applicant proposes to implement TDM strategies as potential mitigation. The following TDM elements are proposed:

1) Voluntary employer commute program. Employers to provide information about the SANDAG's iCommute program (www.icommutesd.com) and encourage carpooling.

2) Develop and/or promote bicycle usage through a bikeshare program to help reduce vehicle usage and demand for parking by providing users with on-demand access to bikes for short-term rental, contribute to electric bicycle charging stations, contribute to bicycle infrastructure improvements, and disseminate a bicycle riders guide to make it easier for people to bike and walk to work.

3) Provide pedestrian improvements such as a connection to the hotel to the north.

4) Provide information about maps, routes, and schedules for public transit.

TDM strategies for VMT reductions can be calculated using the SANDAG mobility management calculator. Therefore, a SANDAG mobility management VMT analysis was conducted to determine if the project could mitigate the VMT impact.

5.2 SANDAG Mobility Management VMT Reduction Calculations

SANDAG's Mobility Management VMT Reduction Calculator Tool provides the means to estimate VMT reductions based on a project's design and planned programs. However, the SANDAG calculator tool does not provide measures for all of the proposed TMD strategies. The following TDM and project elements were entered into the SANDAG reduction calculator tool to determine the VMT reduction:

1) Voluntary employer commute program. The SANDAG model calculates a 6.2% VMT reduction with the implementation of a Voluntary employer commute program.

2) Mixed-Use project. The SANDAG model calculates a 0.2% VMT reduction from pedestrian interaction between the mixed land uses.

The SANDAG Draft Mobility Management VMT Reduction Calculator Tool computed a sum of 6.4% VMT reduction based on the project's voluntary employer commute program and the project's mixed land uses. Output from the SANDAG Reduction Calculator Tool is included in **Appendix C**.

CAPCOA states that the maximum combined allowable VMT reduction is 15% for land development projects located within suburban areas (**Appendix D**); therefore, this project with a range of VMT from 5.7% to 31.8% above 85% of the regional mean could not reach the required VMT reduction to fully mitigate the total project VMT impact. While the proposed TDM strategies do not reduce the VMT impact to below a level of significance, they do provide some level of VMT reduction. <u>The VMT impact remains significant, unmitigated, and requires overrides</u>.

6.0 Conclusion

A VMT analysis was prepared to determine if the project would create a potential CEQA transportation impact. The San Diego ITE VMT Guidelines use VMT/capita and VMT/employee to define a significant transportation impact when a project exceeds a level of 85% of the regional mean. The project is considered to have a significant transportation VMT impact because the individual elements of the project exceed 85% of the regional mean as follows:

1) VMT per Capita (resident) by Census Tract is at 115.7% of the regional mean
2) VMT per Capita (resident) by City/CPA is at 116.8% of the regional mean
3) VMT per Employee by Census Tract is at 90.7% of the regional mean
4) VMT per Employee by City/CPA is at 112.7% of the regional mean

The project applicant proposes to implement the following TDM strategies:

1) Voluntary employer commute program. Employers to provide information about the SANDAG's iCommute program (www.icommutesd.com) and encourage carpooling.
2) Develop and/or promote bicycle usage through a bikeshare program to help reduce vehicle usage and demand for parking by providing users with on-demand access to bikes for short-term rental, contribute to electric bicycle charging stations, contribute to bicycle infrastructure improvements, and disseminate a bicycle riders guide to make it easier for people to bike and walk to work.
3) Provide pedestrian improvements such as a connection to the hotel to the north.
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1) Voluntary employer commute program. The SANDAG model calculates a 6.2% VMT reduction with the implementation of a Voluntary employer commute program.
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Appendix A

OPR Technical Advisory

TECHNICAL ADVISORY

ON EVALUATING TRANSPORTATION IMPACTS IN CEQA

December 2018

Contents

A. Introduction

This technical advisory is one in a series of advisories provided by the Governor's Office of Planning and Research (OPR) as a service to professional planners, land use officials, and CEQA practitioners. OPR issues technical assistance on issues that broadly affect the practice of land use planning and the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.). (Gov. Code, § 65040, subds. (g), (l), (m).) The purpose of this document is to provide advice and recommendations, which agencies and other entities may use at their discretion. This document does not alter lead agency discretion in preparing environmental documents subject to CEQA. This document should not be construed as legal advice.

Senate Bill 743 (Steinberg, 2013), which was codified in Public Resources Code section 21099, required changes to the guidelines implementing CEQA (CEQA Guidelines) (Cal. Code Regs., Title 14, Div. 6, Ch. 3, § 15000 et seq.) regarding the analysis of transportation impacts. As one appellate court recently explained: "During the last 10 years, the Legislature has charted a course of long-term sustainability based on denser infill development, reduced reliance on individual vehicles and improved mass transit, all with the goal of reducing greenhouse gas emissions. Section 21099 is part of that strategy . . . ." (*Covina Residents for Responsible Development v. City of Covina* (2018) 21 Cal.App.5th 712, 729.) Pursuant to Section 21099, the criteria for determining the significance of transportation impacts must "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." (*Id.*, subd. (b)(1); see generally, adopted CEQA Guidelines, § 15064.3, subd. (b) [Criteria for Analyzing Transportation Impacts].) To that end, in developing the criteria, OPR has proposed, and the California Natural Resources Agency (Agency) has certified and adopted, changes to the CEQA Guidelines that identify vehicle miles traveled (VMT) as the most appropriate metric to evaluate a project's transportation impacts. With the California Natural Resources Agency's certification and adoption of the changes to the CEQA Guidelines, automobile delay, as measured by "level of service" and other similar metrics, generally no longer constitutes a significant environmental effect under CEQA. (Pub. Resources Code, § 21099, subd. (b)(3).)

This advisory contains technical recommendations regarding assessment of VMT, thresholds of significance, and mitigation measures. Again, OPR provides this Technical Advisory as a resource for the public to use at their discretion. OPR is not enforcing or attempting to enforce any part of the recommendations contained herein. (Gov. Code, § 65035 ["It is not the intent of the Legislature to vest in the Office of Planning and Research any direct operating or regulatory powers over land use, public works, or other state, regional, or local projects or programs."].)

This December 2018 technical advisory is an update to the advisory it published in April 2018. OPR will continue to monitor implementation of these new provisions and may update or supplement this advisory in response to new information and advancements in modeling and methods.

B. Background

VMT and Greenhouse Gas Emissions Reduction. Senate Bill 32 (Pavley, 2016) requires California to reduce greenhouse gas (GHG) emissions 40 percent below 1990 levels by 2030, and Executive Order B-16-12 provides a target of 80 percent below 1990 emissions levels for the transportation sector by 2050. The transportation sector has three major means of reducing GHG emissions: increasing vehicle efficiency, reducing fuel carbon content, and reducing the amount of vehicle travel. The California Air Resources Board (CARB) has provided a path forward for achieving these emissions reductions from the transportation sector in its 2016 Mobile Source Strategy. CARB determined that it will not be possible to achieve the State's 2030 and post-2030 emissions goals without reducing VMT growth. Further, in its 2018 Progress Report on California's Sustainable Communities and Climate Protection Act, CARB found that despite the State meeting its 2020 climate goals, "emissions from statewide passenger vehicle travel per capita [have been] increasing and going in the wrong direction," and "California cannot meet its [long-term] climate goals without curbing growth in single-occupancy vehicle activity."[1] CARB also found that "[w]ith emissions from the transportation sector continuing to rise despite increases in fuel efficiency and decreases in the carbon content of fuel, California will not achieve the necessary greenhouse gas emissions reductions to meet mandates for 2030 and beyond without significant changes to how communities and transportation systems are planned, funded, and built."[2]

Thus, to achieve the State's long-term climate goals, California needs to reduce per capita VMT. This can occur under CEQA through VMT mitigation. Half of California's GHG emissions come from the transportation sector[3], therefore, reducing VMT is an effective climate strategy, which can also result in co-benefits.[4] Furthermore, without early VMT mitigation, the state may follow a path that meets GHG targets in the early years, but finds itself poorly positioned to meet more stringent targets later. For example, in absence of VMT analysis and mitigation in CEQA, lead agencies might rely upon verifiable offsets for GHG mitigation, ignoring the longer-term climate change impacts resulting from land use development and infrastructure investment decisions. As stated in CARB's 2017 Scoping Plan:

> "California's future climate strategy will require increased focus on integrated land use planning to support livable, transit-connected communities, and conservation of agricultural and other lands. Accommodating population and economic growth through travel- and energy-efficient land use provides GHG-efficient growth, reducing GHGs from both transportation and building energy use. GHGs can be further reduced at the project level through implementing energy-efficient construction and travel demand management approaches."[5] (*Id.* at p. 102.)

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[1] California Air Resources Board (Nov. 2018) *2018 Progress Report on California's Sustainable Communities and Climate Protection Act*, pp. 4, 5, available at https://ww2.arb.ca.gov/sites/default/files/2018-11/Final2018Report_SB150_112618_02_Report.pdf.
[2] *Id.*, p. 28.
[3] See https://ca50million.ca.gov/transportation/
[4] Fang et al. (2017) *Cutting Greenhouse Gas Emissions Is Only the Beginning: A Literature Review of the Co-Benefits of Reducing Vehicle Miles Traveled*.
[5] California Air Resources Board (Nov. 2017) *California's 2017 Climate Change Scoping Plan*, p. 102, available at https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

In light of this, the 2017 Scoping Plan describes and quantifies VMT reductions needed to achieve our long-term GHG emissions reduction goals, and specifically points to the need for statewide deployment of the VMT metric in CEQA:

> "Employing VMT as the metric of transportation impact statewide will help to ensure GHG reductions planned under SB 375 will be achieved through on-the-ground development, and will also play an important role in creating the additional GHG reductions needed beyond SB 375 across the State. Implementation of this change will rely, in part, on local land use decisions to reduce GHG emissions associated with the transportation sector, both at the project level, and in long-term plans (including general plans, climate action plans, specific plans, and transportation plans) and supporting sustainable community strategies developed under SB 375."[6]

VMT and Other Impacts to Health and Environment. VMT mitigation also creates substantial benefits (sometimes characterized as "co-benefits" to GHG reduction) in both in the near-term and the long-term. Beyond GHG emissions, increases in VMT also impact human health and the natural environment. Human health is impacted as increases in vehicle travel lead to more vehicle crashes, poorer air quality, increases in chronic diseases associated with reduced physical activity, and worse mental health. Increases in vehicle travel also negatively affect other road users, including pedestrians, cyclists, other motorists, and many transit users. The natural environment is impacted as higher VMT leads to more collisions with wildlife and fragments habitat. Additionally, development that leads to more vehicle travel also tends to consume more energy, water, and open space (including farmland and sensitive habitat). This increase in impermeable surfaces raises the flood risk and pollutant transport into waterways.[7]

VMT and Economic Growth. While it was previously believed that VMT growth was a necessary component of economic growth, data from the past two decades shows that economic growth is possible without a concomitant increase in VMT. (Figure 1.) Recent research shows that requiring development projects to mitigate LOS may actually reduce accessibility to destinations and impede economic growth.[8,9]

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[6] *Id.* at p. 76.

[7] Fang et al. (2017) *Cutting Greenhouse Gas Emissions Is Only the Beginning: A Literature Review of the Co-Benefits of Reducing Vehicle Miles Traveled*, available at https://ncst.ucdavis.edu/wp-content/uploads/2017/03/NCST-VMT-Co-Benefits-White-Paper_Fang_March-2017.pdf.

[8] Haynes et al. (Sept. 2015) *Congested Development: A Study of Traffic Delays, Access, and Economic Activity in Metropolitan Los Angeles*, available at http://www.its.ucla.edu/wp-content/uploads/sites/6/2015/11/Haynes_Congested-Development_1-Oct-2015_final.pdf.

[9] Osman et al. (Mar. 2016) *Not So Fast: A Study of Traffic Delays, Access, and Economic Activity in the San Francisco Bay Area*, available at http://www.its.ucla.edu/wp-content/uploads/sites/6/2016/08/Taylor-Not-so-Fast-04-01-2016_final.pdf.

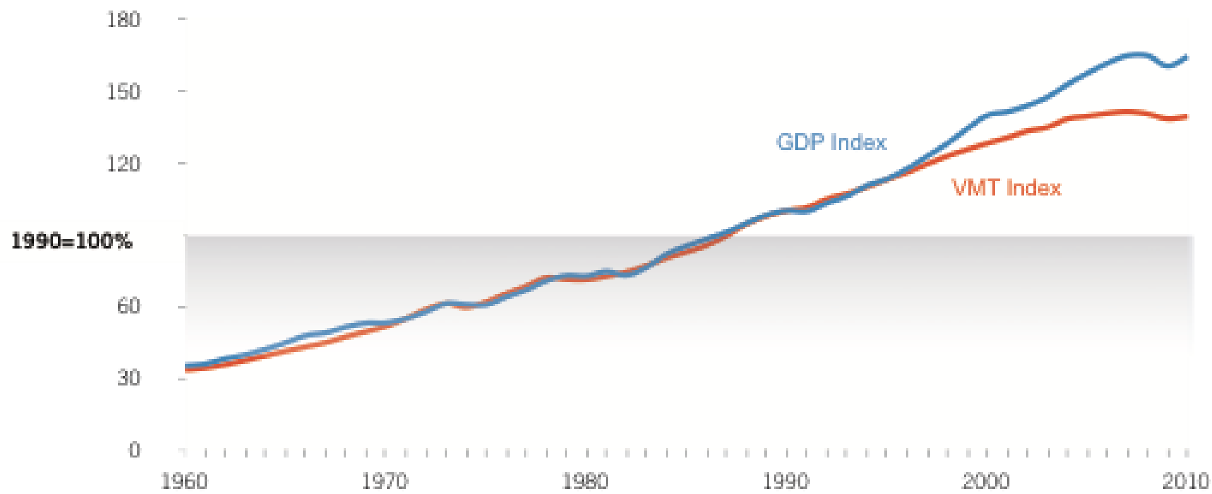

Figure 1. Kooshian and Winkelman (2011) *VMT and Gross Domestic Product (GDP), 1960-2010*.

C. Technical Considerations in Assessing Vehicle Miles Traveled

Many practitioners are familiar with accounting for VMT in connection with long-range planning, or as part of the CEQA analysis of a project's greenhouse gas emissions or energy impacts. This document provides technical information on how to assess VMT as part of a transportation impacts analysis under CEQA. Appendix 1 provides a description of which VMT to count and options on how to count it. Appendix 2 provides information on induced travel resulting from roadway capacity projects, including the mechanisms giving rise to induced travel, the research quantifying it, and information on additional approaches for assessing it.

1. Recommendations Regarding Methodology

Proposed Section 15064.3 explains that a "lead agency may use models to estimate a project's vehicle miles traveled . . . ." CEQA generally defers to lead agencies on the choice of methodology to analyze impacts. (*Santa Monica Baykeeper v. City of Malibu* (2011) 193 Cal.App.4th 1538, 1546; see *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 409 ["the issue is not whether the studies are irrefutable or whether they could have been better" … rather, the "relevant issue is only whether the studies are sufficiently credible to be considered" as part of the lead agency's overall evaluation].) This section provides suggestions to lead agencies regarding methodologies to analyze VMT associated with a project.

Vehicle Types. Proposed Section 15064.3, subdivision (a), states, "For the purposes of this section, 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project." Here, the term "automobile" refers to on-road passenger vehicles, specifically cars and light trucks. Heavy-duty truck VMT could be included for modeling convenience and ease of calculation (for example, where models or data provide combined auto and heavy truck VMT). For an apples-to-apples comparison, vehicle types considered should be consistent across project assessment, significance thresholds, and mitigation.

Residential and Office Projects. Tour- and trip-based approaches[10] offer the best methods for assessing VMT from residential/office projects and for comparing those assessments to VMT thresholds. These approaches also offer the most straightforward methods for assessing VMT reductions from mitigation measures for residential/office projects. When available, tour-based assessment is ideal 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.

Models and methodologies used to calculate thresholds, estimate project VMT, and estimate VMT reduction due to mitigation should be comparable. For example:

- A tour-based assessment of project VMT should be compared to a tour-based threshold, or a trip-based assessment to a trip-based VMT threshold.
- Where a travel demand model is used to determine thresholds, the same model should also be used to provide trip lengths as part of assessing project VMT.
- Where only trip-based estimates of VMT reduction from mitigation are available, a trip-based threshold should be used, and project VMT should be assessed in a trip-based manner.

When a trip-based method is used to analyze a residential project, the focus can be on home-based trips. Similarly, when a trip-based method is used to analyze an office project, the focus can be on home-based work trips.

When tour-based models are used to analyze an office project, either employee work tour VMT or VMT from all employee tours may be attributed to the project. This is because workplace location influences overall travel. For consistency, the significance threshold should be based on the same metric: either employee work tour VMT or VMT from all employee tours.

For office projects that feature a customer component, such as a government office that serves the public, a lead agency can analyze the customer VMT component of the project using the methodology for retail development (see below).

Retail Projects. Generally, lead agencies should analyze the effects of a retail project by assessing the change in total VMT[11] because retail projects typically re-route travel from other retail destinations. A retail project might lead to increases or decreases in VMT, depending on previously existing retail travel patterns.

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[10] See Appendix 1, *Considerations About Which VMT to Count,* for a description of these approaches.
[11] See Appendix 1, *Considerations About Which VMT to Count, "*Assessing Change in Total VMT" section, for a description of this approach.

Considerations for All Projects. Lead agencies should not truncate any VMT analysis because of jurisdictional or other boundaries, for example, by failing to count the portion of a trip that falls outside the jurisdiction or by discounting the VMT from a trip that crosses a jurisdictional boundary. CEQA requires environmental analyses to reflect a "good faith effort at full disclosure." (CEQA Guidelines, § 15151.) Thus, where methodologies exist that can estimate the full extent of vehicle travel from a project, the lead agency should apply them to do so. Where those VMT effects will grow over time, analyses should consider both a project's short-term and long-term effects on VMT.

Combining land uses for VMT analysis is not recommended. 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. As a result, it could be difficult or impossible for a lead agency to connect a significance threshold with an environmental policy objective (such as a target set by law), inhibiting the CEQA imperative of identifying a project's significant impacts and providing mitigation where feasible. Combining land uses for a VMT analysis could streamline certain mixes of uses in a manner disconnected from policy objectives or environmental outcomes. Instead, 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.

Any project that includes in its geographic bounds a portion of an existing or planned Transit Priority Area (i.e., the project is within a ½ mile of an existing or planned major transit stop or an existing stop along a high quality transit corridor) may employ VMT as its primary metric of transportation impact for the entire project. (See Pub. Resources Code, § 21099, subds. (a)(7), (b)(1).)

Cumulative Impacts. A project's cumulative impacts are based on an assessment of whether the "incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (Pub. Resources Code, § 21083, subd. (b)(2); see CEQA Guidelines, § 15064, subd. (h)(1).) When using an absolute VMT metric, i.e., total VMT (as recommended below for retail and transportation projects), analyzing the combined impacts for a cumulative impacts analysis may be appropriate. However, metrics such as VMT per capita or VMT per employee, i.e., metrics framed in terms of efficiency (as recommended below for use on residential and office projects), cannot be summed because they employ a denominator. A project that falls below an efficiency-based threshold that is aligned with long-term environmental goals and relevant plans would have no cumulative impact distinct from the project impact. Accordingly, a finding of a less-than-significant project impact would imply a less than significant cumulative impact, and vice versa. This is similar to the analysis typically conducted for greenhouse gas emissions, air quality impacts, and impacts that utilize plan compliance as a threshold of significance. (See *Center for Biological Diversity v. Department of Fish & Wildlife* (2015) 62 Cal.4th 204, 219, 223; CEQA Guidelines, § 15064, subd. (h)(3).)

D. General Principles to Guide Consideration of VMT

SB 743 directs OPR to establish specific "criteria for determining the significance of transportation impacts of projects[.]" (Pub. Resources Code, § 21099, subd. (b)(1).) In establishing this criterion, OPR was guided by the general principles contained within CEQA, the CEQA Guidelines, and applicable case law.

To assist in the determination of significance, many lead agencies rely on "thresholds of significance." The CEQA Guidelines define a "threshold of significance" to mean "an identifiable **quantitative, qualitative**[12] **or performance level** of a particular environmental effect, non-compliance with which means the effect will ***normally*** be determined to be significant by the agency and compliance with which means the effect ***normally*** will be determined to be less than significant." (CEQA Guidelines, § 15064.7, subd. (a) (emphasis added).) Lead agencies have discretion to develop and adopt their own, or rely on thresholds recommended by other agencies, "provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence." (*Id*. at subd. (c); *Save Cuyama Valley v. County of Santa Barbara* (2013) 213 Cal.App.4th 1059, 1068.) Substantial evidence means "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached." (*Id*. at § 15384 (emphasis added); *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1108-1109.)

Additionally, the analysis leading to the determination of significance need not be perfect. The CEQA Guidelines describe the standard for adequacy of environmental analyses:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to **make a decision which intelligently takes account of environmental consequences**. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is **reasonably feasible**. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The **courts have looked not for perfection** but for **adequacy**, **completeness**, and a **good faith effort** at full disclosure.

(CEQA Guidelines, § 15151 (emphasis added).)

These general principles guide OPR's recommendations regarding thresholds of significance for VMT set forth below.

[12] Generally, qualitative analyses should only be conducted when methods do not exist for undertaking a quantitative analysis.

E. Recommendations Regarding Significance Thresholds

As noted above, lead agencies have the discretion to set or apply their own thresholds of significance. (*Center for Biological Diversity v. California Dept. of Fish & Wildlife* (2015) 62 Cal.4th 204, 218-223 [lead agency had discretion to use compliance with AB 32's emissions goals as a significance threshold]; *Save Cuyama Valley v. County of Santa Barbara* (2013) 213 Cal.App.4th at p. 1068.) However, Section 21099 of the Public Resources Code states that the criteria for determining the significance of transportation impacts must promote: (1) reduction of greenhouse gas emissions; (2) development of multimodal transportation networks; and (3) a diversity of land uses. It further directed OPR to prepare and develop criteria for determining significance. (Pub. Resources Code, § 21099, subd. (b)(1).) This section provides OPR's suggested thresholds, as well as considerations for lead agencies that choose to adopt their own

The VMT metric can support the three statutory goals: "the reduction of greenhouse gas emissions, the development of multimodal transportation networks, *and* a diversity of land uses." (Pub. Resources Code, § 21099, subd. (b)(1), emphasis added.) However, in order for it to promote and support all three, lead agencies should select a significance threshold that aligns with state law on all three. State law concerning the development of multimodal transportation networks and diversity of land uses requires planning for and prioritizing increases in complete streets and infill development, but does not mandate a particular depth of implementation that could translate into a particular threshold of significance. Meanwhile, the State has clear quantitative targets for GHG emissions reduction set forth in law and based on scientific consensus, and the depth of VMT reduction needed to achieve those targets has been quantified. Tying VMT thresholds to GHG reduction also supports the two other statutory goals. Therefore, to ensure adequate analysis of transportation impacts, OPR recommends using quantitative VMT thresholds linked to GHG reduction targets when methods exist to do so.

Various legislative mandates and state policies establish quantitative greenhouse gas emissions reduction targets. For example:

- Assembly Bill 32 (2006) requires statewide GHG emissions reductions to 1990 levels by 2020 and continued reductions beyond 2020.

- Senate Bill 32 (2016) requires at least a 40 percent reduction in GHG emissions from 1990 levels by 2030.

- Pursuant to Senate Bill 375 (2008), the California Air Resources Board GHG emissions reduction targets for metropolitan planning organizations (MPOs) to achieve based on land use patterns and transportation systems specified in Regional Transportation Plans and Sustainable Community Strategies (RTP/SCS). Current targets for the State's largest MPOs call for a 19 percent reduction in GHG emissions from cars and light trucks from 2005 emissions levels by 2035.

- Executive Order B-30-15 (2015) sets a GHG emissions reduction target of 40 percent below 1990 levels by 2030.

- Executive Order S-3-05 (2005) sets a GHG emissions reduction target of 80 percent below 1990 levels by 2050.

- Executive Order B-16-12 (2012) specifies a GHG emissions reduction target of 80 percent below 1990 levels by 2050 specifically for transportation.

- Executive Order B-55-18 (2018) established an additional statewide goal of achieving carbon neutrality as soon as possible, but no later than 2045, and maintaining net negative emissions thereafter. It states, "The California Air Resources Board shall work with relevant state agencies to develop a framework for implementation and accounting that tracks progress toward this goal."

- Senate Bill 391 requires the California Transportation Plan to support 80 percent reduction in GHGs below 1990 levels by 2050.

- The *California Air Resources Board Mobile Source Strategy* (2016) describes California's strategy for containing air pollutant emissions from vehicles, and quantifies VMT growth compatible with achieving state targets.

- The California Air Resources Board's *2017 Climate Change Scoping Plan Update: The Strategy for Achieving California's 2030 Greenhouse Gas Target* describes California's strategy for containing GHG emissions from vehicles, and quantifies VMT growth compatible with achieving state targets.

Considering these various targets, the California Supreme Court observed:

> Meeting our statewide reduction goals does not preclude all new development. Rather, the Scoping Plan … assumes continued growth and depends on increased efficiency and conservation in land use and transportation from all Californians.

(*Center for Biological Diversity v. California Dept. of Fish & Wildlife*, *supra*, 62 Cal.4th at p. 220.) Indeed, the Court noted that when a lead agency uses consistency with climate goals as a way to determine significance, particularly for long-term projects, the lead agency must consider the project's effect on meeting long-term reduction goals. (*Ibid*.) And more recently, the Supreme Court stated that "CEQA requires public agencies . . . to ensure that such analysis stay in step with evolving scientific knowledge and state regulatory schemes." (*Cleveland National Forest Foundation v. San Diego Assn. of Governments* (2017) 3 Cal.5th 497, 504.)

Meeting the targets described above will require substantial reductions in existing VMT per capita to curb GHG emissions and other pollutants. But targets for overall GHG emissions reduction do not translate directly into VMT thresholds for individual projects for many reasons, including:

- Some, but not all, of the emissions reductions needed to achieve those targets could be accomplished by other measures, including increased vehicle efficiency and decreased fuel carbon content. The CARB's *First Update to the Climate Change Scoping Plan* explains:

"Achieving California's long-term criteria pollutant and GHG emissions goals will require four strategies to be employed: (1) improve vehicle efficiency and develop zero emission technologies, (2) reduce the carbon content of fuels and provide market support to get these lower-carbon fuels into the marketplace, (3) **plan and build communities to reduce vehicular GHG emissions and provide more transportation options, and (4) improve the efficiency and throughput of existing transportation systems.**"[13] CARB's *2018 Progress Report on California's Sustainable Communities and Climate Protection Act* states on page 28 that "California cannot meet its climate goals without curbing growth in single-occupancy vehicle activity." In other words, vehicle efficiency and better fuels are necessary, but insufficient, to address the GHG emissions from the transportation system. Land use patterns and transportation options also will need to change to support reductions in vehicle travel/VMT.

- New land use projects alone will not sufficiently reduce per-capita VMT to achieve those targets, nor are they expected to be the sole source of VMT reduction.

- Interactions between land use projects, and also between land use and transportation projects, existing and future, together affect VMT.

- Because location within the region is the most important determinant of VMT, in some cases, streamlining CEQA review of projects in travel efficient locations may be the most effective means of reducing VMT.

- When assessing climate impacts of some types of land use projects, use of an efficiency metric (e.g., per capita, per employee) may provide a better measure of impact than an absolute numeric threshold. (*Center for Biological Diversity*, *supra*.)

Public Resources Code section 21099 directs OPR to propose criteria for determining the significance of transportation impacts. In this Technical Advisory, OPR provides its recommendations to assist lead agencies in selecting a significance threshold that may be appropriate for their particular projects. While OPR's Technical Advisory is not binding on public agencies, CEQA allows lead agencies to "consider thresholds of significance . . . recommended by other public agencies, provided the decision to adopt those thresholds is supported by substantial evidence." (CEQA Guidelines, § 15064.7, subd. (c).) Based on OPR's extensive review of the applicable research, and in light of an assessment by the California Air Resources Board quantifying the need for VMT reduction in order to meet the State's long-term climate goals, **OPR recommends that a per capita or per employee VMT that is fifteen percent below that of existing development may be a reasonable threshold**.

Fifteen percent reductions in VMT are achievable at the project level in a variety of place types.[14]

Moreover, a fifteen percent reduction is consistent with SB 743's direction to OPR to select a threshold that will help the State achieve its climate goals. As described above, section 21099 states that the

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[13] California Air Resources Board (May 2014) *First Update to the Climate Change Scoping Plan*, p. 46 (emphasis added).

[14] CAPCOA (2010) *Quantifying Greenhouse Gas Mitigation Measures*, p. 55, available at http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.

criteria for determining significance must "promote the reduction in greenhouse gas emissions." In its document *California Air Resources Board 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals*[15], CARB assesses VMT reduction per capita consistent with its evidence-based modeling scenario that would achieve State climate goals of 40 percent GHG emissions reduction from 1990 levels by 2030 and 80 percent GHG emissions reduction levels from 1990 by 2050. Applying California Department of Finance population forecasts, CARB finds per-capita light-duty vehicle travel would need to be approximately 16.8 percent lower than existing, and overall per-capita vehicle travel would need to be approximately 14.3 percent lower than existing levels under that scenario. Below these levels, a project could be considered low VMT and would, on that metric, be consistent with 2017 Scoping Plan Update assumptions that achieve climate state climate goals.

CARB finds per capita vehicle travel would need to be kept below what today's policies and plans would achieve.

CARB's assessment is based on data in the 2017 Scoping Plan Update and 2016 Mobile Source Strategy. In those documents, CARB previously examined the relationship between VMT and the state's GHG emissions reduction targets. The Scoping Plan finds:

> "While the State can do more to accelerate and incentivize these local decisions, local actions that reduce VMT are also necessary to meet transportation sector-specific goals and achieve the 2030 target under SB 32. Through developing the Scoping Plan, CARB staff is more convinced than ever that, in addition to achieving GHG reductions from cleaner fuels and vehicles, California must also reduce VMT. Stronger SB 375 GHG reduction targets will enable the State to make significant progress toward needed reductions, but alone will not provide the VMT growth reductions needed; there is a gap between what SB 375 can provide and what is needed to meet the State's 2030 and 2050 goals."[16]

Note that, at present, consistency with RTP/SCSs does not necessarily lead to a less-than-significant VMT impact.[17] As the Final 2017 Scoping Plan Update states,

> VMT reductions are necessary to achieve the 2030 target and must be part of any strategy evaluated in this Plan. Stronger SB 375 GHG reduction targets will enable the State to make significant progress toward this goal, but alone will not provide all of the VMT growth reductions that will be needed. There is a gap between what SB 375 can provide and what is needed to meet the State's 2030 and 2050 goals."[18]

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[15] California Air Resources Board (Jan. 2019) *California Air Resources Board 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals*, available at https://ww2.arb.ca.gov/resources/documents/carb-2017-scoping-plan-identified-vmt-reductions-and-relationship-state-climate.

[16] California Air Resources Board (Nov. 2017) *California's 2017 Climate Change Scoping Plan*, p. 101.

[17] California Air Resources Board (Feb. 2018) *Updated Final Staff Report: Proposed Update to the SB 375 Greenhouse Gas Emission Reduction Targets*, Figure 3, p. 35, available at https://www.arb.ca.gov/cc/sb375/sb375_target_update_final_staff_report_feb2018.pdf.

[18] California Air Resources Board (Nov. 2017) *California's 2017 Climate Change Scoping Plan*, p. 75.

Also, in order to capture the full effects of induced travel resulting from roadway capacity projects, an RTP/SCS would need to include an assessment of land use effects of those projects, and the effects of those land uses on VMT. (See section titled "*Estimating VMT Impacts from Transportation Projects"* below.) RTP/SCSs typically model VMT using a collaboratively-developed land use "vision" for the region's land use, rather than studying the effects on land use of the proposed transportation investments.

In summary, achieving 15 percent lower per capita (residential) or per employee (office) VMT than existing development is both generally achievable and is supported by evidence that connects this level of reduction to the State's emissions goals.

1. Screening Thresholds for Land Use Projects

Many agencies use "screening thresholds" to quickly identify when a project should be expected to cause a less-than-significant impact without conducting a detailed study. (See e.g., CEQA Guidelines, §§ 15063(c)(3)(C), 15128, and Appendix G.) As explained below, this technical advisory suggests that lead agencies may screen out VMT impacts using project size, maps, transit availability, and provision of affordable housing.

Screening Threshold for Small Projects

Many local agencies have developed screening thresholds to indicate when detailed analysis is needed. Absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with a Sustainable Communities Strategy (SCS) or general plan, projects that generate or attract fewer than 110 trips per day[19] generally may be assumed to cause a less-than-significant transportation impact.

Map-Based Screening for Residential and Office Projects

Residential and office projects that locate in areas with low VMT, and that incorporate similar features (i.e., density, mix of uses, transit accessibility), will tend to exhibit similarly low VMT. Maps created with VMT data, for example from a travel survey or a travel demand model, can illustrate areas that are

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[19] CEQA provides a categorical exemption for existing facilities, including additions to existing structures of up to 10,000 square feet, so long as the project is in an area where public infrastructure is available to allow for maximum planned development and the project is not in an environmentally sensitive area. (CEQA Guidelines, § 15301, subd. (e)(2).) Typical project types for which trip generation increases relatively linearly with building footprint (i.e., general office building, single tenant office building, office park, and business park) generate or attract an additional 110-124 trips per 10,000 square feet. Therefore, absent substantial evidence otherwise, it is reasonable to conclude that the addition of 110 or fewer trips could be considered not to lead to a significant impact.

currently below threshold VMT (see recommendations below). Because new development in such locations would likely result in a similar level of VMT, such maps can be used to screen out residential and office projects from needing to prepare a detailed VMT analysis.

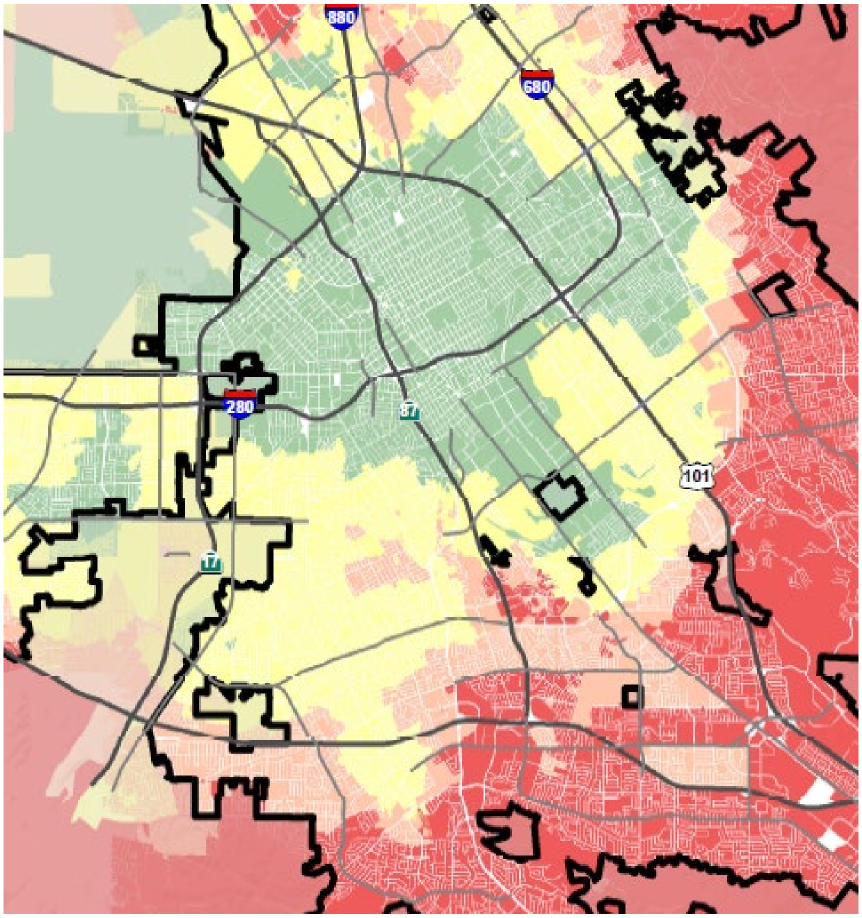

Figure 2. Example map of household VMT that could be used to delineate areas eligible to receive streamlining for VMT analysis. (Source: City of San José, Department of Transportation, draft output of City Transportation Model.)

Presumption of Less Than Significant Impact Near Transit Stations

Proposed CEQA Guideline Section 15064.3, subdivision (b)(1), states that lead agencies generally should presume that certain projects (including residential, retail, and office projects, as well as projects that are a mix of these uses) proposed within ½ mile of an existing major transit stop[20] or an existing stop

[20] Pub. Resources Code, § 21064.3 ("'Major transit stop' means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.").

along a high quality transit corridor[21] will have a less-than-significant impact on VMT. This presumption would not apply, however, if project-specific or location-specific information indicates that the project will still generate significant levels of VMT. For example, the presumption might not be appropriate if the project:

- Has a Floor Area Ratio (FAR) of less than 0.75
- Includes more parking for use by residents, customers, or employees of the project than required by the jurisdiction (if the jurisdiction requires the project to supply parking)
- Is inconsistent with the applicable Sustainable Communities Strategy (as determined by the lead agency, with input from the Metropolitan Planning Organization)
- Replaces affordable residential units with a smaller number of moderate- or high-income residential units

A project or plan near transit which replaces affordable residential units[22] with a smaller number of moderate- or high-income residential units may increase overall VMT because the increase in VMT of displaced residents could overwhelm the improvements in travel efficiency enjoyed by new residents.[23]

If any of these exceptions to the presumption might apply, the lead agency should conduct a detailed VMT analysis to determine whether the project would exceed VMT thresholds (see below).

Presumption of Less Than Significant Impact for Affordable Residential Development

Adding affordable housing to infill locations generally improves jobs-housing match, in turn shortening commutes and reducing VMT.[24,25] Further, "… low-wage workers in particular would be more likely to choose a residential location close to their workplace, if one is available."[26] In areas where existing jobs-housing match is closer to optimal, low income housing nevertheless generates less VMT than market-

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[21] Pub. Resources Code, § 21155 ("For purposes of this section, a high-quality transit corridor means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.").
[22] Including naturally-occurring affordable residential units.
[23] Chapple et al. (2017) *Developing a New Methodology for Analyzing Potential Displacement,* Chapter 4, pp. 159-160, available at https://www.arb.ca.gov/research/apr/past/13-310.pdf.
[24] Karner and Benner (2016) *The convergence of social equity and environmental sustainability: Jobs-housing fit and commute distance* ("[P]olicies that advance a more equitable distribution of jobs and housing by linking the affordability of locally available housing with local wage levels are likely to be associated with reduced commuting distances").
[25] Karner and Benner (2015) *Low-wage jobs-housing fit: identifying locations of affordable housing shortages.*
[26] Karner and Benner (2015) *Low-wage jobs-housing fit: identifying locations of affordable housing shortages.*

rate housing.[27,28] Therefore, a project consisting of a high percentage of affordable housing may be a basis for the lead agency to find a less-than-significant impact on VMT. Evidence supports a presumption of less than significant impact for a 100 percent affordable residential development (or the residential component of a mixed-use development) in infill locations. Lead agencies may develop their own presumption of less than significant impact for residential projects (or residential portions of mixed use projects) containing a particular amount of affordable housing, based on local circumstances and evidence. Furthermore, a project which includes any affordable residential units may factor the effect of the affordability on VMT into the assessment of VMT generated by those units.

2. Recommended Numeric Thresholds for Residential, Office, and Retail Projects

Recommended threshold for residential projects: A proposed project exceeding a level of 15 percent below existing VMT per capita may indicate a significant transportation impact. Existing VMT per capita may be measured as regional VMT per capita or as city VMT per capita. Proposed development referencing a threshold based on city VMT per capita (rather than regional VMT per capita) should not cumulatively exceed the number of units specified in the SCS for that city, and should be consistent with the SCS.

Residential development that would generate vehicle travel that is 15 or more percent below the existing residential VMT per capita, measured against the region or city, may indicate a less-than-significant transportation impact. In MPO areas, development measured against city VMT per capita (rather than regional VMT per capita) should not cumulatively exceed the population or number of units specified in the SCS for that city because greater-than-planned amounts of development in areas above the region-based threshold would undermine the VMT containment needed to achieve regional targets under SB 375.

For residential projects in unincorporated county areas, the local agency can compare a residential project's VMT to (1) the region's VMT per capita, or (2) the aggregate population-weighted VMT per capita of all cities in the region. In MPO areas, development in unincorporated areas measured against aggregate city VMT per capita (rather than regional VMT per capita) should not cumulatively exceed the population or number of units specified in the SCS for that city because greater-than-planned amounts of development in areas above the regional threshold would undermine achievement of regional targets under SB 375.

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[27] Chapple et al. (2017) *Developing a New Methodology for Analyzing Potential Displacement*, available at https://www.arb.ca.gov/research/apr/past/13-310.pdf.
[28] CAPCOA (2010) *Quantifying Greenhouse Gas Mitigation Measures*, pp. 176-178, available at http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.

These thresholds can be applied to either household (i.e., tour-based) VMT or home-based (i.e., trip-based) VMT assessments.[29] It is critical, however, that the agency be consistent in its VMT measurement approach throughout the analysis to maintain an "apples-to-apples" comparison. For example, if the agency uses a home-based VMT for the threshold, it should also be use home-based VMT for calculating project VMT and VMT reduction due to mitigation measures.

Recommended threshold for office projects: A proposed project exceeding a level of 15 percent below existing regional VMT per employee may indicate a significant transportation impact.

Office projects that would generate vehicle travel exceeding 15 percent below existing VMT per employee for the region may indicate a significant transportation impact. In cases where the region is substantially larger than the geography over which most workers would be expected to live, it might be appropriate to refer to a smaller geography, such as the county, that includes the area over which nearly all workers would be expected to live.

Office VMT screening maps can be developed using tour-based data, considering either total employee VMT or employee work tour VMT. Similarly, tour-based analysis of office project VMT could consider either total employee VMT or employee work tour VMT. Where tour-based information is unavailable for threshold determination, project assessment, or assessment of mitigation, home-based work trip VMT should be used throughout all steps of the analysis to maintain an "apples-to-apples" comparison.

Recommended threshold for retail projects: A net increase in total VMT may indicate a significant transportation impact.

Because new retail development typically redistributes shopping trips rather than creating new trips,[30] estimating the total change in VMT (i.e., the difference in total VMT in the area affected with and without the project) is the best way to analyze a retail project's transportation impacts.

By adding retail opportunities into the urban fabric and thereby improving retail destination proximity, local-serving retail development tends to shorten trips and reduce VMT. Thus, lead agencies generally may presume such development creates a less-than-significant transportation impact. Regional-serving retail development, on the other hand, which can lead to substitution of longer trips for shorter ones, may tend to have a significant impact. Where such development decreases VMT, lead agencies should consider the impact to be less-than-significant.

Many cities and counties define local-serving and regional-serving retail in their zoning codes. Lead agencies may refer to those local definitions when available, but should also consider any project-

[29] See Appendix 1 for a description of these approaches.

[30] Lovejoy, et al. (2013) *Measuring the impacts of local land-use policies on vehicle miles of travel: The case of the first big-box store in Davis, California, The Journal of Transport and Land Use*.

specific information, such as market studies or economic impacts analyses that might bear on customers' travel behavior. Because lead agencies will best understand their own communities and the likely travel behaviors of future project users, they are likely in the best position to decide when a project will likely be local-serving. Generally, however, retail development including stores larger than 50,000 square feet might be considered regional-serving, and so lead agencies should undertake an analysis to determine whether the project might increase or decrease VMT.

Mixed-Use Projects

Lead agencies can evaluate each component of a mixed-use project independently and apply the significance threshold for each project type included (e.g., residential and retail). Alternatively, a lead agency may consider only the project's dominant use. In the analysis of each use, a project should take credit for internal capture. Combining different land uses and applying one threshold to those land uses may result in an inaccurate impact assessment.

Other Project Types

Of land use projects, residential, office, and retail projects tend to have the greatest influence on VMT. For that reason, OPR recommends the quantified thresholds described above for purposes of analysis and mitigation. Lead agencies, using more location-specific information, may develop their own more specific thresholds, which may include other land use types. In developing thresholds for other project types, or thresholds different from those recommended here, lead agencies should consider the purposes described in section 21099 of the Public Resources Code and regulations in the CEQA Guidelines on the development of thresholds of significance (e.g., CEQA Guidelines, § 15064.7).

Strategies and projects that decrease local VMT but increase total VMT should be avoided. Agencies should consider whether their actions encourage development in a less travel-efficient location by limiting development in travel-efficient locations.

Redevelopment Projects

Where a project replaces existing VMT-generating land uses, if the replacement leads to a net overall decrease in VMT, the project would lead to a less-than-significant transportation impact. If the project leads to a net overall increase in VMT, then the thresholds described above should apply.

As described above, a project or plan near transit which replaces affordable[31] residential units with a smaller number of moderate- or high-income residential units may increase overall VMT, because

[31] Including naturally-occurring affordable residential units.

displaced residents' VMT may increase.[32] A lead agency should analyze VMT for such a project even if it otherwise would have been presumed less than significant. The assessment should incorporate an estimate of the aggregate VMT increase experienced by displaced residents. That additional VMT should be included in the numerator of the VMT per capita assessed for the project.

If a residential or office project leads to a net increase in VMT, then the project's VMT per capita (residential) or per employee (office) should be compared to thresholds recommended above. Per capita and per employee VMT are efficiency metrics, and, as such, apply only to the existing project without regard to the VMT generated by the previously existing land use.

If the project leads to a net increase in provision of locally-serving retail, transportation impacts from the retail portion of the development should be presumed to be less than significant. If the project consists of regionally-serving retail, and increases overall VMT compared to with existing uses, then the project would lead to a significant transportation impact.

RTP/SCS Consistency (All Land Use Projects)

Section 15125, subdivision (d), of the CEQA Guidelines provides that lead agencies should analyze impacts resulting from inconsistencies with regional plans, including regional transportation plans. For this reason, if a project is inconsistent with the Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS), the lead agency should evaluate whether that inconsistency indicates a significant impact on transportation. For example, a development may be inconsistent with an RTP/SCS if the development is outside the footprint of development or within an area specified as open space as shown in the SCS.

3. Recommendations Regarding Land Use Plans

As with projects, agencies should analyze VMT outcomes of land use plans across the full area over which the plan may substantively affect travel patterns, including beyond the boundary of the plan or jurisdiction's geography. And as with projects, VMT should be counted in full rather than split between origin and destination. (Emissions inventories have sometimes spit cross-boundary trips in order to sum to a regional total, but CEQA requires accounting for the full impact without truncation or discounting). Analysis of specific plans may employ the same thresholds described above for projects. A general plan, area plan, or community plan may have a significant impact on transportation if proposed new residential, office, or retail land uses would in aggregate exceed the respective thresholds recommended above. Where the lead agency tiers from a general plan EIR pursuant to CEQA Guidelines sections 15152 and 15166, the lead agency generally focuses on the environmental impacts that are specific to the later project and were not analyzed as significant impacts in the prior EIR. (Pub. Resources Code, § 21068.5; Guidelines, § 15152, subd. (a).) Thus, in analyzing the later project, the lead agency

[32] Chapple et al. (2017) *Developing a New Methodology for Analyzing Potential Displacement,* Chapter 4, pp. 159-160, available at https://www.arb.ca.gov/research/apr/past/13-310.pdf.

would focus on the VMT impacts that were not adequately addressed in the prior EIR. In the tiered document, the lead agency should continue to apply the thresholds recommended above.

Thresholds for plans in non-MPO areas may be determined on a case-by-case basis.

4. Other Considerations

Rural Projects Outside of MPOs

In rural areas of non-MPO counties (i.e., areas not near established or incorporated cities or towns), fewer options may be available for reducing VMT, and significance thresholds may be best determined on a case-by-case basis. Note, however, that clustered small towns and small town main streets may have substantial VMT benefits compared to isolated rural development, similar to the transit oriented development described above.

Impacts to Transit

Because criteria for determining the significance of transportation impacts must promote "the development of multimodal transportation networks" pursuant to Public Resources Code section 21099, subd. (b)(1), lead agencies should consider project impacts to transit systems and bicycle and pedestrian networks. For example, a project that blocks access to a transit stop or blocks a transit route itself may interfere with transit functions. Lead agencies should consult with transit agencies as early as possible in the development process, particularly for projects that are located within one half mile of transit stops.

When evaluating impacts to multimodal transportation networks, lead agencies generally should not treat the addition of new transit users as an adverse impact. An infill development may add riders to transit systems and the additional boarding and alighting may slow transit vehicles, but it also adds destinations, improving proximity and accessibility. Such development also improves regional vehicle flow by adding less vehicle travel onto the regional network.

Increased demand throughout a region may, however, cause a cumulative impact by requiring new or additional transit infrastructure. Such impacts may be adequately addressed through a fee program that fairly allocates the cost of improvements not just to projects that happen to locate near transit, but rather across a region to all projects that impose burdens on the entire transportation system, since transit can broadly improve the function of the transportation system.

F. Considering the Effects of Transportation Projects on Vehicle Travel

Many transportation projects change travel patterns. A transportation project which leads to additional vehicle travel on the roadway network, commonly referred to as "induced vehicle travel," would need to quantify the amount of additional vehicle travel in order to assess air quality impacts, greenhouse gas emissions impacts, energy impacts, and noise impacts. Transportation projects also are required to examine induced growth impacts under CEQA. (See generally, Pub. Resources Code, §§ 21065 [defining "project" under CEQA as an activity as causing either a direct or reasonably foreseeable indirect physical change], 21065.3 [defining "project-specific effect" to mean all direct or indirect environmental effects], 21100, subd. (b) [required contents of an EIR].) For any project that increases vehicle travel, explicit assessment and quantitative reporting of the amount of additional vehicle travel should not be omitted from the document; such information may be useful and necessary for a full understanding of a project's environmental impacts. (See Pub. Resources Code, §§ 21000, 21001, 21001.1, 21002, 21002.1 [discussing the policies of CEQA].) A lead agency that uses the VMT metric to assess the transportation impacts of a transportation project may simply report that change in VMT as the impact. When the lead agency uses another metric to analyze the transportation impacts of a roadway project, changes in amount of vehicle travel added to the roadway network should still be analyzed and reported.[33]

While CEQA does not require perfection, it is important to make a reasonably accurate estimate of transportation projects' effects on vehicle travel in order to make reasonably accurate estimates of GHG emissions, air quality emissions, energy impacts, and noise impacts. (See, e.g., *California Clean Energy Com. v. City of Woodland* (2014) 225 Cal.App.4th 173, 210 [EIR failed to consider project's transportation energy impacts]; *Ukiah Citizens for Safety First v. City of Ukiah* (2016) 248 Cal.App.4th 256, 266.) Appendix 2 describes in detail the causes of induced vehicle travel, the robust empirical evidence of induced vehicle travel, and how models and research can be used in conjunction to quantitatively assess induced vehicle travel with reasonable accuracy.

If a project would likely lead to a measurable and substantial increase in vehicle travel, the lead agency should conduct an analysis assessing the amount of vehicle travel the project will induce. Project types that would likely lead to a measurable and substantial increase in vehicle travel generally include:

- Addition of through lanes on existing or new highways, including general purpose lanes, HOV lanes, peak period lanes, auxiliary lanes, or lanes through grade-separated interchanges

Projects that would not likely lead to a substantial or measurable increase in vehicle travel, and therefore generally should not require an induced travel analysis, include:

- Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity
- Roadside safety devices or hardware installation such as median barriers and guardrails

[33] See, e.g., California Department of Transportation (2006) *Guidance for Preparers of Growth-related, Indirect Impact Analyses*, available at http://www.dot.ca.gov/ser/Growth-related_IndirectImpactAnalysis/GRI_guidance06May_files/gri_guidance.pdf.

- Roadway shoulder enhancements to provide “breakdown space,” dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes
- Addition of an auxiliary lane of less than one mile in length designed to improve roadway safety
- Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left, right, and U-turn pockets, two-way left turn lanes, or emergency breakdown lanes that are not utilized as through lanes
- Addition of roadway capacity on local or collector streets provided the project also substantially improves conditions for pedestrians, cyclists, and, if applicable, transit
- Conversion of existing general purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel
- Addition of a new lane that is permanently restricted to use only by transit vehicles
- Reduction in number of through lanes
- Grade separation to separate vehicles from rail, transit, pedestrians or bicycles, or to replace a lane in order to separate preferential vehicles (e.g., HOV, HOT, or trucks) from general vehicles
- Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority (TSP) features
- Installation of traffic metering systems, detection systems, cameras, changeable message signs and other electronics designed to optimize vehicle, bicycle, or pedestrian flow
- Timing of signals to optimize vehicle, bicycle, or pedestrian flow
- Installation of roundabouts or traffic circles
- Installation or reconfiguration of traffic calming devices
- Adoption of or increase in tolls
- Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase
- Initiation of new transit service
- Conversion of streets from one-way to two-way operation with no net increase in number of traffic lanes
- Removal or relocation of off-street or on-street parking spaces
- Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)
- Addition of traffic wayfinding signage
- Rehabilitation and maintenance projects that do not add motor vehicle capacity
- Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of-way
- Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve non-motorized travel
- Installation of publicly available alternative fuel/charging infrastructure
- Addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor

1. Recommended Significance Threshold for Transportation Projects

As noted in Section 15064.3 of the CEQA Guidelines, lead agencies for roadway capacity projects have discretion, consistent with CEQA and planning requirements, to choose which metric to use to evaluate transportation impacts. This section recommends considerations for evaluating impacts using vehicle miles traveled. Lead agencies have discretion to choose a threshold of significance for transportation projects as they do for other types of projects. As explained above, Public Resources Code section 21099, subdivision (b)(1), provides that criteria for determining the significance of transportation impacts must promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses. (*Id.;* see generally, adopted CEQA Guidelines, § 15064.3, subd. (b) [Criteria for Analyzing Transportation Impacts].) With those goals in mind, OPR prepared and the Agency adopted an appropriate transportation metric.

Whether adopting a threshold of significance, or evaluating transportation impacts on a case-by-case basis, a lead agency should ensure that the analysis addresses:

- Direct, indirect and cumulative effects of the transportation project (CEQA Guidelines, § 15064, subds. (d), (h))
- Near-term and long-term effects of the transportation project (CEQA Guidelines, §§ 15063, subd. (a)(1), 15126.2, subd. (a))
- The transportation project's consistency with state greenhouse gas reduction goals (Pub. Resources Code, § 21099)[34]
- The impact of the transportation project on the development of multimodal transportation networks (Pub. Resources Code, § 21099)
- The impact of the transportation project on the development of a diversity of land uses (Pub. Resources Code, § 21099)

The CARB Scoping Plan and the CARB Mobile Source Strategy delineate VMT levels required to achieve legally mandated GHG emissions reduction targets. A lead agency should develop a project-level threshold based on those VMT levels, and may apply the following approach:

1. Propose a fair-share allocation of those budgets to their jurisdiction (e.g., by population);

[34] The California Air Resources Board has ascertained the limits of VMT growth compatible with California containing greenhouse gas emissions to levels research shows would allow for climate stabilization. (See *The 2017 Climate Change Scoping Plan: The Strategy for Achieving California's 2030 Greenhouse Gas Target* (p. 78, p. 101); *Mobile Source Strategy* (p. 37).) CARB's *Updated Final Staff Report on Proposed Update to the SB 375 Greenhouse Gas Emission Reduction Targets* illustrates that the current Regional Transportation Plans and Sustainable Communities Strategies will fall short of achieving the necessary on-road transportation-related GHG emissions reductions called for in the 2017 Scoping Plan (Figure 3, p. 35). Accordingly, OPR recommends not basing GHG emissions or transportation impact analysis for a transportation project solely on consistency with an RTP/SCS.

2. Determine the amount of VMT growth likely to result from background population growth, and subtract that from their "budget";
3. Allocate their jurisdiction's share between their various VMT-increasing transportation projects, using whatever criteria the lead agency prefers.

2. Estimating VMT Impacts from Transportation Projects

CEQA requires analysis of a project's potential growth-inducing impacts. (Pub. Resources Code, § 21100, subd. (b)(5); CEQA Guidelines, § 15126.2, subd. (d).) Many agencies are familiar with the analysis of growth inducing impacts associated with water, sewer, and other infrastructure. This technical advisory addresses growth that may be expected from roadway expansion projects.

Because a roadway expansion project can induce substantial VMT, incorporating quantitative estimates of induced VMT is critical to calculating both transportation and other impacts of these projects. Induced travel also has the potential to reduce or eliminate congestion relief benefits. An accurate estimate of induced travel is needed to accurately weigh costs and benefits of a highway capacity expansion project.

The effect of a transportation project on vehicle travel should be estimated using the "change in total VMT" method described in *Appendix 1*. This means that an assessment of total VMT without the project and an assessment with the project should be made; the difference between the two is the amount of VMT attributable to the project. The assessment should cover the full area in which driving patterns are expected to change. As with other types of projects, the VMT estimation should not be truncated at a modeling or jurisdictional boundary for convenience of analysis when travel behavior is substantially affected beyond that boundary.

Transit and Active Transportation Projects

Transit and active transportation projects generally reduce VMT and therefore are presumed to cause a less-than-significant impact on transportation. This presumption may apply to all passenger rail projects, bus and bus rapid transit projects, and bicycle and pedestrian infrastructure projects. Streamlining transit and active transportation projects aligns with each of the three statutory goals contained in SB 743 by reducing GHG emissions, increasing multimodal transportation networks, and facilitating mixed use development.

Roadway Projects

Reducing roadway capacity (for example, by removing or repurposing motor vehicle travel lanes) will generally reduce VMT and therefore is presumed to cause a less-than-significant impact on transportation. Generally, no transportation analysis is needed for such projects.

Building new roadways, adding roadway capacity in congested areas, or adding roadway capacity to areas where congestion is expected in the future, typically induces additional vehicle travel. For the types of projects previously indicated as likely to lead to additional vehicle travel, an estimate should be made of the change in vehicle travel resulting from the project.

For projects that increase roadway capacity, lead agencies can evaluate induced travel quantitatively by applying the results of existing studies that examine the magnitude of the increase of VMT resulting from a given increase in lane miles. These studies estimate the percent change in VMT for every percent change in miles to the roadway system (i.e., "elasticity").[35] Given that lead agencies have discretion in choosing their methodology, and the studies on induced travel reveal a range of elasticities, lead agencies may appropriately apply professional judgment in studying the transportation effects of a particular project. The most recent major study, estimates an elasticity of 1.0, meaning that every percent change in lane miles results in a one percent increase in VMT.[36]

To estimate VMT impacts from roadway expansion projects:

1. Determine the total lane-miles over an area that fully captures travel behavior changes resulting from the project (generally the region, but for projects affecting interregional travel look at all affected regions).
2. Determine the percent change in total lane miles that will result from the project.
3. Determine the total existing VMT over that same area.
4. Multiply the percent increase in lane miles by the existing VMT, and then multiply that by the elasticity from the induced travel literature:

[% increase in lane miles] x [existing VMT] x [elasticity] = [VMT resulting from the project]

A National Center for Sustainable Transportation tool can be used to apply this method: https://ncst.ucdavis.edu/research/tools

This method would not be suitable for rural (non-MPO) locations in the state which are neither congested nor projected to become congested. It also may not be suitable for a new road that provides new connectivity across a barrier (e.g., a bridge across a river) if it would be expected to substantially

[35] See U.C. Davis, Institute for Transportation Studies (Oct. 2015) *Increasing Highway Capacity Unlikely to Relieve Traffic Congestion*; Boarnet and Handy (Sept. 2014) *Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions*, California Air Resources Board Policy Brief, available at https://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief.pdf.
[36] See Duranton and Turner (2011) *The Fundamental Law of Road Congestion: Evidence from US cities*, available at http://www.nber.org/papers/w15376.

shorten existing trips. If it is likely to be substantial, the trips-shortening effect should be examined explicitly.

The effects of roadway capacity on vehicle travel can also be applied at a programmatic level. For example, in a regional planning process the lead agency can use that program-level analysis to streamline later project-level analysis. (See CEQA Guidelines, § 15168.) A program-level analysis of VMT should include effects of the program on land use patterns, and the VMT that results from those land use effects. In order for a program-level document to adequately analyze potential induced demand from a project or program of roadway capacity expansion, lead agencies cannot assume a fixed land use pattern (i.e., a land use pattern that does not vary in response to the provision of roadway capacity). A proper analysis should account for land use investment and development pattern changes that react in a reasonable manner to changes in accessibility created by transportation infrastructure investments (whether at the project or program level).

Mitigation and Alternatives

Induced VMT has the potential to reduce or eliminate congestion relief benefits, increase VMT, and increase other environmental impacts that result from vehicle travel.[37] If those effects are significant, the lead agency will need to consider mitigation or alternatives. In the context of increased travel that is induced by capacity increases, appropriate mitigation and alternatives that a lead agency might consider include the following:

- Tolling new lanes to encourage carpools and fund transit improvements
- Converting existing general purpose lanes to HOV or HOT lanes
- Implementing or funding off-site travel demand management
- Implementing Intelligent Transportation Systems (ITS) strategies to improve passenger throughput on existing lanes

Tolling and other management strategies can have the additional benefit of preventing congestion and maintaining free-flow conditions, conferring substantial benefits to road users as discussed above.

G. Analyzing Other Impacts Related to Transportation

While requiring a change in the methodology of assessing transportation impacts, Public Resources Code section 21099 notes that this change "does not relieve a public agency of the requirement to analyze a project's potentially significant transportation impacts related to air quality, noise, safety, or any other impact associated with transportation." OPR expects that lead agencies will continue to

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[37] See National Center for Sustainable Transportation (Oct. 2015) *Increasing Highway Capacity Unlikely to Relieve Traffic Congestion*, available at http://www.dot.ca.gov/newtech/researchreports/reports/2015/10-12-2015-NCST_Brief_InducedTravel_CS6_v3.pdf; see Duranton and Turner (2011) *The Fundamental Law of Road Congestion: Evidence from US cities*, available at http://www.nber.org/papers/w15376.

address mobile source emissions in the air quality and noise sections of an environmental document and the corresponding studies that support the analysis in those sections. Lead agencies should continue to address environmental impacts of a proposed project pursuant to CEQA's requirements, using a format that is appropriate for their particular project.

Because safety concerns result from many different factors, they are best addressed at a programmatic level (i.e., in a general plan or regional transportation plan) in cooperation with local governments, metropolitan planning organizations, and, where the state highway system is involved, the California Department of Transportation. In most cases, such an analysis would not be appropriate on a project-by-project basis. Increases in traffic volumes at a particular location resulting from a project typically cannot be estimated with sufficient accuracy or precision to provide useful information for an analysis of safety concerns. Moreover, an array of factors affect travel demand (e.g., strength of the local economy, price of gasoline), causing substantial additional uncertainty. Appendix B of OPR's General Plan Guidelines summarizes research which could be used to guide a programmatic analysis under CEQA. Lead agencies should note that automobile congestion or delay does not constitute a significant environmental impact (Pub. Resources Code, §21099(b)(2)), and safety should not be used as a proxy for road capacity.

H. VMT Mitigation and Alternatives

When a lead agency identifies a significant impact, it must identify feasible mitigation measures that could avoid or substantially reduce that impact. (Pub. Resources Code, § 21002.1, subd. (a).) Additionally, CEQA requires that an environmental impact report identify feasible alternatives that could avoid or substantially reduce a project's significant environmental impacts.

Indeed, the California Court of Appeal recently held that a long-term regional transportation plan was deficient for failing to discuss an alternative which could significantly reduce total vehicle miles traveled. In *Cleveland National Forest Foundation v. San Diego Association of Governments, et al.* (2017) 17 Cal.App.5th 413, the court found that omission "inexplicable" given the lead agency's "acknowledgment in its Climate Action Strategy that the state's efforts to reduce greenhouse gas emissions from on-road transportation will not succeed if the amount of driving, or vehicle miles traveled, is not significantly reduced." (*Cleveland National Forest Foundation*, *supra*, 17 Cal.App.5th at p. 436.) Additionally, the court noted that the project alternatives focused primarily on congestion relief even though "the [regional] transportation plan is a long-term and congestion relief is not necessarily an effective long-term strategy." (*Id.* at p. 437.) The court concluded its discussion of the alternatives analysis by stating: "Given the acknowledged long-term drawbacks of congestion relief alternatives, there is not substantial evidence to support the EIR's exclusion of an alternative focused primarily on significantly reducing vehicle trips." (*Ibid*.)

Several examples of potential mitigation measures and alternatives to reduce VMT are described below. However, the selection of particular mitigation measures and alternatives are left to the discretion of the lead agency, and mitigation measures may vary, depending on the proposed project and significant impacts, if any. Further, OPR expects that agencies will continue to innovate and find new ways to reduce vehicular travel.

Potential measures to reduce vehicle miles traveled include, but are not limited to:

- Improve or increase access to transit.
- Increase access to common goods and services, such as groceries, schools, and daycare.
- Incorporate affordable housing into the project.
- Incorporate neighborhood electric vehicle network.
- Orient the project toward transit, bicycle and pedestrian facilities.
- Improve pedestrian or bicycle networks, or transit service.
- Provide traffic calming.
- Provide bicycle parking.
- Limit or eliminate parking supply.
- Unbundle parking costs.
- Provide parking cash-out programs.
- Implement roadway pricing.
- Implement or provide access to a commute reduction program.
- Provide car-sharing, bike sharing, and ride-sharing programs.
- Provide transit passes.
- Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ride-matching services.
- Providing telework options.
- Providing incentives or subsidies that increase the use of modes other than single-occupancy vehicle.
- Providing on-site amenities at places of work, such as priority parking for carpools and vanpools, secure bike parking, and showers and locker rooms.
- Providing employee transportation coordinators at employment sites.
- Providing a guaranteed ride home service to users of non-auto modes.

Notably, because VMT is largely a regional impact, regional VMT-reduction programs may be an appropriate form of mitigation. In lieu fees have been found to be valid mitigation where there is both a commitment to pay fees and evidence that mitigation will actually occur. (*Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 140-141; *Gentry v. City of Murrieta* (1995) 36 Cal.App.4th 1359; *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 727–728.) Fee programs are particularly useful to address cumulative impacts. (CEQA Guidelines, § 15130, subd. (a)(3) [a "project's incremental contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact"].) The mitigation program must undergo CEQA evaluation, either on the program as a whole, or the in-lieu fees or other mitigation must be evaluated on a project-specific basis. (*California Native Plant Society v. County of El Dorado* (2009) 170 Cal.App.4th 1026.) That CEQA evaluation could be part of a larger program, such as a regional transportation plan, analyzed in a Program EIR. (CEQA Guidelines, § 15168.)

Examples of project alternatives that may reduce vehicle miles traveled include, but are not limited to:

- Locate the project in an area of the region that already exhibits low VMT.
- Locate the project near transit.
- Increase project density.
- Increase the mix of uses within the project or within the project's surroundings.
- Increase connectivity and/or intersection density on the project site.
- Deploy management strategies (e.g., pricing, vehicle occupancy requirements) on roadways or roadway lanes.

Appendix 1. Considerations About Which VMT to Count

Consistent with the obligation to make a good faith effort to disclose the environmental consequences of a project, lead agencies have discretion to choose the most appropriate methodology to evaluate project impacts.[38] A lead agency can evaluate a project's effect on VMT in numerous ways. The purpose of this document is to provide technical considerations in determining which methodology may be most useful for various project types.

Background on Estimating Vehicle Miles Traveled

Before discussing specific methodological recommendations, this section provides a brief overview of modeling and counting VMT, including some key terminology.

Here is an illustrative example of some methods of estimating vehicle miles traveled. Consider the following hypothetical travel day (all by automobile):

1. Residence to Coffee Shop
2. Coffee Shop to Work
3. Work to Sandwich Shop
4. Sandwich Shop to Work
5. Work to Residence
6. Residence to Store
7. Store to Residence

Trip-based assessment of a project's effect on travel behavior counts VMT from individual trips to and from the project. It is the most basic, and traditionally the most common, method of counting VMT. A trip-based VMT assessment of the residence in the above example would consider segments 1, 5, 6 and 7. For residential projects, the sum of home-based trips is called *home-based* VMT.

A *tour-based* assessment counts the entire home-back-to-home tour that includes the project. A tour-based VMT assessment of the residence in the above example would consider segments 1, 2, 3, 4, and 5 in one tour, and 6 and 7 in a second tour. A tour-based assessment of the workplace would include segments 1, 2, 3, 4, and 5. Together, all tours comprise *household* VMT.

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[38] The California Supreme Court has explained that when an agency has prepared an environmental impact report:

> [T]he issue is not whether the [lead agency's] studies are irrefutable or whether they could have been better. The relevant issue is only whether the studies are sufficiently credible to be considered as part of the total evidence that supports the [lead agency's] finding[.]

(*Laurel Heights Improvement Assn. v. Regents of the University of California* (1988) 47 Cal.3d 376, 409; see also *Eureka Citizens for Responsible Gov't v. City of Eureka* (2007) 147 Cal.App.4th 357, 372.)

Both trip- and tour-based assessments can be used as measures of transportation efficiency, using denominators such as per capita, per employee, or per person-trip.

Trip- and Tour-based Assessment of VMT

As illustrated above, a tour-based assessment of VMT is a more complete characterization of a project's effect on VMT. In many cases, a project affects travel behavior beyond the first destination. The location and characteristics of the home and workplace will often be the main drivers of VMT. For example, a residential or office development located near high quality transit will likely lead to some commute trips utilizing transit, affecting mode choice on the rest of the tour.

Characteristics of an office project can also affect an employee's VMT beyond the work tour. For example, a workplace located at the urban periphery, far from transit, can require an employee to own a car, which in turn affects the entirety of an employee's travel behavior and VMT. For this reason, when estimating the effect of an office development on VMT, it may be appropriate to consider total employee VMT if data and tools, such as tour-based models, are available. This is consistent with CEQA's requirement to evaluate both direct and *indirect* effects of a project. (See CEQA Guidelines, § 15064, subd. (d)(2).)

Assessing Change in Total VMT

A third method, estimating the *change in total VMT* with and without the project, can evaluate whether a project is likely to divert existing trips, and what the effect of those diversions will be on total VMT. This method answers the question, "What is the net effect of the project on area VMT?" As an illustration, assessing the total change in VMT for a grocery store built in a food desert that diverts trips from more distant stores could reveal a net VMT reduction. The analysis should address the full area over which the project affects travel behavior, even if the effect on travel behavior crosses political boundaries.

Using Models to Estimate VMT

Travel demand models, sketch models, spreadsheet models, research, and data can all be used to calculate and estimate VMT (see Appendix F of the preliminary discussion draft). To the extent possible, lead agencies should choose models that have sensitivity to features of the project that affect VMT. Those tools and resources can also assist in establishing thresholds of significance and estimating VMT reduction attributable to mitigation measures and project alternatives. When using models and tools for those various purposes, agencies should use comparable data and methods, in order to set up an "apples-to-apples" comparison between thresholds, VMT estimates, and VMT mitigation estimates.

Models can work together. For example, agencies can use travel demand models or survey data to estimate existing trip lengths and input those into sketch models such as CalEEMod to achieve more accurate results. Whenever possible, agencies should input localized trip lengths into a sketch model to tailor the analysis to the project location. However, in doing so, agencies should be careful to avoid double counting if the sketch model includes other inputs or toggles that are proxies for trip length (e.g., distance to city center). Generally, if an agency changes any sketch model defaults, it should record and report those changes for transparency of analysis. Again, trip length data should come from the same source as data used to calculate thresholds to be sure of an "apples-to-apples" comparison.

Additional background information regarding travel demand models is available in the California Transportation Commission's "2010 Regional Transportation Plan Guidelines," beginning at page 35.

Appendix 2. Induced Travel: Mechanisms, Research, and Additional Assessment Approaches

Induced travel occurs where roadway capacity is expanded in an area of present or projected future congestion. The effect typically manifests over several years. Lower travel times make the modified facility more attractive to travelers, resulting in the following trip-making changes:

- **Longer trips.** The ability to travel a long distance in a shorter time increases the attractiveness of destinations that are farther away, increasing trip length and vehicle travel.
- **Changes in mode choice.** When transportation investments are devoted to reducing automobile travel time, travelers tend to shift toward automobile use from other modes, which increases vehicle travel.
- **Route changes.** Faster travel times on a route attract more drivers to that route from other routes, which can increase or decrease vehicle travel depending on whether it shortens or lengthens trips.
- **Newly generated trips.** Increasing travel speeds can induce additional trips, which increases vehicle travel. For example, an individual who previously telecommuted or purchased goods on the internet might choose to accomplish those tasks via automobile trips as a result of increased speeds.
- **Land Use Changes.** Faster travel times along a corridor lead to land development farther along that corridor; that new development generates and attracts longer trips, which increases vehicle travel. Over several years, this induced growth component of induced vehicle travel can be substantial, making it critical to include in analyses.

Each of these effects has implications for the total amount of vehicle travel. These effects operate over different time scales. For example, changes in mode choice might occur immediately, while land use changes typically take a few years or longer. CEQA requires lead agencies to analyze both short-term and long-term effects.

Evidence of Induced Vehicle Travel. A large number of peer reviewed studies[39] have demonstrated a causal link between highway capacity increases and VMT increases. Many provide quantitative estimates of the magnitude of the induced VMT phenomenon. Collectively, they provide high quality evidence of the existence and magnitude of the induced travel effect.

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[39] See, e.g., Boarnet and Handy (Sept. 2014) Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions, California Air Resources Board Policy Brief, available at https://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief.pdf; National Center for Sustainable Transportation (Oct. 2015) *Increasing Highway Capacity Unlikely to Relieve Traffic Congestion*, available at http://www.dot.ca.gov/research/researchreports/reports/2015/10-12-2015-NCST_Brief_InducedTravel_CS6_v3.pdf.

Most of these studies express the amount of induced vehicle travel as an "elasticity," which is a multiplier that describes the additional vehicle travel resulting from an additional lane mile of roadway capacity added. For example, an elasticity of 0.6 would signify an 0.6 percent increase in vehicle travel for every 1.0 percent increase in lane miles. Many of these studies distinguish "short run elasticity" (increase in vehicle travel in the first few years) from "long run elasticity" (increase in vehicle travel beyond the first few years). Long run elasticity is larger than short run elasticity, because as time passes, more of the components of induced vehicle travel materialize. Generally, short run elasticity can be thought of as excluding the effects of land use change, while long run elasticity includes them. Most studies find a long run elasticity between 0.6 and just over 1.0,[40] meaning that every increase in lanes miles of one percent leads to an increase in vehicle travel of 0.6 to 1.0 percent. The most recent major study finds the elasticity of vehicle travel by lanes miles added to be 1.03; in other words, each percent increase in lane miles results in a 1.03 percent increase in vehicle travel.[41] (An elasticity greater than 1.0 can occur because new lanes induce vehicle travel that spills beyond the project location.) In CEQA analysis, the long-run elasticity should be used, as it captures the full effect of the project rather than just the early-stage effect.

Quantifying Induced Vehicle Travel Using Models. Lead agencies can generally achieve the most accurate assessment of induced vehicle travel resulting from roadway capacity increasing projects by applying elasticities from the academic literature, because those estimates include vehicle travel resulting from induced land use. If a lead agency chooses to use a travel demand model, additional analysis would be needed to account for induced land use. This section describes some approaches to undertaking that additional analysis.

Proper use of a travel demand model can capture the following components of induced VMT:

- Trip length (generally increases VMT)
- Mode shift (generally shifts from other modes toward automobile use, increasing VMT)
- Route changes (can act to increase or decrease VMT)
- Newly generated trips (generally increases VMT)
  - Note that not all travel demand models have sensitivity to this factor, so an off-model estimate may be necessary if this effect could be substantial.

However, estimating long-run induced VMT also requires an estimate of the project's effects on land use. This component of the analysis is important because it has the potential to be a large component of

[40] See Boarnet and Handy (Sept. 2014) *Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions*, California Air Resources Board Policy Brief, p. 2, available at https://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief.pdf.

[41] Duranton and Turner (2011) *The Fundamental Law of Road Congestion: Evidence from US cities*, available at http://www.nber.org/papers/w15376.

the overall induced travel effect. Options for estimating and incorporating the VMT effects that are caused by the subsequent land use changes include:

1. *Employ an expert panel.* An expert panel could assess changes to land use development that would likely result from the project. This assessment could then be analyzed by the travel demand model to assess effects on vehicle travel. Induced vehicle travel assessed via this approach should be verified using elasticities found in the academic literature.
2. *Adjust model results to align with the empirical research.* If the travel demand model analysis is performed without incorporating projected land use changes resulting from the project, the assessed vehicle travel should be adjusted upward to account for those land use changes. The assessed VMT after adjustment should fall within the range found in the academic literature.
3. *Employ a land use model, running it iteratively with a travel demand model.* A land use model can be used to estimate the land use effects of a roadway capacity increase, and the traffic patterns that result from the land use change can then be fed back into the travel demand model. The land use model and travel demand model can be iterated to produce an accurate result.

A project which provides new connectivity across a barrier, such as a new bridge across a river, may provide a shortened path between existing origins and destinations, thereby shortening existing trips. In rare cases, this trip-shortening effect might be substantial enough to reduce the amount of vehicle travel resulting from the project below the range found in the elasticities in the academic literature, or even lead a net reduction in vehicle travel overall. In such cases, the trip-shortening effect could be examined explicitly.

Whenever employing a travel demand model to assess induced vehicle travel, any limitation or known lack of sensitivity in the analysis that might cause substantial errors in the VMT estimate (for example, model insensitivity to one of the components of induced VMT described above) should be disclosed and characterized, and a description should be provided on how it could influence the analysis results. A discussion of the potential error or bias should be carried into analyses that rely on the VMT analysis, such as greenhouse gas emissions, air quality, energy, and noise.

Appendix B

ITE Guidelines

GUIDELINES FOR TRANSPORTATION IMPACT STUDIES IN THE SAN DIEGO REGION

May 2019

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1.0 BACKGROUND

The original Guidelines for Traffic Impact Studies in the San Diego Region (ITE/SANTEC, 2000) have been in use for over 19 years. They were developed by a group of volunteers from the San Diego Section of the Institute of Transportation Engineers (ITE) and the San Diego Traffic Engineers Council (SANTEC). The guidelines were later incorporated into the region's Congestion Management Program (CMP) prepared by the San Diego Association of Governments (SANDAG, 2008). Although inclusion in the Congestion Management Program (CMP) increased the visibility of the guidelines for a period of time, SANDAG has since opted out of the CMP process.

The intent in preparing the year 2000 guidelines was to promote consistency in the methodology for traffic impact studies used by different agencies in the San Diego region. While these guidelines were not intended to be used as a standard or a requirement, they provided a methodology for traffic impact studies that was similar to the methodology used by most agencies within the region. Some agencies in the region have "adopted" the guidelines by specifying that traffic impact studies follow the procedures recommended by the guidelines. Other agencies, including San Diego County and the City of San Diego, prepared their own guidelines, which included some elements in common with the regional guidelines.

The impetus to develop a revised set of regional transportation impact study guidelines is primarily related to the passage of Senate Bill 743 (SB 743) in the fall of 2013. This legislation led to a change in the way that transportation impacts are measured under the California Environmental Quality Act (CEQA). Starting on July 1, 2020, automobile delay and level of service (LOS) may no longer be used as the performance measure to determine the transportation impacts of land development projects under CEQA. Instead, an alternative metric that supports the goals of the SB 743 legislation will be required. Although there is no requirement to use any particular metric, the use of vehicle miles traveled (VMT) has been recommended by the Governor's Office of Planning and Research (OPR). This requirement does not modify the discretion lead agencies have to develop their own methodologies or guidelines, or to analyze impacts to other components of the transportation system, such as walking, bicycling, transit, and safety. SB 743 also applies to transportation projects, although agencies were given flexibility in the determination of the performance measure for these types of projects.

The intent of SB 743 is to bring CEQA transportation analyses into closer alignment with other statewide policies regarding greenhouse gases, complete streets, and smart growth. Using VMT as a performance measure instead of LOS is intended to discourage suburban sprawl, reduce greenhouse gas emissions, and encourage the development of smart growth, complete streets, and multimodal transportation networks.

2.0 PURPOSE OF GUIDELINES

The guidelines described in this report were prepared to provide methodologies for transportation engineers and planners to conduct CEQA transportation analyses for land development and transportation projects in compliance with SB 743. Lead agencies may opt-in to using VMT at any time but will be required to use it for analysis of transportation impacts of land development projects starting July 1, 2020. In addition, methodologies are provided to evaluate automobile delay and LOS outside of the CEQA process. Although no longer incorporated in CEQA (starting July 1, 2020), automobile delay and LOS continue to be of interest to transportation engineers and planners who plan, design, operate, and maintain the roadway system. In addition, delay experienced due to traffic congestion is a concern to drivers and passengers of vehicles using the roadway system.

Given the need to prepare VMT-based CEQA transportation impact analyses to satisfy the requirements of SB 743 as well as the need to evaluate the performance of the roadway system based on delay and LOS, these guidelines are divided into separate parts. Part I is focused on CEQA transportation impact analyses, while Part II is focused on the more traditional LOS-based transportation analyses, called local transportation analysis for the purpose of these guidelines. Local transportation analysis includes evaluation of any multimodal transportation improvements (transit, bicycle, pedestrian) that are recommended to support a land development project but may or may not be required as mitigation measures for a project's significant VMT impacts. Background information for each is provided below with more detail included in the sections that follow.

CEQA TRANSPORTATION IMPACT ANALYSIS

The SB 743 legislation specified that the Governor's Office of Planning and Research (OPR) prepare guidelines for the implementation of SB 743. During the period from the passage of SB 743 in 2013 to the fall of 2018, OPR prepared various sets of guidelines and sought public comments from stakeholders. At the time of preparation of these transportation impact study guidelines, guidance regarding the changes to CEQA initiated by SB 743 were contained in the following documents:

- CEQA Guidelines Revisions: Revisions to the CEQA Guidelines were adopted into CEQA in December 2018 through a formal process conducted by the Natural Resources Agency. Additional changes can only be made through a future CEQA update process.

- Technical Advisory on Evaluating Transportation Impacts in CEQA (Technical Advisory): The technical advisory provides recommendations for the preparation of transportation impact analyses under SB 743. It is not formally included in CEQA and can be revised by OPR at any time without going through a formal process. Updated versions of the technical advisory are expected to be issued by OPR as new information becomes available and as California agencies gain experience in applying SB 743 to actual projects. As of the time of preparation of these transportation impact study guidelines, the current version of the technical advisory was dated December 2018.

In addition to the differences described above, the CEQA Guidelines revisions and the technical advisory also differ in the extent to which they must be followed by local agencies. The CEQA Guidelines revisions are rules that must be followed in order to prepare an adequate CEQA document. In contrast, the technical advisory provides statewide guidance based on evidence collected by OPR that can be refined or modified by local agencies with appropriate justification and substantial evidence. (Refer to CEQA Guidelines Section 15384 for a definition of substantial evidence). As an example, the CEQA Guidelines revisions specify that a land development project's effect on automobile delay does not cause a significant environmental impact. The use of VMT is suggested as a performance metric, but there is no indication of what level of VMT increase would cause a significant environmental impact. The technical advisory suggests various thresholds for the significance of VMT impacts but does not require the use of a particular threshold. Therefore, lead agencies would be prohibited from using automobile delay to determine significant transportation impacts and would be required to use VMT instead. Lead agencies have discretion to select their preferred significance thresholds and could choose to use the thresholds suggested in the technical advisory or develop alternative thresholds. Either decision should be supported by substantial evidence that considers the legislative intent objectives of SB 743 and the specific direction the statute provides regarding setting thresholds (per the excerpts below):

> SB 743 Statute - Legislative Intent – Senate Bill No. 743, Section (b)(2)
> *More appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of greenhouse gas emissions.*

> SB 743 Statute – Section 21099(b)(1)
> *Those criteria shall promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses.*

Regardless of the changes described above, SB 743 is clear in its intent that CEQA documents continue to address noise, air quality, and safety (per the excerpt below):

> SB 743 Statute – Section 21099(b)(3)
> *This subdivision does not relieve a public agency of the requirement to analyze a project's potentially significant transportation impacts related to air quality, noise, safety, or any other impact associated with transportation. The methodology established by these guidelines shall not create a presumption that a project will not result in significant impacts related to air quality, noise, safety, or any other impact associated with transportation.*

Although State CEQA Guidelines section 15064.3 states that generally vehicle miles traveled is the most appropriate measure of transportation impacts, other relevant considerations may include the project's impact on transit and non-motorized travel. A complete environmental review will generally consider how projects effect VMT in addition to effects on walking, bicycling, transit, and safety.

The CEQA transportation impact analysis described in these transportation impact study guidelines is based on the technical advisory prepared by OPR, but refinements and clarifications have been added to reflect local conditions. For any subsequent revisions of the SB 743 technical advisory prepared by OPR, it would need to be determined whether the new information would suggest a change in the methodologies for conducting CEQA transportation impact studies in the San Diego region.

LOCAL TRANSPORTATION ANALYSIS

As stated above, localized traffic congestion remains a concern to transportation engineers and planners as well as the traveling public. It is recommended that consideration be given to preparation of a local transportation analysis for all land development and transportation projects which evaluate a project's access and circulation within and nearby the project site. The local transportation analysis would provide analysis of roadway conditions where there is the potential that substantial worsening of traffic congestion would result due to implementation of the project. In addition, it would analyze the need for multimodal improvements in cases where there is the potential for the project to cause a substantial worsening of conditions for multimodal travel. Since any increases in traffic congestion or vehicular delay would not constitute a significant environmental impact, the local transportation analysis could be included in the project's CEQA document for information only or it could be provided in a separate document. The purposes of the local transportation analysis may include, but are not limited to the following:

- Recommendations for any roadway improvements that should be built/implemented by the project (or should be built/implemented by the project in coordination with other nearby land development projects) based on the project's expected effect on vehicular delay and LOS.

- Recommendations for any multimodal transportation improvements (transit, bicycle, pedestrian) that should be built/implemented by the project (or should be built/implemented by the project in coordination with other nearby land development projects). Recommended multimodal transportation improvements may be required as mitigation measures for transportation impacts related to VMT increases or they may be recommended for other reasons.

- Transportation analysis needed to determine the appropriate level of fees for multimodal transportation improvements if the local jurisdiction has a fee program in place.

- Documentation of the project's expected effect on vehicular delay and level of service in the nearby transportation system.

The roadway analysis methodologies recommended for conducting local transportation analysis, as detailed in Part II of these guidelines, are based on the previous regional traffic impact study guidelines, with changes to reflect evolution in the practice that has occurred. Users of these guidelines should note that transportation analysis advances occur each year as documented through key conferences, including the Transportation Research Board (TRB) Annual Meeting. Further, new data vendors, and new mobility options continue to evolve. As such, the recommended methodologies in this document may require ongoing updates and refinements. The recommended methodologies for multimodal transportation analysis generally reflect new procedures that were not included in the previous guidelines.

The intent of these guidelines is that agencies in the San Diego region be encouraged to implement Part I – CEQA guidelines to promote consistency in methodology and the pursuit of VMT reductions to meet regional and state goals. It is recognized that agencies may wish to make specific exceptions to these guidelines to account for local conditions. Agencies may also desire to have additional analyses conducted outside of the CEQA analyses to help inform staff and decision makers in reviewing a project. To that end, Part II – Local Transportation Analyses reflects an update to the previous regional Traffic Impact Study Guidelines.

3.0 PROJECT COORDINATION AND STAFF CONSULTATION

TIS preparers are encouraged to discuss the project with the lead agency's staff at an early stage in the planning process. An understanding of the level of detail and the assumptions required for the analysis should be reached. While a pre-submittal conference is highly encouraged, it may not be a requirement. For straightforward studies prepared by consultants familiar with these TIS procedures, a telephone call or email, followed by a verification of key assumptions, may suffice. Transportation impact studies should be prepared by a qualified transportation professional. Lead agencies should consider requiring that all transportation impact studies be prepared by or reviewed under the supervision of a licensed traffic engineer.

PART I – CEQA TRANSPORTATION ANALYSIS

4.0 INDIVIDUAL LAND DEVELOPMENT PROJECTS AND SPECIFIC PLANS

The recommended methodology for conducting a VMT analysis is based on guidance prepared by the California Governor's Office of Planning and Research (OPR) as provided in the published Technical Advisory on Evaluating Transportation Impacts in CEQA. At the time of writing of these guidelines, the current version of OPR's technical advisory was dated December 2018. The guidance recommended by OPR has been modified to be better suited to local conditions in the San Diego region. These modifications are noted in the details described later in this chapter.

The basic process is to compare a project's estimated VMT/capita or VMT/employee to average values on a regional, citywide, or community basis. The target is to achieve a project VMT/capita or VMT/employee that is 85% or less of the appropriate average based on suggestions in these guidelines. Note that lead agencies have discretion for choosing a VMT metric and threshold. The selection should represent how VMT reduction is balanced against other objectives of the lead agency and be supported by substantial evidence.

The methodology for determining VMT/capita or VMT/employee is related to the project's expected daily trip generation. The process for determining appropriate methodology to be used for conducting a VMT analysis for individual land development projects and specific plans is summarized in Figure 4-1.

The remainder of this section of the guidelines is divided into individual components that describe different aspects of the methodology. Other methodologies for VMT analysis could be considered at the discretion of the lead agency. However, it is recommended that any VMT methodologies within a particular analysis use consistent methodologies and that VMT analysis consider the differences between trip-based VMT analysis methodologies and tour-based VMT methodologies, as described in OPR's technical advisory.

MINIMUM PROJECT SIZE

It is recommended that lead agencies determine a minimum project size, below which VMT impacts are presumed to be less than significant. Two alternative approaches for determining minimum project size are described below.

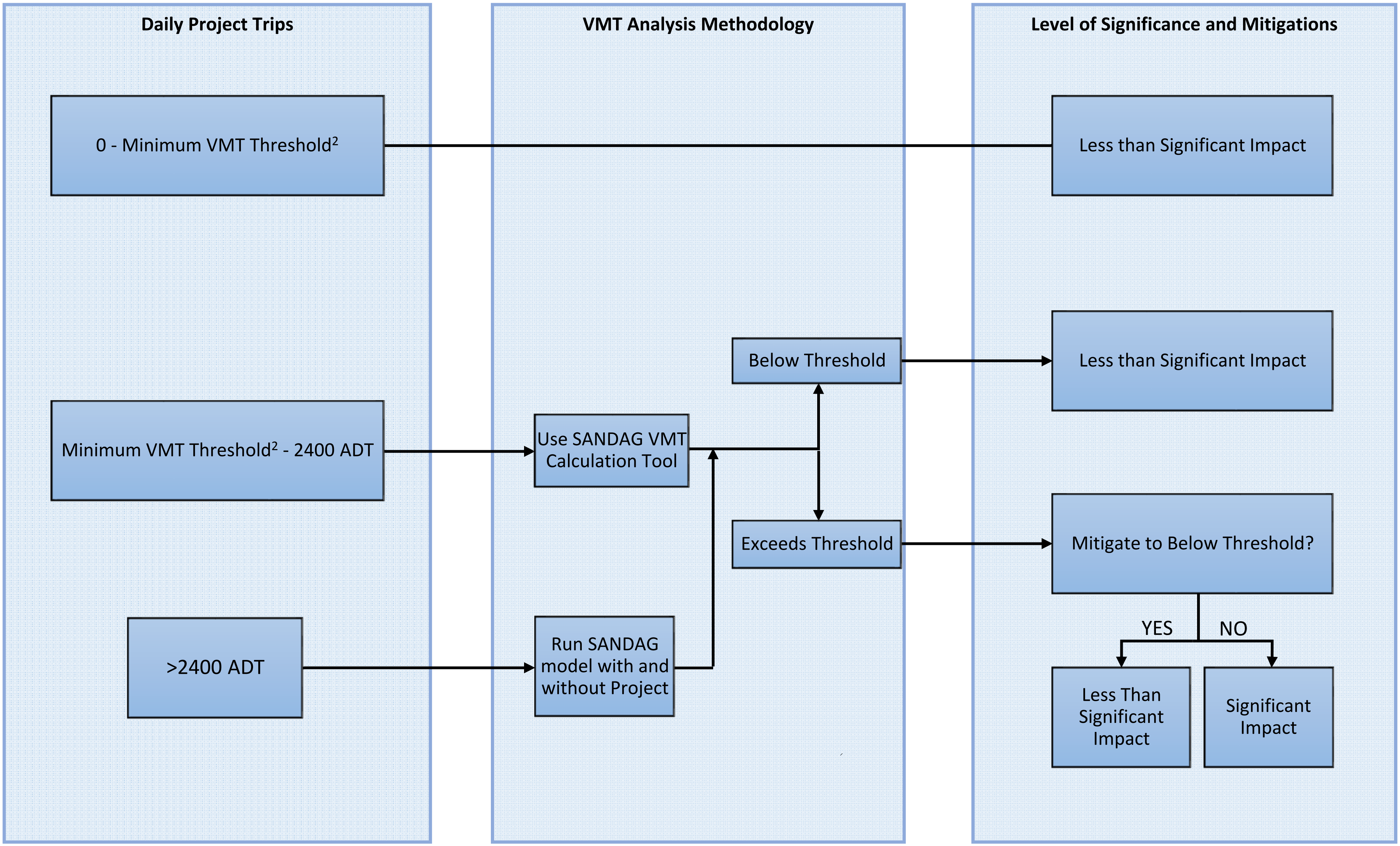
Alternative 1 – Minimum Project Size Based on Previous TIS Guidelines

Under this alternative, projects would be subjected to different levels of VMT analysis, depending on the size of the project and whether the project is consistent with the local jurisdiction's General Plan or Community Plan. Projects that are consistent with the General Plan or Community Plan are also considered to be consistent with the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS).

The determination of minimum project size for VMT analysis described below differs from the statewide guidance provided by OPR. It is based on regional standards for transportation analyses that were documented in the Guidelines for Traffic Impact Studies in the San Diego Region (ITE/SANTEC, 2000) and have been in use for over 19 years.

The following level of VMT analysis is recommended based on project size (expressed in terms of Average Daily Trips generated by the project; also known as ADT) and zoning:

Figure 4-1
VMT Analysis for Individual Land Development Projects[1]



Footnotes:

1. VMT impacts presumed to be less than significant for certain local-serving retail projects, affordable housing projects, and projects within transit priority areas. See text.
2. Minimum VMT threshold to be determined by lead agency.

Projects Inconsistent with General Plan or Community Plan

ADT	Level of Analysis
0 – 500	VMT Analysis Not Needed/VMT Impacts Presumed Less Than Significant
500 and Greater	VMT Analysis Recommended

Projects Consistent with General Plan or Community Plan

ADT	Level of Analysis
0 – 1,000	VMT Analysis Not Needed/VMT Impacts Presumed Less Than Significant
1,000 and Greater	VMT Analysis Recommended

The advantage of this alternative for determining minimum project size is that it is based on the engineering judgment of professionals who are experts in determining the effect of projects on the transportation system. It has been used successfully for over 19 years in the San Diego region and has received wide acceptance from the transportation profession, decision makers, and the public. Transportation engineers and planners who support this alternative for determining minimum project size consider it to be equally valid for the current LOS-based transportation analyses as well as the new VMT-based analyses taking effect on July 1, 2020.

Alternative 2 – Minimum Project Size Based on Statewide Guidance

Under this alternative, the minimum project size for VMT analysis would be based on statewide guidance provided by OPR. In OPR's technical advisory, the minimum project size is based a categorical exemption in CEQA that allows expansion of existing structures under certain circumstances. On page 12 of the December 2018 technical advisory, footnote 19, the following language describes the situation: "CEQA provides a categorical exemption for existing facilities, including additions to existing structures of up to 10,000 square feet, so long as the project is in an area where public infrastructure is available to allow for maximum planned development and the project is not in an environmentally sensitive area. [CEQA Guidelines, § 15301, subd. (e)(2).]"

OPR uses a general office building as the appropriate project type for the determination of minimum project size based on the exemption described above. Typical ITE trip generation rates are then applied to a 10,000 square-foot general office building which yields a minimum project size based on 110 daily trips.

If this alternative is used in the San Diego region, it is recommended that the use of regional or local trip generation rates be considered in addition to the typical trip generation rate used by OPR. For example, using the SANDAG trip generation manual (Brief Guide of Vehicular Traffic Generation Rates for the San Diego Region, April 2002), a standard commercial office would generate 20 daily trips per 1,000 square feet. Therefore, a 10,000 square-foot office would be expected to generate 200 daily trips and projects that generate less than 200 daily trips would not require a VMT analysis and would be presumed to have less than significant VMT impacts.

One advantage of this alternative is that it is based on statewide guidance with a reference to CEQA provisions. A second advantage is that it was developed in consideration of VMT as the performance measure for the determination of the transportation impacts of land development projects.

PROJECTS LOCATED NEAR TRANSIT STATIONS

OPR's technical advisory contains the following guidance regarding projects located near transit stations:

- Proposed CEQA Guideline Section 15064.3, subdivision (b)(1), states that lead agencies generally should presume that certain projects (including residential, retail, and office projects, as well as projects that are a mix of these uses) proposed within ½ mile of an existing major transit stop or an existing stop along a high quality transit corridor will have a less-than-significant impact on VMT. This presumption would not apply, however, if project-specific or location-specific information indicates that the project will still generate significant levels of VMT.

An existing major transit stop is defined as "a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods."

For the purposes of these guidelines, the distance between the project site and the transit station is typically based on direct walking distance without missing sidewalks or physical barriers.

Typically, a major transit stop would be considered to be applicable for this purpose if the transit stop were assumed to be in place in SANDAG's RTIP scenario (see Methodology for VMT analysis for further discussion of this scenario).

METHODOLOGY FOR VMT ANALYSIS

As mentioned above, it is recommended that VMT thresholds for SB 743 analysis will be developed by comparisons to average VMT/capita (for residential projects) or VMT/employee (for employment projects). The analysis can be conducted by comparing either the project VMT/capita or VMT/employee to both the San Diego regional average and the average for the city or community in which the project is located. It is recommended that if the project average is lower than either 85% of the regional average or 85% of the average for the city or community in which the project is located, the VMT impacts of the project can be presumed to be less than significant. Since this is the basis for the presumption of "less than significance," it will be up to each city in the San Diego region and the County to adopt this recommended presumption and either define its jurisdiction as a single community for the purposes of determining VMT thresholds or subdivide its jurisdiction into smaller communities for the purpose of SB 743 analysis.

It should be noted that OPR's technical advisory includes special considerations for affordable housing and these considerations are also recommended for use in the San Diego area. Projects that include 100% affordable housing in infill locations can be presumed to have a less than significant VMT impact. Infill locations will typically have better than average access to transit and/or greater opportunities for walking and bicycling trips. The exact definition of infill locations will need to be determined based on local conditions.

The VMT methodology recommended above differs from the statewide guidance recommended by OPR in the following ways:

- OPR recommends that VMT/capita comparisons for residential projects be made both on a regional and citywide basis. These guidelines recommend that a city may choose to do comparisons at a community level rather than at the citywide level. This recommendation applies to all cities within San Diego County and provides the lead agencies flexibility and discretion for selecting the threshold that is appropriate for their agency, based on their values and substantial evidence. Many communities within cities in the San Diego Region have a size and population that is comparable to a typical city on a statewide basis. The unincorporated area of San Diego County also has a governing structure in place for its communities, and the choice to do VMT/capita comparisons at a community level is also recommended to be extended to the unincorporated area of the County. The Cities of Encinitas and Chula Vista are also examples of cities that have distinct communities which have been treated differently for various historical planning considerations.

- OPR recommends that VMT/employee comparisons for employment projects be conducted at a regional basis only, as compared to VMT/capita comparisons that are made both at a regional and citywide basis. These guidelines recommend that VMT/employee comparisons be made at both the regional and at the citywide level (or community level as described above). The San Diego Region is the third largest region in California (after the Los Angeles Area and the San Francisco Bay Area). While some employment trips are made across the region (or even outside the region), there is a large incentive to live and work within a relatively short distance, even within the same city or community, to avoid the relatively long commute distances that can be experienced by traveling across the region during peak commute hours.

- OPR recommends that the VMT/capita comparisons for projects in unincorporated county areas be based on the region's VMT/capita or the average VMT/capita of all cities within the county. These guidelines recommend that VMT/capita and VMT/employee comparisons for projects in the unincorporated area of San Diego County be made to the overall average VMT/capita and VMT/employee for the unincorporated area of the county (or for individual communities if the County decides to use individual communities rather than the entire unincorporated area for VMT comparisons). San Diego County is one of the largest counties in California in terms of geography and also one of the most diverse in terms of topography and climate. While the VMT/capita comparison recommended by OPR may make sense for some counties in California, the comparisons between unincorporated areas and averages of the cities make less sense in San Diego County, where there are great differences in terms of distance and other factors between rural and urban areas of the county.

It is recommended that once the SB 743 analysis communities have been defined by local jurisdictions, SANDAG should then calculate the average VMT/capita (for residential projects) and the average VMT/employee (for employment projects) for each city or community. This calculation can be based on the Regional Transportation Improvement Plan (RTIP) scenario for future land use and transportation network, which includes expected growth through the end of the RTIP scenario and transportation network improvements that are considered to be funded through the RTIP. It is recommended that the RTIP scenario used for VMT analysis purposes will be held constant once it is created and will only be changed with each update of the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), typically every four years. It is recommended that the SANDAG online VMT analysis tool (described below) also be held constant and be updated on the same schedule as the RTP is updated and a new regional model is produced by SANDAG. If an online VMT analysis tool is not available for the RTIP scenario, it is recommended that analysts use the online VMT analysis tool published by SANDAG that most closely approximates the RTIP scenario.

Retail development falls into a category which is neither considered to be residential nor employment-based. For retail projects, these guidelines are based on the methodology recommended by OPR for retail projects. It is recommended that local-serving retail projects be presumed to have less than significant VMT impacts and regional-serving retail projects be presumed to have significant VMT impacts if they increase VMT above the level that would occur for conditions without the project. OPR's technical advisory recommends that lead agencies determine which retail projects are local-serving, but it does include a general guideline that retail projects larger than 50,000 square feet might be considered regional-serving rather than local-serving.

For some land development projects, it may not be immediately obvious whether the project is a residential project or an employment project. For these projects, the preferred methodology is to analyze the trip-making characteristics of the project and then use either the residential or employment methodology. For example, a hotel may be considered to have trip-making characteristics closer to an employment project, and therefore the employment methodology could be used for this land use category.

The recommended methodology for calculation of VMT depends on the size of the project as determined by the project's trip generation calculated in terms of ADT. The project's trip generation should be calculated using standard practice. For projects with a trip generation of less than 2,400 ADT, the recommended VMT analysis methodology is the SANDAG VMT calculation tool. SANDAG has prepared an online tool that calculates average VMT/capita and VMT/employee at the census tract level. Analysts would use this tool to determine the project's VMT/employee or VMT/capita to be compared to community, city, and/or regional averages.

Definitions of VMT/capita and VMT/employee that are used in SANDAG's VMT calculation tool are as follows:

- VMT/Capita: Includes all vehicle-based person trips grouped and summed to the home location of individuals who are drivers or passengers on each trip. It includes home-based and non-home-based trips. The VMT for each home is then summed for all homes in a particular census tract and divided by the population of that census tract to arrive at Resident VMT/Capita.

- VMT/Employee: Includes all vehicle-based person trips grouped and summed to the work location of individuals on the trip. This includes all trips, not just work-related trips. The VMT for each work location is then summed for all work locations in a particular census tract and divided by the number of employees of that census tract to arrive at Employee VMT/Employee.

The recommended methodology for projects over 2,400 ADT is to run the regional transportation model with and without the project to determine the project's net increase in VMT and then use that value to determine VMT/employee or VMT/capita to be compared to community, city, and/or regional averages.

REDVELOPMENT PROJECTS

Recommendations for VMT analysis of redevelopment projects are based on guidance provided by OPR with the clarifications provided below.

Redevelopment projects represent a special case since the recommended VMT thresholds for SB 743 implementation represent an efficiency metric. Under SB 743, the primary goal is for all new land development projects to achieve efficiency from a VMT point of view. The efficiency or lack of efficiency of the existing land use is typically not relevant per OPR.

The following methodology is recommended:

- A redevelopment project that reduces absolute VMT (i.e. the total VMT with the project is less than the total VMT without the project) would be presumed to have less than significant VMT impacts.

- If a project increases absolute VMT, it is recommended that the VMT analysis methodology described above be applied to the proposed land use, as if the project was proposed on a vacant parcel (i.e. the existing land use didn't exist).

OPR's technical advisory includes specific recommendations that relate to redevelopment projects that replace affordable residential units with a smaller number of market-rate residential units. Those recommendations are also considered applicable for the purposes of these guidelines.

MIXED-USE PROJECTS

Recommendations for VMT analysis of mixed-use projects are based on guidance provided by OPR with additional clarifications recommended for use in the San Diego region.

The following steps are recommended:

- Calculate trip generation separately for each component of the mixed-use project using standard practice.

- Determine the reduction in external vehicle trips due to internal capture based on guidance provided in the ITE Trip Generation manual, MXD methodologies or other techniques.

- Apply the reduction in trips to the individual land uses so that the total trip generation of the individual land uses is equal to the total project trip generation, including internal capture.

- Using the reduced trip generation, determine the VMT/capita or VMT/employee for applicable land uses. SANDAG's online VMT calculation tool may be used to determine an average trip length for the land uses within a mixed-use development based on the reported VMT/capita or VMT/employee in the census tract where the project is located. The number of residents or employees will need to be estimated for each applicable land use. When using SANDAG's VMT calculation tool to estimate average trip length, analysts should be aware that the data produced by the SANDAG VMT calculation tool is based all resident VMT/capita, so it includes the VMT associated with all trips made by the resident for the day, for example trip from home to daycare to office; office to meeting to office; office to store to home. The ITE trip generation rate for residential is only home-based trips, i.e. trips that start or end at the residence. The effect of the distinction between ITE's data and the data produced by the SANDAG VMT calculation tool will vary by location, type of project, and other factors.

- Compare the VMT/capita or VMT/employee values calculated using the reduced trip generation to applicable VMT thresholds to determine whether the individual components of the mixed-use development would be expected to have a significant VMT impact. If any component of the mixed-use development would be expected to have a significant VMT impact, the project as a whole would be considered to have a significant VMT impact.

- Local-serving retail within a mixed-use development can be presumed to have a less than significant VMT impact.

PROJECTS IN RURAL AREAS

Land development projects in rural areas may be given special consideration due to their unique trip-making characteristics. OPR's technical advisory contains the following guidance regarding projects in rural areas:

- "In rural areas of non-MPO counties (i.e., areas not near established or incorporated cities or towns), fewer options may be available for reducing VMT, and significance thresholds may be best determined on a case-by-case basis. Note, however, that clustered small towns and small town main streets may have substantial VMT benefits compared to isolated rural development, similar to the transit oriented development described above."

If interpreted literally, this guidance would not apply to the San Diego region since it is an MPO County. However, rural areas are considered to have similar trip-making characteristics regardless of whether they are located in an MPO County or not. Therefore, different thresholds than described above could be considered for the rural areas of San Diego County. In order to apply this concept, local agencies would designate a portion of their jurisdiction as rural and then establish a separate threshold for the determination of significant VMT impacts.

PHASED PROJECTS

For projects proposed to be built in phases, it is recommended that each phase of the project be evaluated separately. This evaluation would include a determination of whether significant VMT impacts would occur and whether mitigation is recommended. The evaluation of VMT for each phase would include consideration of the previous project phases. For example, a project with three phases would include the following analyses:

- VMT Analysis of Phase 1: Assumes development of Phase 1 only.

- VMT Analysis of Phase 2: Assumes development of Phases 1 and 2.

- VMT Analysis of Complete Project: Assumes development of Phases 1, 2, and 3.

LAND DEVELOPMENT PROJECTS WITH A ROADWAY COMPONENT

Some individual land development projects and specific plans include the implementation of roadways as a component of the project. This requires additional consideration since land development and roadway projects are likely have different significance thresholds for VMT analysis. See Chapter 6 for recommendations for VMT analysis of roadways and other transportation projects. Land development projects may also include transit, bicycle, and pedestrian facilities as components of the project, but these types of projects would generally not be considered to increase VMT and would normally not need to be considered in the VMT analysis of a land development project.

For land development projects and specific plans with a roadway component, the following recommendations are provided:

- If it can be demonstrated that the roadway component of the project built on its own would have a less than significant impact, the roadway component of the project can be ignored and the VMT analysis can proceed based on analysis of the VMT aspects of the land development component of the project.

- If it can be demonstrated that the project as a whole would cause a net decrease in VMT, the VMT impact of the project may be considered less than significant.

- For projects with both land use and roadway components that are outside the circumstances described above, it is recommended that the VMT analysis be based on consideration of the net increase or decrease in VMT with the project implemented as compared to conditions without the project. For projects that would be expected to cause a net increase in VMT, the project would be expected to provide mitigation measures to reduce VMT to the level of the no project condition in order to have a less than significant impact. For projects in which the roadway component would require analysis of induced travel demand (see Chapter 6), the VMT generated by the induced travel should also be considered in the analysis.

MITIGATION

If a project's VMT exceeds the thresholds identified above for individual land development projects and specific plans, it may have a significant transportation impact. According to the OPR's technical advisory, when a significant impact is determined, feasible mitigation measures must be identified that could avoid or substantially reduce the impact. Lead agencies are generally given the discretion to determine what mitigation actions are "feasible," but they must rely on substantial evidence in making these determinations. In addition, CEQA requires the identification of feasible alternatives that could avoid or substantially reduce a project's significant environmental impacts.

Not all mitigation measures are physical improvements to the transportation network. A sample mitigation measure might include telework options for employees to reduce vehicular travel. Examples of other mitigation measures based on OPR's technical advisory include but are not limited to the following:

- Improve or increase access to transit.
- Increase access to common goods and services, such as groceries, schools, and daycare.
- Incorporate affordable housing into the project.
- Incorporate a neighborhood electric vehicle network.
- Orient the project toward transit, bicycle, and pedestrian facilities.
- Improve pedestrian or bicycle networks, or transit service.
- Provide traffic calming as a way to incentivize bicycling and/or walking.
- Provide bicycle parking.
- Limit or eliminate parking supply.
- Unbundle parking costs.
- Provide parking cash-out programs.

- Implement or provide access to a commute reduction program.
- Provide car-sharing, bike sharing, and ride-sharing programs.
- Provide partially or fully subsidized transit passes.
- Shift single occupancy vehicle trips to carpooling or vanpooling by providing ride-matching services or shuttle services.
- Provide telework options.
- Provide incentives or subsidies that increase the use of modes other than a single-occupancy vehicle.
- Provide on-site amenities at places of work, such as priority parking for carpools and vanpools, secure bike parking, showers and locker rooms, and bicycle repair services.
- Provide employee transportation coordinators at employment sites.
- Provide a guaranteed ride home service to users of non-auto modes.
- Contribute to a mobility fee program that funds multimodal transportation improvements, such as those described above.

Additional mitigation measures may become acceptable as agencies continue to innovate and find new ways to reduce vehicular travel.

Changes to the project design or location could potentially reduce VMT. Project alternatives based on OPR's technical advisory that may reduce vehicle miles of travel include but are not limited to the following:

- Locate the project in an area of the region that already exhibits low VMT.
- Locate the project near transit.
- Increase project density.
- Increase the mix of uses within the project or within the project's surroundings.
- Increase connectivity and/or intersection density on the project site.

OPR's technical advisory notes that because VMT is largely a regional impact, regional VMT-reduction programs may be an appropriate form of mitigation. In-lieu fees and development impact fees have been found to be valid mitigation where there is both a commitment to pay fees and evidence that mitigation will actually occur.

Fee programs are particularly useful to address cumulative impacts. The physical improvements that constitute the mitigation program as a whole must undergo CEQA evaluation, and the imposition of development impact fees or in-lieu fees shall be in accordance with applicable regulations, such as the Mitigation Fee Act. Other mitigation must be evaluated on a project-specific basis. That CEQA evaluation could be part of a larger program, such as a regional transportation plan analyzed in a Program EIR.

Quantifying the reduction in VMT associated with potential mitigation measures for land development projects and specific plans is a relatively new endeavor for transportation engineers and planners. Therefore, these guidelines do not recommend a methodology that has been in practice or has generally been accepted for local use.

One current resource that has been identified to quantify the reduction in vehicle miles traveled associated with a particular mitigation measure is the latest edition of California Air Pollution Control Officers Association's *Quantifying Greenhouse Gas Mitigation Measures, A Resource for Local Government to Assess Emission Reductions from Green Gas Mitigation Measures* (CAPCOA, August 2010), also known as the CAPCOA Report. This report provides a methodology to quantify the reductions in vehicle miles traveled for many of the mitigation measures listed above. At the time of preparation of these guidelines, new research was underway that would provide an update to the CAPCOA Report.

The following elements should be considered when utilizing the CAPCOA Report:

- The CAPCOA VMT reduction strategies include built environment changes and transportation demand management (TDM) actions. The built environment changes are scalable from the project site to larger geographic areas and are often captured in regional travel forecasting models such as the SANDAG model. Prior to any application of a built environment change to a project as mitigation, the project analyst should verify that the project VMT forecasting tool or model is appropriately accurate and sensitive to built-environment effects and that no double counting will occur in the application of the mitigation measure. The TDM actions are sensitive to the project site and ultimate building tenants. As such, VMT reductions associated with TDM actions cannot be guaranteed through CEQA mitigation without ongoing monitoring and adjustment.

- There are rules for calculating the VMT reduction when applying multiple mitigation measures. The CAPCOA Report rules should be considered.

- Only "new" mitigation measures should be included in the analysis to prevent double counting. For example, if the project is located near transit, the VMT reduction cannot be applied if the project utilized a model that factored in the project's proximity to transit. In addition, telecommuting is included in SANDAG's base model.

- Mitigation measures should be applied to the appropriate user group (employees, guest/patrons, etc.). If a certain measure applies to multiple user groups, the weighted average should be considered as the effect of the mitigation measure will vary based on the user group.

A second resource that is available is the VMT calculation tool that was provided as part of SANDAG's Mobility Management Toolbox project.

Additional VMT calculation tools are currently available or under development by several local agencies in California. Although these tools are being developed for specific jurisdictions, they could be adopted or modified for use in individual jurisdictions in San Diego County. At the time of development of these guidelines, the following calculation tools were publicly available.

- City of San Jose: A VMT calculation tool and other information can be found at the following website: http://www.sanjoseca.gov/vmt.

5.0 COMMUNITY PLANS AND GENERAL PLANS

The recommended methodology for conducting a VMT analysis for community plans and general plans is to compare the existing VMT/capita for the community plan or general plan area with the expected horizon year VMT/capita. The recommended target is to achieve a lower VMT/capita in the horizon year with the proposed plan than occurs for existing conditions.

The calculation of VMT for a planning area requires different considerations than the calculation of VMT for an individual project or a specific plan. Generally, the use of a computerized travel forecasting model (such as the SANDAG regional model) would be needed. For details on the calculation of VMT for a planning area, analysts are referred to ITE's paper on VMT calculations (Vehicle Miles Travelled Calculations Using the SANDAG Regional Model, 2013).

If VMT analysis for a community plan or general plan requires consideration of mitigation measures to mitigate significant VMT impacts, potential mitigation measures would be similar to those used for land development projects with some modifications. The following measures could be considered:

- Modify the land use plan to increase development in areas with low VMT/capita characteristics and/or decrease development in areas with high VMT/capita characteristics.
- Provide enhanced bicycle and/or pedestrian facilities.
- Add roadways to the street network if those roadways would provide shorter travel paths for existing and/or future trips.
- Improve or increase access to transit.
- Increase access to common goods and services, such as groceries, schools, and daycare.
- Incorporate a neighborhood electric vehicle network.
- Provide traffic calming to incentivize bicycling and walking.
- Limit or eliminate parking supply.
- Unbundle parking costs.
- Provide parking or roadway pricing or cash-out programs.
- Implement or provide access to a commute reduction program.
- Provide car-sharing, bike sharing, and ride-sharing programs.
- Shift single occupancy vehicle trips to carpooling or vanpooling by providing ride-matching services or shuttle services.
- Provide telework options beyond those already assumed in current plans.
- Provide incentives or subsidies that increase the use of modes other than a single-occupancy vehicle.
- Provide employee transportation coordinators at employment sites.
- Provide a guaranteed ride home service to users of non-auto modes.

Additional mitigation measures may become acceptable as agencies continue to innovate and find new ways to reduce vehicular travel.

6.0 TRANSPORTATION PROJECTS

STATEWIDE GUIDANCE

Statewide guidance for the analysis of transportation projects after the implementation of SB 743 is based on the revisions to CEQA guidelines adopted in December 2018 and OPR's technical advisory dated December 2018. This guidance may be summarized as follows:

- The revised CEQA guidelines allow lead agencies the discretion to choose a performance measure and significance thresholds for the determination of the significant impacts of transportation projects, including the continued use of level of service as a performance measure.
- OPR's technical advisory recommends the use of VMT as the appropriate performance measure for transportation projects, but it does not include a recommendation for significance thresholds. It also states that transit, bicycle, and pedestrian projects can generally be presumed to have less than significant VMT impacts.
- If VMT is selected as the performance measure for roadway projects, OPR's technical advisory recommends the inclusion of induced travel demand in the VMT calculations for roadway projects. Induced travel demand is the travel demand that would be generated by new land development projects that are built as a result of reduced travel times provided by a new roadway project.

RECOMMENDATIONS FOR THE SAN DIEGO REGION

The approach to analysis of transportation projects recommended for use in the San Diego Region is summarized as follows:

- Transit, bicycle, and pedestrian projects can generally be presumed to have less than significant VMT impacts since they will tend to reduce VMT, as suggested by OPR's technical advisory.
- For roadway projects, VMT is the recommended performance measure. This performance measure is considered to be best suited to meeting the intent of SB 743, since focusing on VMT tends to encourage smart growth development, a reduction in vehicle trips, and the construction of multimodal transportation networks.
- VMT analysis for roadway projects can best be considered at regional, citywide, and community levels prior to the consideration of individual projects. Most roadway projects are included in the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), city circulation elements of the general plan, and/or in the circulation elements of community plans. A typical process would be for a roadway to be added to a citywide or community plan first, then incorporated into the RTP/SCS prior to the initiation of a CEQA analysis for the project. Inclusion in the citywide or community plan is considered to be a point at which the project has been accepted into the future planning process. Therefore, inclusion of a project in the citywide or community plan is recommended as the threshold of significance for VMT analysis. It is recommended that projects included in the citywide or community plan may be presumed to have less than significant VMT impacts.

- Individual roadway projects that are not included in the citywide or community plan could be presumed to have less than significant VMT impacts if they have no net increase in VMT compared to the no project condition or if they provide mitigation measures that would reduce VMT to levels at or below the no project condition.

Additional details are provided below.

VMT is the recommended performance measure for the analysis of transportation projects. The recommended methodology for conducting a VMT analysis for transportation projects is to compare the project with the community plan or general plan in which the project is located to determine whether the project would increase VMT as compared to the VMT that would be expected to occur with the community plan or general plan. This is summarized in Figure 6-1. The analysis would vary depending on the mode of travel associated with the project and based on whether the project is currently included in the community plan or general plan.

- Transit, bicycle, and pedestrian projects that would encourage the use of these modes of travel would be expected to reduce VMT, would not require a detailed VMT analysis, and would be presumed to have a less than significant impact on transportation. For these project types, the presumption of less than significant impact would apply even if the project was not in the community plan or general plan.

- Roadway projects (or multimodal projects that include roadways) that are included in the community or general plan would be presumed to have less than significant VMT impacts. In the case of some projects, a similar project may have been included in the community plan or general plan, but revisions or refinements have been incorporated. If the revisions or refinements are expected to cause increases in VMT, analysis should be conducted to compare the proposed project to the project description in the community plan or general plan. Projects that cause VMT increases, in comparison to similar projects proposed in the community plan or general plan, would need to reduce VMT levels below the level of VMT expected in the community plan or general plan in order to avoid a significant VMT impact.

- Roadway projects (or multimodal projects that include roadways) that are not included in the community or general plan would need a detailed analysis of VMT to determine whether the project would be expected to increase or decrease VMT as compared to VMT levels in the community plan or general plan. For small projects, the VMT analysis could be conducted using sketch planning techniques. For large projects, the analysis would generally require the use of a computerized travel forecasting model (such as the SANDAG regional model). For very large projects (i.e. projects that would reduce travel time by five minutes or more for any individual trips), consideration should be given to conducting an analysis of induced demand as described in OPR's technical advisory. The five-minute threshold for analysis of induced demand is based on a research paper published by the Transportation Research Board (Effects of Increased Highway Capacity: Results of Household Travel Behavior Survey, Richard G. Dowling and Steven B. Colman, Transportation Research Record 1493, Transportation Research Board, 1995). This research concluded that projects that decrease travel time by more than five minutes for a large number of trips would probably warrant an upward adjustment of travel demand.

The statewide guidance for VMT analysis of transportation projects is less specific than the guidance provided for land development projects. In the case of transportation projects, new CEQA guidance allows lead agencies the discretion to choose the performance measure for transportation analysis, including the use of level of service and delay as a performance measure. OPR's technical advisory provides guidance indicating that VMT is the preferred measure of effectiveness for transportation projects but it has no authority to require the use of VMT as a performance measure. Although OPR's technical advisory encourages the use of VMT as a performance measure, it does not recommend a particular threshold of significance for VMT.

Given the available statewide guidance, these guidelines recommend the use of VMT as the performance measure for transportation projects. The recommended significance threshold is the level of VMT expected based on the community plan or general plan in which the project is located. This methodology is recommended for the following reasons:

- Although the new CEQA guidance allows for the use of any appropriate performance measure for the analysis of transportation projects, the intent of the SB 743 legislation was taken into consideration in the selection of a performance measure. SB 743 is intended to promote multimodal transportation networks, encourage infill development, and promote reduction of greenhouse gases. VMT is considered to be the performance measure that best reflects this intent.

- OPR's technical advisory encourages the use of VMT as a performance measure. Although this recommendation is not binding, the intent of these guidelines is to follow OPR's guidance, except in cases where there are regional characteristics or other factors that suggest a revision or clarification.

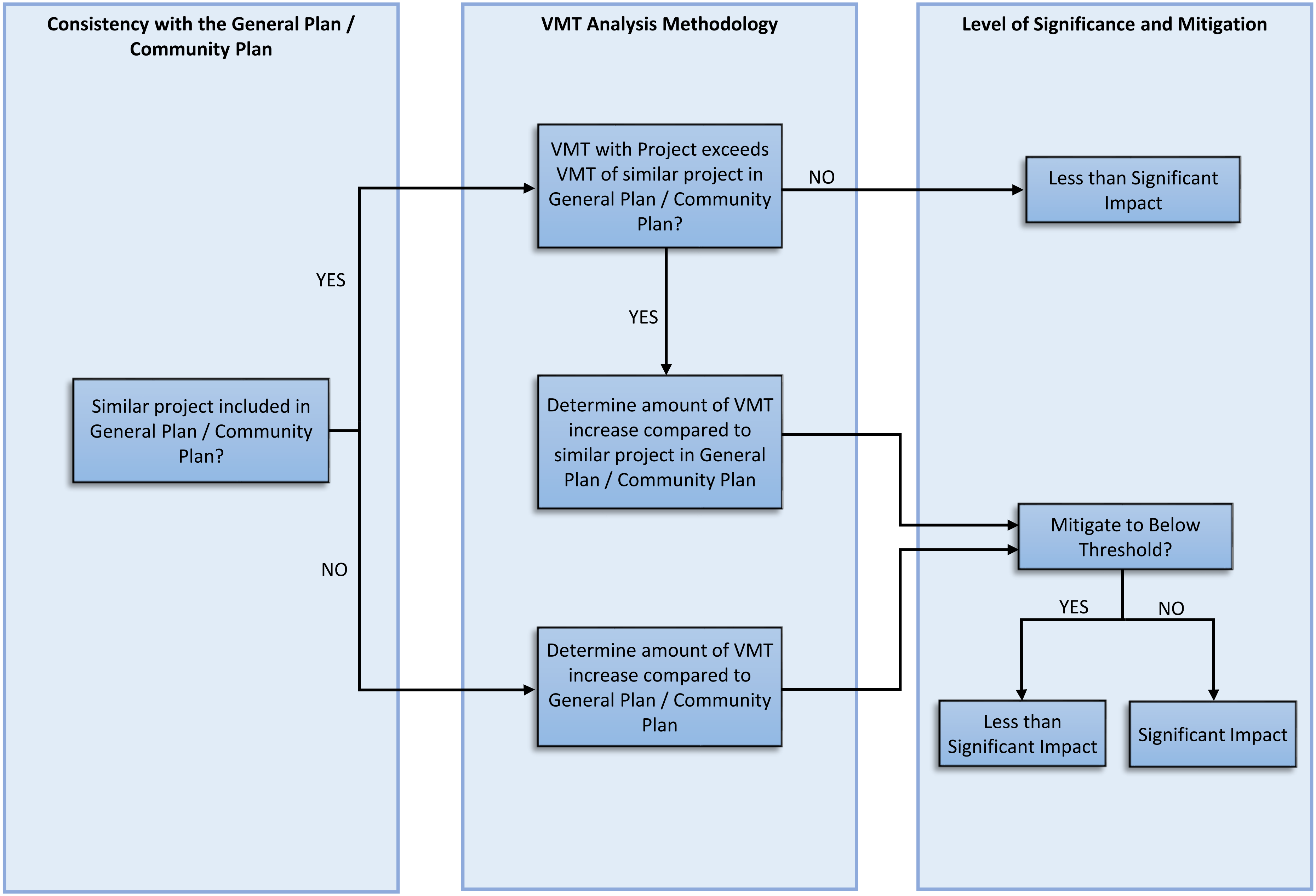
- The use of community plan or general plan consistency as a VMT threshold is based on the process by which transportation projects are incorporated into a community plan or general plan. In order for a transportation project to be incorporated into a community or general plan, a considerable amount of analysis is typically conducted. Community plans and general plans typically include the preparation of an Environmental Impact Report that considers a variety of environmental impacts, including transportation impacts. Since community plans and general plans are considered to represent sound urban planning decisions, consistency with these plans is considered to be a reasonable benchmark for the determination of a VMT significance threshold.

While the guidance described above is considered to be appropriate for larger transportation projects, smaller projects would be presumed to have less than significant VMT impacts based on their size or other considerations. Following is a list of projects considered to be in this category. This list in based on information in OPR's technical advisory, with revisions and clarifications based on local conditions:

1. Rehabilitation, maintenance, replacement and repair projects designed to improve the condition of existing transportation assets (e.g., highways, roadways, bridges, culverts, tunnels, transit systems, and assets that serve bicycle and pedestrian facilities) and that do not add motor vehicle capacity

2. Roadside safety devices or hardware installation such as median barriers and guardrails

Figure 6-1
VMT Analysis Flow Chart for Transportation Projects



3. Roadway shoulder enhancements to provide "breakdown space," dedicated space for use only by transit vehicles, to provide bicycle access, or otherwise to improve safety, but which will not be used as automobile vehicle travel lanes

4. Addition of an auxiliary lane of less than two miles in length

5. Installation, removal, or reconfiguration of traffic lanes at intersections that are intended to provide operational or safety improvements

6. Addition of roadway capacity on local or collector streets provided the project also includes appropriate improvements for pedestrians, cyclists, and, if applicable, transit

7. Conversion of existing general purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel

8. Addition of a new lane that is intended to be restricted to use only by transit vehicles

9. Reduction in number of through lanes

10. Grade separation to separate vehicles from rail, transit, pedestrians or bicycles, or to replace a lane in order to separate preferential vehicles (e.g., HOV, HOT, or trucks) from general vehicles

11. Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority (TSP) features

12. Installation of traffic metering systems, detection systems, cameras, changeable message signs, and other electronics designed to optimize vehicle, bicycle, or pedestrian flow

13. Timing of signals to optimize vehicle, bicycle, or pedestrian flow

14. Installation of roundabouts or traffic circles

15. Installation or reconfiguration of traffic calming devices

16. Adoption of or increase in tolls

17. Addition of tolled lanes, where tolls are sufficient to mitigate any potential VMT increase

18. Initiation of new transit service

19. Conversion of streets from one-way to two-way operation with no net increase in number of traffic lanes

20. Removal or relocation of off-street or on-street parking spaces

21. Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)

22. Addition of traffic wayfinding signage

23. Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of-way

24. Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve non-motorized travel

25. Installation of publicly available alternative fuel/charging infrastructure

26. Addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor

27. Roadway striping modifications that don't change the number of through lanes

Regardless of the project type and analysis method, projects that would be expected to have a significant VMT increase would be expected to consider mitigation measures. Potential mitigation measures would include the following:

- Deploy management strategies (e.g., pricing, vehicle occupancy requirements) on roadways or roadway lanes.
- Improve pedestrian or bicycle networks, or transit service.

Additional mitigation measures may become acceptable as agencies continue to innovate and find new ways to reduce vehicular travel.

PART II – LOCAL TRANSPORTATION ANALYSIS

7.0 ROADWAY

It is recommended that consideration be given to preparation of a local transportation analysis (LTA) for all land development and transportation projects. This section describes the recommended methodology for analysis of local roadway conditions.

The purpose of the roadway analysis portion of an LTA is to forecast, describe, and analyze how a development will affect existing and future circulation infrastructure for users of the roadway system, including vehicles, bicycles, pedestrians, and transit. The LTA assists transportation engineers and planners in both the development community and public agencies when making land use, mobility infrastructure, and other development decisions. An LTA quantifies the expected changes in transportation conditions and translates these changes into transportation system effects in the vicinity of a project.

The roadway transportation analysis included in an LTA is separate from the transportation impact analysis conducted as part of the environmental (CEQA) project review process, as described in Part I. The purpose of the roadway transportation analysis is to ensure that all projects provide a fair share of roadway infrastructure improvements in order to accommodate their multimodal transportation demands.

The following guidelines were prepared to assist local agencies throughout the San Diego Region in promoting consistency and uniformity in local transportation studies. These guidelines do not establish a legal standard for these functions but are intended to supplement any individual manuals or level of service objectives for the various jurisdictions. These guidelines attempt to consolidate regional efforts to identify when an LTA is needed, what professional procedures should be followed, and what constitutes a significant traffic effect that should be dealt with.

The instructions outlined in these guidelines are subject to update as future conditions and experience become available. Special situations may call for variation from these guidelines. It is recommended that consultants who prepare an LTA submit a scoping letter (methodology memo) for review by the lead agency to verify the application of these guidelines and to identify any analysis needed to address special circumstances. The scoping letter in this context is used for transportation analysis only and is not related to a formal scoping process that occurs with preparation of a CEQA study. Caltrans and lead agencies should agree on the specific methods used in local transportation analysis studies involving any State Route facilities, including metered and unmetered freeway ramps.

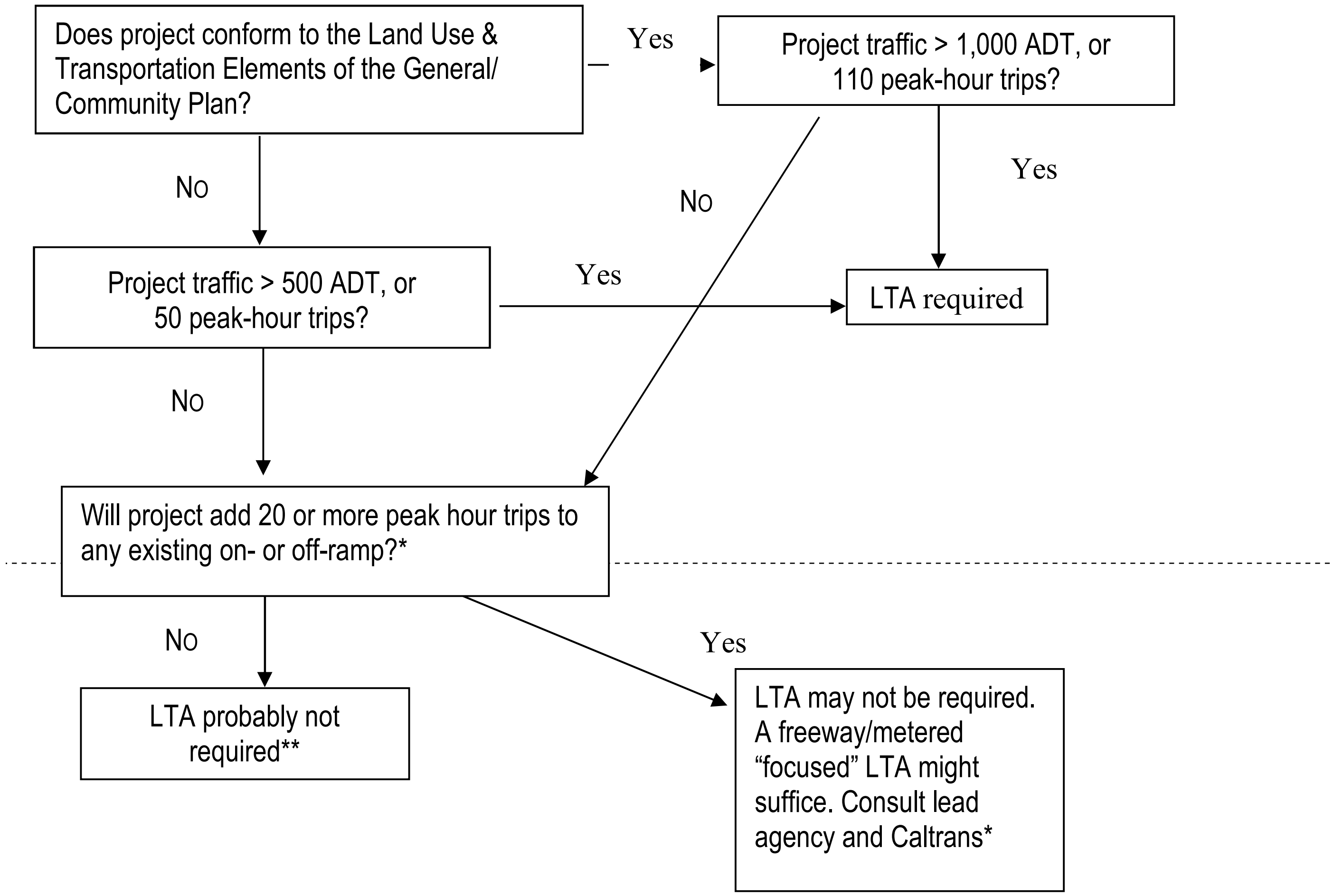
NEED FOR A STUDY

Figure 7-1 shows the flow chart for determination of when a roadway analysis should be conducted. A roadway analysis should be prepared for all projects which generate traffic greater than 1,000 total average daily driveway trips (ADT) or 100 peak-hour trips. If a proposed project is not in conformance with the land use and/or transportation element of the general or community plan, use threshold rates of 500 ADT or 50 peak-hour trips.

Early consultation with any affected jurisdictions is strongly encouraged since a "focused" or "abbreviated" roadway analysis may still be required – even if the above threshold rates are not met. An understanding of the level of detail and the assumptions required for the analysis should be reached. A pre-submittal in-person conference may not be required. However, the applicant should prepare a scoping letter for the agency's review and approval prior to preparation of the analysis.

Figure 7-1

FLOW CHART FOR LTA ROADWAY ANALYSIS



* Check with Caltrans for current ramp metering rates. (See Attachment B – Ramp Metering Analysis)

** However, for health and safety reasons, and/or local and residential street issues, an "abbreviated" or "focused" LTA may still be requested by a local agency. (For example, this may include traffic backed up beyond an off-ramp's storage capacity or may include diverted traffic through an existing neighborhood.)

STUDY PARAMETERS

It is recommended that the geographic area examined in the LTA include the following for roadways:

- All local roadway segments between signalized intersections (including all State surface routes), intersections, and mainline freeway locations where the proposed project will add 50 or more peak-hour trips in either direction to the existing roadway traffic.

- All freeway entrance and exit ramps where the proposed project will add a substantial number of peak-hour trips to cause any traffic queues to exceed ramp storage capacities (see Figure 1). (NOTE: Care must be taken to include other ramps and intersections that may receive project traffic diverted as a result of already existing or project causing congestion at freeway entrances and exits.)

The data used in the LTA should generally not be more than two years old and should not reflect a temporary interruption (special events, construction detour, etc.) in the normal traffic patterns unless that is the nature of the project itself. If recent traffic data is not available, current counts should be made by the project applicant's consultant. For areas near beaches or bays, counts should be taken during summer or adjusted to reflect summer conditions.

In general, the region-wide goal for roadway level of service (LOS) on all freeways, roadway segments, and intersections is "D." For central urbanized areas, the goal may be to achieve a level of service of "E." Individual jurisdictions have slightly different LOS objectives.

SCENARIOS TO BE STUDIED

The following scenarios are recommended to be addressed in the roadway analysis (unless there is concurrence with the lead agency that one or more of these scenarios may be omitted). Some exceptions are noted at the end of this list:

Existing Conditions: Document existing traffic levels and peak-hour levels of service in the study area. Identify locations where roadways do not meet target levels of service for existing conditions.

Existing Plus Project Conditions: Analyze the effect of the proposed project in addition to existing conditions. This scenario identifies the effect of a project on the transportation network with no other changes in conditions.

Near-term (approved and pending): Analyze the cumulative conditions resulting from the development of "other" approved and "reasonably foreseeable" pending projects (application on file) that are expected to influence the study area. This is the baseline against which project effects are assessed. The lead agency may be able to provide copies of the traffic studies for the "other" projects if they are already approved. If data is not available for near-term cumulative projects, an ambient growth factor should be used. If applicable, transportation network improvements should also be included in this scenario. This would include programmed and fully funded network improvements that are scheduled to open prior to the project's expected opening day.

Near-term + Proposed Project: Analyze the effects of the proposed project at its expected opening day in addition to near-term baseline conditions. For phased projects, a separate analysis could be conducted for each phase.

Horizon Year: Identify traffic forecasts, typically 20 years in the future, through the output of a SANDAG model forecast or other computer model approved by the local agency.

Horizon Year + Proposed Project: Analyze the additional project traffic effect to the horizon year condition. When justified, and particularly in the case of very large developments or new general/community plans, a transportation model should be run with, and without, the additional development to show the net effect on all parts of the area's transportation system.

Analysis of near-term scenarios may not be necessary if this scenario is incorporated in the agency's Traffic Impact Fee (TIF) program. If an agency has established a fee program to cover near-term improvements on all key roadways, the payment of traffic impact fees could be considered to be sufficient to offset a project's effect on these roadways.

Horizon year studies may not be needed, depending on the discretion of the lead agency. Reasons for including these scenarios may vary, but they would generally be added because the proposed project is substantially different than was expected in the Community Plan/General Plan, or if the area near the project is expected to experience land use or network changes that have not been adequately accounted for in previous planning studies.

In order to use LOS criteria to determine the need for roadway improvements (see Table 7-1), proposed model or manual forecast adjustments must be made to address scenarios both with and without the project. Model data should be carefully verified to ensure accurate project and "other" cumulative project representation. In these cases, regional or subregional models conducted by SANDAG need to be reviewed for appropriateness.

PROJECT TRAFFIC GENERATION

Use of SANDAG [*Traffic Generators Manual* and *(Not So) Brief Guide….*] or City of San Diego (*Trip Generation Manual*) rates should first be considered. Trip generation rates from ITE's latest *Trip Generation Manual* or *ITE Journal* articles could also be considered. Smart growth projects should consider use of the SANDAG Smart Growth Trip Generation and Parking Study guidelines. If local and sufficient national data do not exist, conduct trip generation studies at multiple sites with characteristics similar to those of the proposed project.

Reasonable reductions to trip rates may also be considered: (a) with proper analysis of pass-by and diverted traffic on adjacent roadways, (b) for developments near transit stations, and (c) for mixed-use developments. (Note: Caltrans and local agencies may use different trip reduction rates. Early consultation with the reviewing agencies is strongly recommended.)

Project trips can be assigned and distributed either manually or by a computer model based upon review and approval of the local agency Traffic Engineer. The magnitude of the proposed project will usually determine which method is employed.

If the manual method is used, the trip distribution percentages could be derived from existing local traffic patterns or optionally (with local agency approval) by professional judgement. If the computer model is used, the trip distribution percentages could be derived from a computer generated "select zone assignment." The centroid connectors should accurately represent project access to the street network. Preferably the project would be represented by its own traffic zone. Some adjustments to the output volumes may be needed (especially at intersections) to smooth out volumes, quantify peak volumes, adjust for pass-by and diverted trips, and correct illogical output.

ANALYSIS OF PROJECT EFFECT ON THE ROADWAY SYSTEM

It is recommended that the roadway analysis determine the effect that a project will have for each of the previously outlined study scenarios. Peak-hour capacity analyses for freeways, roadway segments (ADTs may be used here to estimate V/C ratios), intersections, and freeway ramps can be conducted for existing, near-term, and long-term conditions. The methodologies used in determining the traffic effects are not only critical to the validity of the analysis, they are pertinent to the credibility and confidence the decision-makers have in the resulting findings, conclusions, and recommendations. Methodologies for roadway capacity analyses vary by agency and change over time so it is recommended that consultation be conducted with the lead agency and/or Caltrans to determine an appropriate methodology for a particular study.

NEED FOR ROADWAY IMPROVEMENTS

Table 7-1 indicates when a project's effect on the roadway system is considered to justify need for roadway improvements. That is, if a project's traffic effect causes the values in this table to be exceeded, roadway improvements should be considered. Table 7-2 provides guidance on the levels of ADT that can be accommodated on various types of roadways, based on level of service.

It is the responsibility of Caltrans, on Caltrans initiated projects, to analyze the effect of ramp metering, for initial as well as future operational effect, on local streets that intersect and feed entrance ramps to the freeway. Developers and/or local agencies, however, should consider improvements to existing ramp meter facilities, future ramp meter installations, or local streets, when those effects are attributable to new development and/or local agency roadway improvement projects. When conducting analyses related to ramp meters, it is recommended that analysts consider calibrating the analysis in the transportation impact study to observed conditions in the field.

Not all improvement measures can feasibly consist of roadway widening (new lanes or new capacity). A sample improvement might include financing toward a defined ITS (Intelligent Transportation System) project, enhanced traffic signal communications project, or active transportation projects. This type of improvement would allow a project applicant (especially with a relatively small project) to provide improvements to the roadway system by paying into a local or regional fee program, providing the fee can be established in the near future.

Other improvement measures may include Transportation Demand Management recommendations – transit facilities, bike facilities, walkability, telecommuting, traffic rideshare programs, flex-time, carpool incentives, parking cash-out, complete or partial subsidization of transit passes, etc. Additional improvement measures may be identified as future technologies and policies evolve.

Table 7-1

DETERMINATION OF THE NEED FOR ROADWAY IMPROVEMENTS

LEVEL OF SERVICE WITH PROJECT*	ALLOWABLE CHANGE DUE TO PROJECT EFFECT**					
	FREEWAYS		ROADWAY SEGMENTS		INTERSECTIONS	RAMP*** METERING
	V/C	SPEED (MPH)	V/C	SPEED (MPH)	DELAY (SEC.)	DELAY(MIN.)
E, & F (OR RAMP METER DELAYS ABOVE 15 MIN.)	0.01	1	0.02	1	2	2

NOTES:

* All level of service measurements are based upon Highway Capacity Manual (HCM) procedures for peak-hour conditions. However, V/C ratios for Roadway Segments may be estimated on an ADT/24-hour traffic volume basis (using Table 7-2 or a similar LOS chart for each jurisdiction). The target LOS for freeways, roadways, and intersections is generally "D." For metered freeway ramps, LOS does not apply; however, ramp meter delays above 15 minutes are considered excessive.

** If a proposed project's traffic causes the values shown in the table to be exceeded, the effects of the project are determined to justify improvements. These changes may be measured from appropriate computer programs or expanded manual spreadsheets. The project applicant shall then identify feasible improvements within the LTA report that will maintain the traffic facility at the target LOS or restore to pre-project conditions. If the LOS with the proposed project becomes worse than the target (see above * note), or if the project adds a significant amount of peak-hour trips to cause any traffic queues to exceed on- or off-ramp storage capacities, roadway improvements should be considered.

*** See Attachment B for ramp metering analysis.

KEY:
- V/C = Volume to Capacity ratio
- Speed = Speed measured in miles per hour
- Delay = Average stopped delay per vehicle measured in seconds for intersections, or minutes for ramp meters
- LOS = Level of Service

Table 7-2

ROADWAY CLASSIFICATIONS, LEVELS OF SERVICE (LOS) AND AVERAGE DAILY TRAFFIC (ADT)

			LEVEL OF SERVICE W/ADT				
STREET CLASSIFICATION	LANES		A	B	C	D	E
Expressway	6 lanes		30,000	42,000	60,000	70,000	80,000
Prime Arterial	6 lanes		25,000	35,000	50,000	55,000	60,000
Major Arterial	6 lanes		20,000	28,000	40,000	45,000	50,000
Major Arterial	4 lanes		15,000	21,000	30,000	35,000	40,000
Major Arterial (One-Way)	3 lanes		12,500	16,500	22,500	25,000	27,500
Major Arterial (One-Way)	2 lanes		10,000	13,000	17,500	20,000	22,500
Secondary Arterial/ Collector	4 lanes		10,000	14,000	20,000	25,000	30,000
Collector (no center lane)	4 lanes		5,000	7,000	10,000	13,000	15,000
Collector (continuous left-turn lane)	2 lanes		5,000	7,000	10,000	13,000	15,000
Collector (no fronting property)	2 lanes		4,000	5,500	7,500	9,000	10,000
Collector (commercial- industrial fronting)	2 lanes		2,500	3,500	5,000	6,500	8,000
Collector (multi-family)	2 lanes		2,500	3,500	5,000	6,500	8,000
Collector (One-Way)	3 lanes		11,000	14,000	19,000	22,500	26,000
Collector (One-Way)	2 lanes		7,500	9,500	12,500	15,000	17,500
Collector (One-Way)	1 lane		2,500	3,500	5,000	6,500	7,500
Sub-Collector (single-family)	2 lanes		---	---	2,200	---	---

NOTES:

1. The volumes and the average daily level of service listed above are only intended as a general planning guideline.
2. Levels of service are not applied to residential streets since their primary purpose is to serve abutting lots, not carry through traffic. Levels of service normally apply to roads carrying through traffic between major trip generators and attractors.

8.0 TRANSIT

It is recommended that the geographic area examined in the LTA include the following for transit:

- All existing transit lines and transit stops within a ½ mile walking distance of the project
- Any planned transit lines or upgrades within a ½ mile walking distance of the project

In general, the region-wide goal for evaluating pedestrian, bicycle, and transit facilities is to identify opportunities to increase connectivity, frequency of service, and level of comfort. Individual jurisdictions may have different qualitative or quantitative ways of performing these evaluations.

9.0 BICYCLE

It is recommended that the geographic area examined in the LTA include the following for bicycle travel:

- All roadways adjacent to the project, extending in each direction to the nearest intersection with a classified roadway or with a Class I path
- Both directions of travel should be evaluated

In general, the region-wide goal for evaluating pedestrian, bicycle, and transit facilities is to identify opportunities to increase connectivity and level of comfort. Individual jurisdictions may have different qualitative or quantitative ways of performing these evaluations.

10.0 PEDESTRIAN

It is recommended that the geographic area examined in the LTA include the following for pedestrians:

- All pedestrian facilities directly connected to project access points or adjacent to the project development, extending in each direction to the nearest intersection with a classified roadway or connection with a Class I path
- Facilities connecting to transit stops within two blocks of the project
- Only facilities on the side of the project or along the walking route to transit stop
- Additional geographic areas may be included in certain cases to address special cases such as schools or retail centers

In general, the region-wide goal for evaluating pedestrian, bicycle, and transit facilities is to identify opportunities to increase connectivity and level of comfort. Individual jurisdictions may have different qualitative or quantitative ways of performing these evaluations.

APPENDICES

GUIDELINES FOR TRANSPORTATION IMPACT STUDIES IN THE SAN DIEGO REGION

APPENDIX A

ATTACHMENT A

Completed by Staff:
Date Received __________________
Reviewer ______________________
Date Screen Check ______________

LOCAL TRANSPORTATION ANALYSIS SCREEN CHECK

To be completed by consultant (including page #):
Name of Study ____
Consultant ____
Date Submitted ____

Indicate Page # in report:			Satisfactory YES	Satisfactory NO	NOT REQUIRED
pg. ___	1.	Table of contents, list of figures and list of tables.	☐	☐	
pg. ___	2.	Executive summary.	☐	☐	
pg. ___	3.	Map of the proposed project location.	☐	☐	
	4.	General project description and background information:			
pg. ___		a. Proposed project description (acres, dwelling units….)	☐	☐	
pg. ___		b. Total trip generation of proposed project.	☐	☐	
pg. ___		c. Community plan assumption for the proposed site.	☐	☐	
pg. ___	5.	Parking, transit and on-site circulation discussions are included.	☐	☐	
pg. ___	6.	Map of the Study Area and specific intersections studied in the traffic report.	☐	☐	
pg. ___	7.	Existing Transportation Conditions:			
		a. Figure identifying roadway conditions including raised medians, median openings, separate left and right turn lanes, roadway and intersection dimensions, bike lanes, parking, number of travel lanes, posted speed, intersection controls, turn restrictions and intersection lane configurations.	☐	☐	
		b. Figure indicating the daily (ADT) and peak-hour volumes.	☐	☐	
		c. Figure or table showing level of service (LOS) for intersections during peak hours and roadway sections within the study area (include analysis sheets in an appendix).	☐	☐	
	8.	Project Trip Generation:			
pg. ___		Table showing the calculated project generated daily (ADT) and peak hour volumes.	☐	☐	
pg. ___	9.	Project Trip Distribution using the current travel demand model (provide a computer plot) or manual assignment if previously approved. (Identify which method was used.)	☐	☐	
	10.	Project Traffic Assignment:			
pg. ___		a. Figure indicating the daily (ADT) and peak-hour volumes.	☐	☐	
pg. ___		b. Figure showing pass-by-trip adjustments, and, if cumulative trip rates are used.	☐	☐	☐
	11.	Existing Near-term Cumulative Conditions:			
pg. ___		a. Figure indicating the daily (ADT) and peak-hour volumes.	☐	☐	
pg. ___		b. Figure or table showing the projected LOS for intersections during peak hours and roadway sections within the study area (analysis sheets included in the appendix).	☐	☐	
pg. ___		c. Traffic signal warrant analysis (Caltrans Traffic Manual) for	☐	☐	

Indicate Page # in report:				Satisfactory YES	NO	NOT REQUIRED
			appropriate locations.			
	12.		Existing Near-term Cumulative Conditions + Proposed Project (each phase when applicable)			
pg. ___		a.	Figure or table showing the projected LOS for intersections during peak hours and roadway sections with the project (analysis sheets included in the appendix).	☐	☐	
pg. ___		b.	Figure showing other projects that were included in the study, and the assignment of their site traffic.	☐	☐	
pg. ___		c.	Traffic signal warrant analysis for appropriate locations.	☐	☐	
	13.		Horizon Year Transportation Conditions (if project conforms to the General/ Community Plan):			
pg. ___		a.	Horizon Year ADT and street classification that reflect the Community Plan.	☐	☐	☐
pg. ___		b.	Figure or table showing the horizon LOS for intersections during peak hours and roadway sections <u>with</u> and <u>without</u> the project (analysis sheets included in the appendix).	☐	☐	☐
pg. ___		c.	Traffic signal warrant analysis at appropriate locations.	☐	☐	☐
	14.		Horizon Year Transportation Conditions + Proposed Project (if project does not conform to the General/Community Plan):			
pg. ___		a.	Horizon Year ADT and street classification as shown in the Community Plan.	☐	☐	☐
pg. ___		b.	Horizon Year ADT and street classification for two scenarios: with the proposed project and with the land use assumed in the Community Plan.	☐	☐	☐
pg. ___		c.	Figure or table showing the horizon LOS for intersections during peak hours and roadway sections for two scenarios: <u>with</u> and <u>without</u> the proposed project and with the land use assumed in the Community Plan (analysis sheets included in the appendix).	☐	☐	☐
pg. ___		d.	Traffic signal warrant analysis at appropriate locations with the land use assumed in the General/Community Plan.	☐	☐	☐
pg. ___	15.		A summary table showing the comparison of Existing, Existing + Near-term Cumulative, Existing + Near-term Cumulative + Proposed Project, Horizon Year, and Horizon Year + Proposed Project (if different from General/Community Plan), LOS on roadway sections and intersections during peak hours.	☐	☐	
pg. ___	16.		A summary table showing the project’s “significant traffic effects.”	☐	☐	
	17.		Transportation Improvements:			
pg. ___		a.	Table identifying the improvements required that are the responsibility of the developer and others. A phasing plan is required if improvements are proposed in phases.	☐	☐	
pg. ___		b.	Figure showing all proposed improvements that include: intersection lane configurations, lane widths, raised medians, median openings, roadway and intersection dimensions, right-of-way, offset, etc.	☐	☐	
pg. ___	18.		The Highway Capacity Manual Operation Method or other approved method is used at appropriate locations within the study area.	☐	☐	
pg. ___	20.		Appropriate freeway analysis is included.	☐	☐	☐

Indicate Page # in report:			Satisfactory YES	NO	NOT REQUIRED
pg. ___	21.	Appropriate freeway ramp metering analysis is included.	☐	☐	☐
pg. ___	22.	The traffic study is signed by a California Registered Traffic Engineer.	☐	☐	

THE STUDY SCREEN CHECK FOR THE SUBJECT PROJECT IS:

____________ Approved

____________ Not approved because the following items are missing:

____

____

____

APPENDIX B

ATTACHMENT B

RAMP METERING ANALYSIS

Ramp metering analysis should be performed for each horizon year scenario in which ramp metering is expected. The following table shows relevant information that should be included in the ramp meter analysis, "Summary of Freeway Ramp Metering Effects."

LOCATION	DEMAND (veh/hr)[1]	METER RATE (veh/hr)[2]	EXCESS DEMAND (veh/hr)[3]	DELAY (min)[4]	QUEUE (feet)[5]

NOTES:

[1] DEMAND is the peak hour demand expected to use the on-ramp.

[2] METER RATE is the peak hour capacity expected to be processed through the ramp meter. This value should be obtained from Caltrans.

[3] EXCESS DEMAND = (DEMAND) – (METER RATE) or zero, whichever is greater.

[4] $$\text{DELAY} = \frac{\text{EXCESS DEMAND}}{\text{METER RATE}} \times 60 \text{ MINUTES/HOUR}$$

[5] QUEUE = (EXCESS DEMAND) X 29 feet/vehicle

NOTE: Delay will be less at the beginning of metering. However, since peaks will almost always be more than one hour, delay will be greater after the first hour of metering. (See discussion on next page.)

SUMMARY OF FREEWAY RAMP METERING EFFECTS
(Lengthen as necessary to include all affected meter locations)

LOCATION(S)	PEAK HOUR	PEAK HOUR DEMAND D	FLOW (METER RATE) F	EXCESS DEMAND E	DELAY (MINUTES)	QUEUE Q (feet)
	AM PM					
	AM PM					
	AM PM					

DISCUSSION OF RAMP METER ANALYSIS

A. CAUTION: The ramp metering analysis shown in Attachment B may lead to grossly understated results for delay and queue length, since important aspects of queue growth are ignored. Also, the draft guidelines method derives <u>average</u> values instead of <u>maximum</u> values for delay and queue length. Utilizing average values instead of maximum values can lead to obscuring important effects, particularly in regard to queue length.

Predicting ramp meter delays and queues requires a storage-discharge type of analysis, where a pattern of arriving traffic at the meter is estimated by the analyst, and the discharge, or meter rate, is a somewhat fixed value set by Caltrans for each individual metered ramp.

Since a ramp meter queue continues to grow longer during all times that the arrival rate exceeds the discharge rate, the maximum queue length (and hence, the maximum delay) usually occurs after the end of the peak (or highest) one hour. This leads to the need for an analysis for the entire time period during which the arrival rate exceeds the meter rate, not just the peak hour. For a similar reason, the analysis needs to consider that a substantial queue may have already formed by the beginning of the "peak hour." Traffic arriving during the peak hour is then stacked onto an existing queue, not just starting from zero as the draft analysis suggests.

Experience shows that the theoretical queue length derived by this analysis often does not materialize. Motorists, after a brief time of adjustment, seek alternate travel paths or alternate times of arrival at the meter. The effect is to approximately minimize total trip time by seeking out the best combinations of route and departure time at the beginning of the trip. This causes at least two important changes in the pattern or arriving traffic at ramp meters. First, the peak period is spread out, with some traffic arriving earlier and some traffic arriving later than predicted. Second, a significant proportion of the predicted arriving traffic will use another ramp, use another freeway, or stay on surface streets.

It is acceptable to make reasonable estimates of these temporal and spatial (time and occupying space) diversions as long as all assumptions are stated and that the unmodified, or theoretical values are shown for comparison.

B. Additional areas for study include being able to define acceptable levels of service (LOS) and "significant" thresholds (e.g., a maximum ramp meter delay of 15 minutes) for metered freeway entrance ramps.

Currently there are no acceptable software programs for measuring project effects on metered freeway ramps nor does the Highway Capacity Manual (HCM) adequately address this issue. Hopefully in the near future a regionwide study will be initiated to determine what metering rate (at each metered ramp) would be required in order to guarantee that traffic will flow (even at LOS "E") on the entire freeway system during peak-hour conditions. From this, the ramp delays and resultant queue lengths might then be calculated. Overall, this is a very complex issue that needs considerable research and refinement in cooperation with Caltrans.

APPENDIX C

LEVEL OF SERVICE (LOS) DEFINITIONS (generally used by Caltrans)

The concept of Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A Level of Service[s] definition generally describes these conditions in terms of such factors as speed, travel time, freedom to maneuver, comfort and convenience, and safety. Levels of Service definitions can generally be categorized as follows:

LOS	D/C*	Congestion/Delay	Traffic Description
		(Used for freeways, expressways and conventional highways[A])	
"A"	<0.41	None	Free flow.
"B"	0.42-0.62	None	Free to stable flow, light to moderate volumes.
"C"	0.63-0.79	None to minimal	Stable flow, moderate volumes, freedom to maneuver noticeably restricted.
"D"	0.80-0.92	Minimal to substantial	Approaches unstable flow, heavy volumes, very limited freedom to maneuver.
"E"	0.93-1.00	Significant	Extremely unstable flow, maneuverability and psychological comfort extremely poor.
		(Used for conventional highways)	
"F"	>1.00	Considerable	Forced or breakdown. Delay measured in average flow, travel speed (MPH). Signal-ized segments experience delays >60.0 seconds/vehicle.
		(Used for freeways and expressways)	
"F0"	1.01-1.25	Considerable 0-1 hour delay	Forced flow, heavy congestion, long queues form behind breakdown points, stop and go.
"F1"	1.26-1.35	Severe 1-2 hour delay	Very heavy congestion, very long queues.
"F2"	1.36-1.45	Very severe 2-3 hour delay	Extremely heavy congestion, longer queues, more numerous breakdown points, longer stop periods.
"F3"	>1.46	Extremely severe 3+ hours of delay	Gridlock.

[s] Level of Service can generally be calculated using the latest Highway Capacity Manual. However, contact Caltrans for more specific information on determining existing "free-flow" freeway speeds.
* Demand/Capacity ratio used for forecasts (V/C ratio used for operational analysis, where V = volume)
[A] Arterial LOS is based upon average "free-flow" travel speeds, and should refer to definitions in the HCM.

Appendix C

SANDAG Mobility Management VMT Reduction Calculator Tool Output

MOBILITY MANAGEMENT VMT REDUCTION CALCULATOR TOOL

Return to Main

Project Information

Project Name (optional):	**Fenway Mixed Use Project**
Project Address (optional):	**1900 N. Coast Hwy, Encinitas**
Project Type (optional):	**Mixed Use**
Scale of Analysis:	**Project/Site**
Analysis Location:	**Encinitas**
CPA (if applicable):	**n/a**

Project/Site Results

Project-Level Strategies		**VMT Type**	**Change in VMT**	**Exclusions**
Employer Commute Trip Reduction Programs				
1A	Voluntary Employer Commute Program	Employee commute trips	-6.2%	
1B	Mandatory Employer Commute Program	Employee commute trips		Strategy 1A selected
1C	Employer Carpool Program	Employee commute trips		Included in 1A or 1B
1D	Employer Transit Pass Subsidy	Employee commute trips		Included in 1A or 1B
1E	Employer Vanpool Program	Employee commute trips		Included in 1A or 1B
1F	Employer Telework Program	Employee commute trips		
Land Use Strategies				
2A	Transit Oriented Development	Project-generated trips		
2B	Mixed Use Development	Project-generated trips	-0.2%	
Parking Management				
3A	Parking Pricing	Project-generated trips		
3B	Parking Cash Out	Employee commute trips		
	Employee Commute Trips - Total Change in VMT		**-6.2%**	
	Project-Generated Trips - Total Change in VMT		**-0.2%**	

Citations for all Project-Level Strategies

1A. Voluntary Employer Commute Program

(1). California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

(2). Cambridge Systematics. 2009. "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions." Technical Appendices. Prepared for the Urban Land Institute. www.reconnectingamerica.org/assets/Uploads/2009movingcoolerexecsumandappend.pdf

(3). Boarnet, Marlon G., Hsin-Ping Hsu, and Susan Handy. 2014. "Impacts of Employer-Based Trip Reduction Programs and Vanpools on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief." www.arb.ca.gov/cc/sb375/policies/ebtr/ebtr_brief.pdf

1B. Mandatory Employer Commute Program

(1). California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

(2). City of South San Francisco. 2015. "2015 Genentech Annual Report." http://ci-ssf-ca.granicus.com/MetaViewer.php?view_id=2&clip_id=859&meta_id=62028

(3). Cambridge Systematics. 2009. "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions." Technical Appendices. Prepared for the Urban Land Institute. www.reconnectingamerica.org/assets/Uploads/2009movingcoolerexecsumandappend.pdf

1C. Employer Carpool Program

(1). Ewing, R. 1993. "TDM, Growth Management and the Other Four out of Five Trips." Transportation Quarterly, Vol. 48, No. 3.

(2). Victoria Transport Policy Institute. "Ridesharing: Carpooling and Vanpooling." TDM Encyclopedia. www.vtpi.org/tdm/tdm34.htm

(3). California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

(4). New York State Department of Transportation. 2019. Data from 511NYRideshare program participants.

1D. Employer Transit Pass Subsidy

(1). Nelson Nygaard. 2010. "Santa Monica LUCE Trip Reduction Impacts Analysis." City of Santa Monica Land Use and Circulation Element, Final EIR. www.smgov.net/Departments/PCD/Plans/2010-Land-Use-and-Circulation-Element/

(2). Transportation Research Board. 2010. "TCRP Report 95 Chapter 19: Employer and Institutional TDM Strategies." www.trb.org/Publications/TCRPReport95.aspx

(3). Boarnet, Marlon G., Hsin-Ping Hsu, and Susan Handy. 2014. "Impacts of Employer-Based Trip Reduction Programs and Vanpools on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief." www.arb.ca.gov/cc/sb375/policies/ebtr/ebtr_brief.pdf

1E. Employer Vanpool Program

(1). SANDAG. 2018. Commute Behavior Survey.

(2). SANDAG. 2016. Activity Based Model. (v14.0.1, scenario ID 232)

(3). SANDAG. 2018. SANDAG Vanpool Program

(4). Transportation Research Board. 2005. "TCRP Report 95 Chapter 5 Buspools and Vanpools." www.trb.org/Publications/TCRPReport95.aspx

(5). New York State Department of Transportation. 2019. Data from 511NYRideshare program participants.

1F. Employer Telework Program

(1). Cambridge Systematics. 2009. "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions." Technical Appendices. Prepared for the Urban Land Institute. www.reconnectingamerica.org/assets/Uploads/2009movingcoolerexecsumandappend.pdf

(2). California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2A. Transit Oriented Development

(1). Tal, G., et al. 2013. "Technical Background Document on the Impacts of Transit Access (Distance to Transit) Based on a Review of the Empirical Literature." www.arb.ca.gov/cc/sb375/policies/transitservice/transit_brief.pdf

(2). SANDAG. 2016. Activity Based Model. (v14.0.1, scenario ID 232)

(3). Lund, H., et al. 2004. "Travel Characteristics of Transit-Oriented Development in California." www.bart.gov/sites/default/files/docs/Travel_of_TOD.pdf

2B. Mixed Use Development
(1). SANDAG. 2016. Land Use Inventory (SPACECORE).
(2). Ewing, R., and Cervero, R. 2010. "Travel and the Built Environment - A Meta-Analysis." Journal of the American Planning Association.
(3). California Air Pollution Control Officers Association. 2010. "Quantifying Greenhouse Gas Mitigation Measures." www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

3A. Parking Pricing
(1). Transportation Research Board. 2009. "TCRP Report 95 Chapter 13 Parking Pricing and Fees". p13-4. www.trb.org/Publications/TCRPReport95.aspx
(2). Cambridge Systematics. 2009. "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions." Technical Appendices. Prepared for the Urban Land Institute.

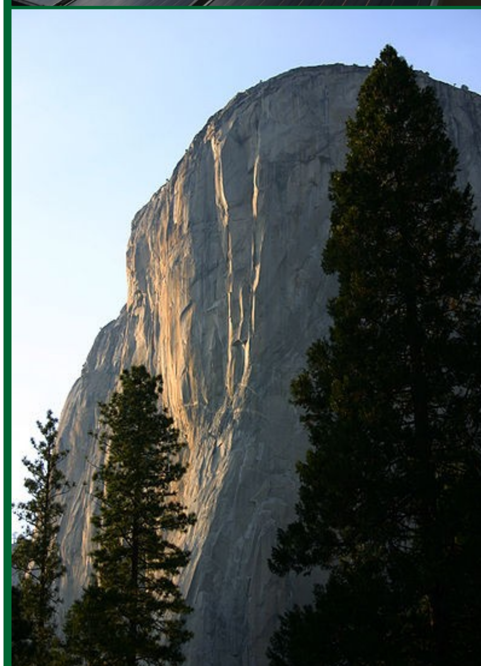
3B. Parking Cash Out
(1). California Air Resources Board. 2009. "California’s Parking Cash-Out Program: An Informational Guide for Employers." www.arb.ca.gov/planning/tsaq/cashout/cashout_guide_0809.pdf
(2). Shoup, Donald C. 2005. "Parking Cash Out." Planners Advisory Service, American Planning Association. http://shoup.bol.ucla.edu/ParkingCashOut.pdf

Appendix D

Excerpts from CAPCOA

CAPCOA

CALIFORNIA
AIR
POLLUTION
CONTROL
OFFICERS
ASSOCIATION



Quantifying Greenhouse Gas Mitigation Measures

A Resource for Local Government
to Assess Emission Reductions from
Greenhouse Gas Mitigation Measures

August, 2010

Chart 6-2: Transportation Strategies Organization

Transportation Measures (Five Subcategories) Global Maximum Reduction (all VMT):
urban = 75%; compact infill = 40%; suburban center or suburban with NEV = 20%; suburban = 15%

Global Cap for Road Pricing needs further study

Transportation Measures (Four Categories) Cross-Category Max Reduction (all VMT):
urban = 70%; compact infill = 35%; suburban center or suburban with NEV = 15%; suburban = 10%

Max Reduction = 15% overall; work VMT = 25%; school VMT = 65%;

Max Reduction = 25% (all VMT)

Land Use / Location	Neighborhood / Site Enhancement	Parking Policy / Pricing	Transit System Improvements	Commute Trip Reduction (assumes mixed use)	Road Pricing Management	Vehicles
Max Reduction: urban = 65%; compact infill = 30%; suburban center = 10%; suburban = 5%	Max Reduction: without NEV = 5%; with NEV = 15%	Max Reduction = 20%	Max Reduction = 10%	Max Reduction = 25% (work VMT)	Max Reduction = 25%	
Density (30%)	Pedestrian Network (2%)	Parking Supply Limits (12.5%)	Network Expansion (8.2%)	CTR Program Required = 21% work VMT Voluntary = 6.2% work VMT	Cordon Pricing (22%)	Electrify Loading Docks
Design (21.3%)	Traffic Calming (1%)	Unbundled Parking Costs (13%)	Service Frequency / Speed (2.5%)	Transit Fare Subsidy (20% work VMT)	Traffic Flow Improvements (45% CO2)	Utilize Alternative Fueled Vehicles
Location Efficiency (65%)	NEV Network (14.4) <NEV Parking>	On-Street Market Pricing (5.5%)	Bus Rapid Transit (3.2%)	Employee Parking Cash-out (7.7% work VMT)	Required Contributions by Project	Utilize Electric or Hybrid Vehicles
Diversity (30%)	Car Share Program (0.7%)	Residential Area Parking Permits	Access Improvements	Workplace Parking Pricing (19.7% work VMT)		
Destination Accessibility (20%)	Bicycle Network <Lanes> <Parking> <Land Dedication for Trails>		Station Bike Parking	Alternative Work Schedules & Telecommute (5.5% work VMT)		
Transit Accessibility (25%)	Urban Non-Motorized Zones		Local Shuttles	CTR Marketing (5.5% work VMT)		
BMR Housing (1.2%)			Park & Ride Lots*	Employer-Sponsored Vanpool/Shuttle (13.4% work VMT)		
Orientation Toward Non-Auto Corridor				Ride Share Program (15% work VMT)		
Proximity to Bike Path				Bike Share Program		
				End of Trip Facilities		
				Preferential Parking Permit		
				School Pool (15.8% school VMT)		
				School Bus (6.3% school VMT)		

Note: Strategies in bold text are primary strategies with reported VMT reductions; non-bolded strategies are support or grouped strategies.