SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

ITEM: 3.47
(ID # 13183)
MEETING DATE:
Tuesday, December 15, 2020

FROM: TLMA-TRANSPORTATION:

SUBJECT: TRANSPORTATION AND LAND MANAGEMENT AGENCY/TRANSPORTATION DEPARTMENT: Adoption of New Thresholds of Significance for Vehicle Miles Traveled for the Purpose of Analyzing Transportation Impacts in Accordance with the California Environmental Quality Act and Approval of Transportation Analysis Guidelines for Level of Service and Vehicle Miles Traveled. All Districts. [$130,000 Total Cost - Combined Improvement Funds 100%]

RECOMMENDED MOTION: That the Board of Supervisors:

1. Adopt the new thresholds of significance for vehicle miles traveled for compliance in assessing transportation impacts under the California Environmental Quality Act;
2. Approve the Traffic Impact Analysis Guidelines for Level of Service and Vehicle Miles Traveled; and
3. Authorize the Director of Transportation to update the Transportation Analysis Guidelines as necessary to meet any requirements from future updates to the California Environmental Quality Act.

ACTION: Policy

Patricia Romo, Director of Transportation 12/2/2020

MINUTES OF THE BOARD OF SUPERVISORS

On motion of Supervisor Jeffries, seconded by Supervisor Washington and duly carried, IT WAS ORDERED that the above matter is approved as recommended.

Ayes:	Jeffries, Spiegel, Washington, and Perez
Nays:	Hewitt
Absent:	None
Date:	December 15, 2020
xc:	Transp.

Kecia R. Harper
Clerk of the Board
By: Deputy

FINANCIAL DATA	Current Fiscal Year:	Next Fiscal Year:	Total Cost:	Ongoing Cost
COST	$ 130,000	$ 0	$ 130,000	$ 0
NET COUNTY COST	$ 0	$ 0	$ 0	$ 0
SOURCE OF FUNDS: 100% Combined Improvement Fund			**Budget Adjustment:** No	
			For Fiscal Year: 20/21	

C.E.O. RECOMMENDATION: Approve

BACKGROUND:

Historically, the assessment of transportation impacts under the California Environmental Quality Act (CEQA) used vehicle delay and congestion as the principle measure to evaluate the transportation impacts of a given project. The measure of delay is typically reported in the form of vehicle levels of service (LOS) grades A through F to denote the amount of traffic congestion. In addition to the requirements under CEQA, several policies related to LOS are also contained within the County General Plan.

In 2013, the State of California passed Senate Bill 743 (SB743) which required the Governor's Office of Planning & Research (OPR) to identify new metrics for identifying and mitigating transportation impacts within the CEQA guidelines. OPR selected Vehicle Miles Traveled (VMT) as the principal measure for assessing transportation impacts under CEQA. The shift to VMT is intended to meet the State's objectives in reducing greenhouse gas (GHG) emissions, promoting the development of infill land use projects and multimodal transportation networks, and to promote a diversity of land uses within developments. In December 2018, the California Natural Resources Agency certified and adopted the new CEQA Guidelines Section 15064.3 that identifies VMT as the most appropriate measure to evaluate a project's transportation impacts under CEQA. The County will continue to require LOS analysis for General Plan consistency and transportation planning purposes while requiring VMT analysis for CEQA compliance.

To address the change from LOS to VMT per Section 15064.3 of the CEQA Guidelines, the Transportation Department has developed a process to assess transportation impacts that is aligned with the guidance document provided in OPR's *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018). Although this advisory document provides a framework with which local jurisdictions can use to analyze transportation impacts, its coverage is limited to residential, office, and retail land uses. It does not provide sufficient guidance on how to address other common land use types that are processed through the County. The Transportation Department has revised its traffic study guidelines and developed the Transportation Analysis Guidelines for Level of Service and Vehicle Miles Traveled, which contains an implementation plan that provides procedures to evaluate transportation impacts for a broader range of land use projects. The following will cover the thresholds and analysis tool to be used for VMT analysis.

Thresholds of Significance

To determine whether a proposed project's transportation impact creates a significant impact on the environment, the County must define VMT thresholds. In order to establish thresholds of significance, the Transportation Department considered the objectives of SB743 and OPR's approved guidance document while remaining sensitive to the County's land use plan contained in the General Plan. Other factors, such as meeting state housing objectives for the County and promoting economic growth were also considered. The effort has led to the recommendation of utilizing the county-wide average VMT as the threshold of significance. This approach is similar to several other jurisdictions located within the County. The thresholds of significance, as they relate to the County are illustrated in the following table.

VMT Thresholds of Significance

LAND USE TYPE	THRESHOLDS OF SIGNIFICANCE
Residential	Existing county-wide average VMT per capita
Office	Existing county-wide average Work VMT per employee
Retail	Net regional change in VMT in the County or other defined area
Other Employment	Existing county-wide average Work VMT per employee
Other Customer	Net regional change in VMT in the County or other defined area

The inclusion of "Other Employment" and "Other Customer" categories refers to all other service and goods providers that are not included in the basic office or retail land use categories.

For a given land use type, a project would have a significant transportation impact if its VMT exceeds the corresponding threshold outlined in the preceding table.

Screening for Non-Significant Transportation Impacts

The technical advisory guidance document from OPR allows local jurisdictions to continue the use of screening thresholds to quickly determine when a proposed project is expected to cause a less-than-significant impact without conducting a detailed analysis. The intention with utilizing screening thresholds is to determine if a presumption of less-than-significant transportation impact can be made based on the facts of the project. A detailed VMT analysis will not be required for land use projects that meet one of the criteria shown in Figure 4 of the Transportation Analysis Guidelines (attachment).

Analysis Tool

Travel Demand Models are broadly considered to be amongst the most accurate of available tools to assess regional and sub-area VMT. While the Southern California Association of Governments (SCAG) maintains the regional travel demand model as a part of the Regional Transportation Plan/Sustainable Communities Strategy program (RTP/SCS), Riverside County maintains its own travel demand model (Riverside County Transportation Analysis Model, RIVTAM) in support of travel forecasting needs of the various agencies and jurisdictions within the County. The latest available version of RIVTAM was determined to be the best tool for

conducting VMT analysis as it has the most up to date land use information for the County, as well as refined zonal structure within the County.

Mitigation

Mitigating transportation impacts identified in a VMT analysis will typically require the preparation of a transportation demand management (TDM) program. A TDM program is a combination of strategies to reduce VMT. The program is created by an applicant for their land use project based on a list of strategies that are both feasible and sustainable.

Riverside County has developed a list of potential TDM strategies with respective magnitudes of VMT reduction which could be achieved. The selection process was guided by the California Air Pollution Control Officers Association (CAPCOA) recommendations found in the 2010 publication Quantifying Greenhouse Gas Mitigation Measures. The area context of the County influenced the type of TDM strategies that were selected. CAPCOA has found strategies with the largest VMT reduction in rural areas include vanpools, telecommute or alternative work schedules, and master planned communities with design and land-use diversity to encourage intra-community travel.

Another potential form of mitigation for VMT impacts that can be utilized by land use projects is through participation in a VMT mitigation program. The program would be established through a nexus study that demonstrates how mitigation would occur. Program concepts include mitigation banks and exchanges that would fund VMT reducing strategies and TDM measures. Although a program does not exist at this time, land use projects may consider participating if one were to be established in the future.

Updated Traffic Impact Analysis Guidelines

The County has replaced its Traffic Impact Analysis Preparation Guidelines, with the Transportation Analysis Guidelines, to ensure consistency with SB743 and OPR's Technical Advisory document (Attachment). SB743 and OPR's Technical Advisory document does not prevent a local agency from continuing to analyze delay or LOS outside of CEQA review for other transportation planning or analysis purposes, but these metrics may no longer constitute the sole basis for CEQA impacts. The General Plan contains LOS policies that are still necessary to maintain a safe and efficient transportation system. These policies apply to discretionary approvals of new land use and transportation projects. The updates made to the County guidelines provide procedures for conducting VMT analysis as required under CEQA and instructions for LOS analysis necessary to demonstrate consistency with policies contained within the General Plan. To avoid confusion with historic CEQA terminology, other textual changes were made to distinguish between CEQA and non-CEQA requirements. The Transportation Analysis Guidelines may need to be modified from time to time in order to improve screening tools, analysis methods, and mitigation strategies based on future updates and to insure that best practices specific to Riverside County are used. The Department recommends that the Director of Transportation be given authority to make these modifications as needed.

Environmental Review

This action is not subject to CEQA pursuant to State CEQA Guidelines Section 15060 because it is not a project as defined in the Public Resource Code Section 21065 and Guidelines Section 15378 as it will not result in a direct or indirect physical change to the environment.

Impact on Residents and Businesses

The goal of reducing VMT is to promote infill development, reduce greenhouse gas emissions, and promote the use of alternatives to single-occupant vehicles such as bicycling, walking, and transit use.

Additional Fiscal Information

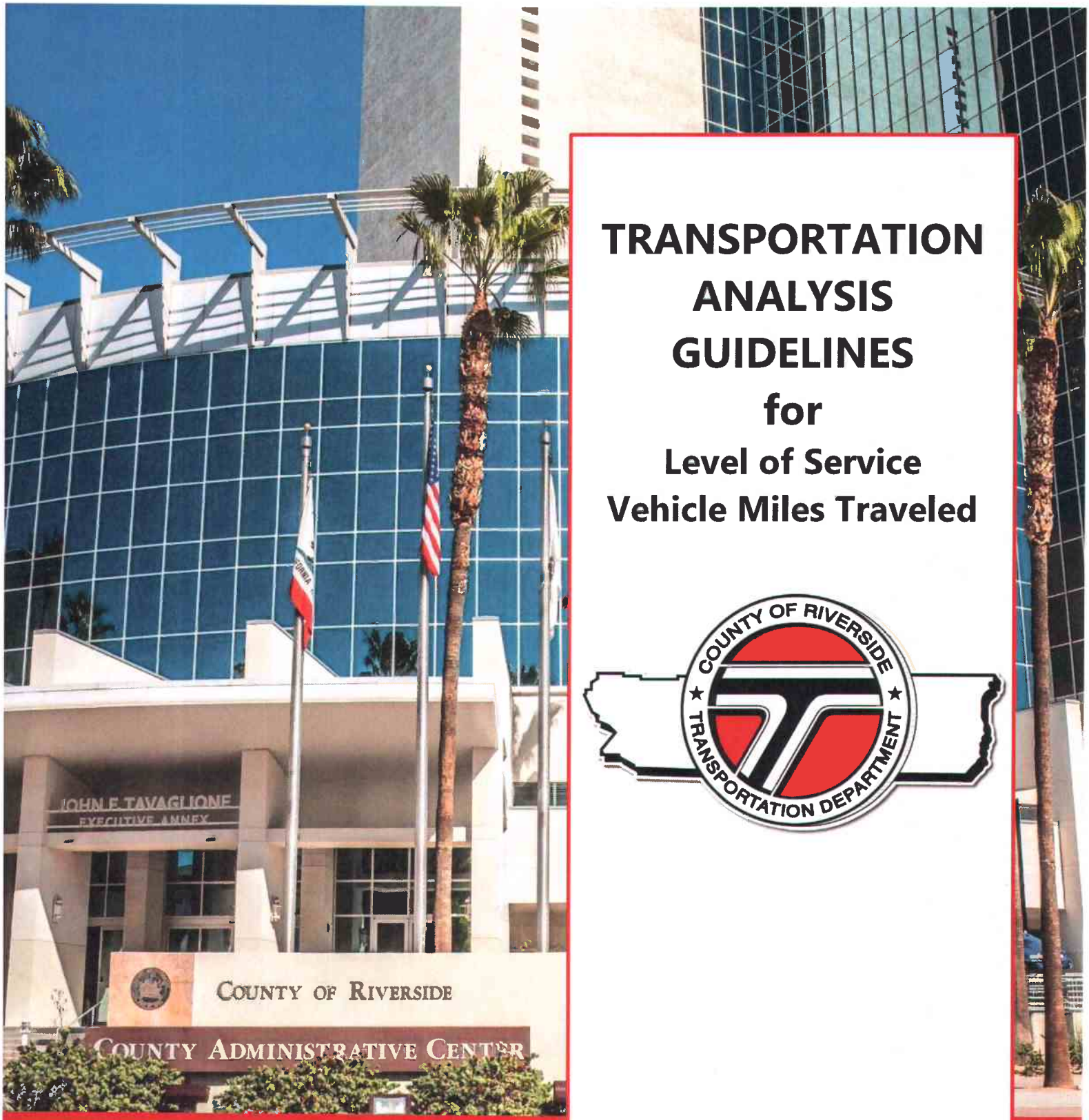
The cost to develop the new Transportation Analysis Guidelines was $130,000 and will be funded with Combined Improvement Fund. The Combined Improvement Fund is made up of the interest revenue from several Transportation funds, along with various cash-in-lieu fees paid by developers that are then pooled together for efficiency and ease of use. All costs for VMT analysis and compliance will be borne by the specific project. There are no General Funds associated with this policy.

ATTACHMENTS:

Screening Maps
OPR Technical Advisory on Evaluating Transportation Impacts in CEQA (2018)
Transportation Analysis Guidelines
VMT Analysis Flowchart

Jason Farin, Principal Management Analyst 12/10/2020

Gregory P. Priamos, Director County Counsel 12/3/2020



TRANSPORTATION ANALYSIS GUIDELINES for Level of Service Vehicle Miles Traveled

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT

Patricia Romo, P.E. Date
Director of Transportation
December 2020

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APPENDICES

INTRODUCTION

The County's General Plan requires that traffic and circulation impacts of proposed development projects, General Plan Amendments, and Specific Plans be analyzed. The traffic impacts of proposed developments are to be analyzed through the preparation of a "Traffic Analysis" or "TA" prepared in conformance with Riverside County Transportation Department "Transportation Department" requirements. The TA must be prepared, signed and sealed by a Traffic Engineer or a Civil Engineer registered in the State of California, qualified to practice traffic engineering "Engineer". Guidance included within this document describes the required content, format, and methodology that is generally required to be utilized in the preparation of a TA, which is subject to the review and approval of the Transportation Department.

The TA will continue to require the level of service (LOS) analysis to maintain consistency with policies contained in the County General Plan. The passage of SB-743 requires a Vehicle Miles Traveled (VMT) analysis to assess the impacts required by the California Environmental Quality Act (CEQA) process. This document will provide guidance for both the LOS and VMT analyses.

The contents of this document are general guidelines and the Transportation Department has the discretion to modify the TA requirements based on the unique characteristics of a particular project.

NEED FOR TRANSPORTATION ANALYSES

The purpose of the Transportation Analysis Guideline is to provide instructions for analyzing projects in compliance with (1) the County's General Plan policies and (2) transportation related Vehicle Miles Traveled (VMT) analysis as required under CEQA.

As the County of Riverside continues to develop both residential and employment generating uses, an emphasis on transportation network capacity will be needed. Levels of Service (LOS) analysis will largely be the determinant to assess capacity and operational deficiencies of County roadways. In order to maintain consistency with the General Plan, projects are to identify deficiencies and provide recommendations to meet level of service targets.

All projects, whether public or private, requiring a discretionary approval trigger the CEQA review process. The objective of this process, in part, is to identify significant environmental impacts, including those from transportation impacts. Under CEQA guidelines, VMT is the principal measure for determining transportation impacts. Where necessary, projects will be required to prepare a VMT analysis to identify project impacts and mitigation measures.

OVERVIEW OF PROCESS AND PROCEDURES

For development projects, two analyses will be required: (1) LOS analysis for General Plan consistency and; (2) VMT analysis for CEQA compliance. Not all projects require both analyses. The Transportation Department determines the need for a TA in compliance with CEQA guidelines and General Plan policies.

Transportation Analysis Process

The process of preparing a TA begins with accessing and reviewing the Transportation Land Management Agency website. The website provides access to the County's General Plan as well as the application for a TA scoping agreement. Applicants must fill out the application and submit it along with the scoping agreement and initial deposit to the Transportation Department.

Scoping Agreement

Figure 1 presents a framework to determine when LOS analysis and VMT analysis would be included in a scoping agreement for a TA. The Transportation Department will ultimately determine the required types of analyses required for the TA through its review of the scoping agreement.

Projects that meet the screening criteria, **discussed later**, will not be required to prepare a detailed VMT analysis. Such projects would typically still be required to prepare a LOS analysis, with exceptions outlined in the Traffic Analysis Exemptions.

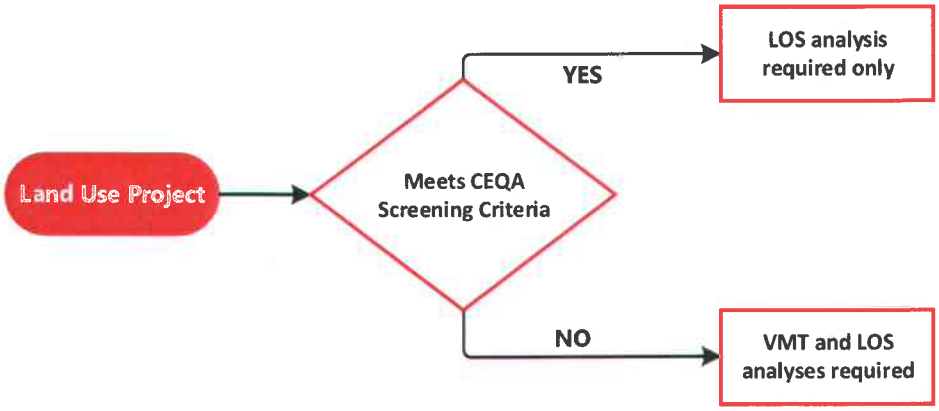

Figure 1

The scoping agreement provides the following key points in order to establish the scope of the TA:

- Determination of study area, intersections, and roadway links to be analyzed.
- Project trip generation, distribution, and assignment.
- Use of other approved projects for background traffic, traffic growth assumptions, or integration with RIVTAM/RIVCOM, or other travel demand models approved for use by the Transportation Department.
- For those projects located within a City's Sphere of Influence or adjacent to a city, the Engineer shall also solicit comments on the scoping agreement from City staff. The Engineer shall submit all comments received from City staff to the Transportation Department for review and consideration.
- For projects within one-mile of a state highway, or any project that may create a deficiency on a state highway, the Engineer shall coordinate with Caltrans.
- Identification of unique transportation issues that may be specific to a project's design or location related to queuing, sight distance, other safety issues, transit, pedestrian, bicycle, access, adjacent land uses, etc.

The Engineer shall submit the scoping agreement to the Transportation Department for review and obtain approval before the preparation of the TA.

TRAFFIC ANALYSIS EXEMPTIONS

Certain types of projects, because of their size, nature, or location, are exempt from the requirement of preparing a LOS analysis. The types of projects that are generally exempt from preparing a LOS analysis are described in **APPENDIX B**.

The Transportation Department, at its discretion, may require that a TA be prepared for any development, regardless of size, if there are concerns over safety, operational issues, or if located in an area that has significant traffic related deficiencies.

LEVEL OF SERVICE

ANALYSIS METHODOLOGY

The Level of Service analysis is required to maintain traffic operation performance in accordance with the General Plan policies.

Intersections Analysis

The Transportation Department requires the use of the most recent version of the Transportation Research Board Highway Capacity Manual (HCM) for both signalized and unsignalized intersections. Refer to **APPENDIX C** for the default input parameters to be utilized. When analysis parameters are not specifically provided in this document, the Engineer determines the appropriate parameters subject to review and comment the Transportation Department. Any uncertainty should be resolved during the preparation of the TA in consultation with the Transportation Department.

Roadway Segment Analysis

The Transportation Department may require that analysis of roadway segments be conducted in certain cases, such as when intersection analyses are not the controlling factor or for general planning purposes. Roadway segment capacities are provided in **APPENDIX D**.

Establishing the Study Area

In general, the minimum area to be studied shall include any intersection of 2 or more "Collector" or higher classification streets, at which the proposed project will add 50 or more peak hour trips, not exceeding a 5-mile radius from the project site. The Transportation Department may require deviation from these requirements based on the location.

Analysis Scenarios

The TA shall include the following analysis scenarios:

1. **Existing Conditions**. Existing traffic will be counted to determine current conditions. Traffic count data shall be new or recent. In some cases, data up to one year old may be acceptable with the approval of the Transportation Department. Any exception to this must be requested prior to approval of the scoping agreement.

2. **Project Completion** (Existing plus Ambient Growth plus Project). Traffic conditions prior to the time that the proposed development is completed will be estimated by increasing the existing traffic counts by an appropriate growth rate to be provided by Transportation Department staff, projected to the year that the project is estimated to be completed. Traffic generated by

the proposed project will then be added, and the impacts on the circulation system will be analyzed. This will be the basis for determining deficiencies as a direct result of the project implementation. The TA shall provide recommendations necessary to address the identified deficiencies. The Transportation Department may choose to incorporate the recommendations as conditions of approval for the project.

3. **Cumulative** (Existing plus Ambient Growth plus Project plus Cumulative Projects). Traffic generated by other approved projects in the study area shall be identified and added to the Project Completion traffic identified in Scenario 2. This may also include projects that are proposed and in the review process, but not yet approved.

4. **Project Phasing**. Traffic conditions at each project phase completion are to be analyzed using the same approach as for the project completion year, if applicable. Traffic associated with each previous project phase shall be included in the analyses of each successive phase of the proposed project.

General Plan Amendments and Specific Plans

Development proposals that also include a General Plan Amendment to Land Use or Circulation Elements, Specific Plan, Zone Change or other that increases traffic beyond what was approved in the General Plan will also be required to perform a Build-out Analysis to assess long-term deficiencies. This analysis will determine if the Circulation Element of the General Plan is adequate to accommodate projected traffic at the target LOS, or if additional improvements are necessary. A phasing plan for all Specific Plans that identifies necessary improvements for each development phase is required.

The following analysis scenarios should be included for Build-out Analysis:

5. **Horizon Year No Project Conditions**. This represents traffic conditions at an identified horizon year (typically coinciding with the forecast horizon year of the RIVTAM/RIVCOM travel demand forecasting model).

6. **Horizon Year plus Project Conditions**. Project traffic added to Scenario 5 identified above (Horizon Year No Project Conditions).

Data Collection, Trip Generation, Trip Distribution

The following recommendations pertaining to traffic count collection, project trip development, and traffic forecasting methodologies have been developed to maintain consistency across different TAs and reflect the current state of the practice.

Traffic Counts. Data for existing traffic conditions should be collected for the project using the following guidelines.

- Peak period turning movement counts at all study intersections, roadway segments (if required) and/or driveways, including bicycle and pedestrian counts at intersections with high non-automotive use, should be collected. For intersections with high percentages of trucks, turning movement counts should count trucks separately.
- Average Daily Traffic (ADT) for all roadways within study area (if required) and vehicle classification counts in areas with a high percentage of truck use.
- Traffic counts should not be used if more than one year old without prior approval.
- Traffic data should not be collected on weeks that include a holiday and non-school session time period unless approved by the Transportation Department.
- Traffic data should not be collected between Thanksgiving and the first week of the New Year without prior approval.
- Traffic counts should be conducted on Tuesdays, Wednesdays, or Thursdays.
- For congested conditions, back of queue estimates by approach (and turning movement) should be conducted every 15 minutes.
- Traffic counts should not be collected in an active construction work-zone.

Unless directed otherwise by the Transportation Department, traffic counts should be collected during the following timeframes presuming the time period captures the beginning and end times of any congested conditions.

- Morning (7:00 AM to 9:00 AM).
- Afternoon (4:00 PM to 6:00 PM).
- Midday and school-release peak hours – as directed by the Transportation Department.
- Other peak hours, off-peak hours, weekend, or special event periods may also be required based on the project location and type of use.

Under circumstances where traffic counts would be collected under atypical conditions (significant economic downturn, pandemic, etc.) that may result in altered trip patterns or traffic volumes, traffic count collection details should be approved by the Transportation Department prior to being undertaken. Depending on the circumstances, it may be preferable to use historic count data, use factored historical data, big data sources, or other acceptable estimation techniques allowed by the Transportation Department. Traffic count data should be included in the study appendices.

Trip Generation. Trip generation may be estimated using the Institute of Transportation Engineers (ITE) Trip Generation Manual (latest edition). Other trip generation sources may be used with the approval of the Transportation Department. For land uses not included or with a limited sample size in the ITE Trip Generation Manual or other published sources, local trip generation surveys should be conducted for at least three similar project sites following the methodology contained in the ITE Trip Generation Handbook. If locally valid trip generation surveys cannot be conducted, then use of the ITE

trip generation rates with limited sample size may be allowed but limitations of the data should be fully disclosed especially related to land use context.

Trip generation for high truck generating uses such as high cube warehouses, logistics space, etc. shall be based on ITE data when available or shall be determined with Transportation Department staff input on a case-by-case basis. The proposed trip generation should be listed in the scoping agreement for review and approval prior to study initiation.

Internal capture for mixed use developments (if applicable) should be calculated using state of the practice methodologies such as ITE's mixed use trip generation method or the US Environmental Protection Agency's (EPA) mixed-use trip generation (MXD) methodology or other state of the practice method approved by the Transportation Department prior to use in any studies. Trip internalization calculations (including gross trips, net trips after internalization, and MXD input assumptions (such as intersection density, TOD assumptions, acres, etc.) should be documented in the TA.

For projects that anticipate the generation of significant truck traffic, all truck trips may be converted into passenger car equivalents (PCE) for the capacity analysis or the analyst should adjust the truck percentage in the capacity assessment appropriately. The following table shows the PCE factors that shall be applied for truck traffic:

Vehicle Type	PCE Factor
2 axle trucks	1.5
3 axle trucks	2.0
4+ axle trucks	3.0

For microsimulation analyses, the measured and/or project heavy truck percentages shall be used.

Trip Distribution. The project's trip distribution should be based on expected origin-destination patterns related to the project's land uses. The trip distribution should be determined based on consideration of following factors, subject to approval by the Transportation Department:

- Type of proposed development.
- Location and intensity of development.
- Conditions on the roadway network in the vicinity.
- Land uses in the vicinity.
- Truck route system.
- As directed by the Transportation Department.

In some cases, use of select zone assignments from RIVTAM/RIVCOM or mobile device data measuring trip distribution for similar sites may be appropriate. Other data may be used to help refine trip distribution patterns including the relative location of population, commercial, recreational and employment centers; existing peak hour link and turning movement volumes; ADT volumes; proximity to regional transportation corridors; and knowledge of local and regional traffic circulation. Directional movements at key access points to the project shall be provided. A preliminary trip distribution pattern map shall be submitted in the scoping agreement for review and approval by the Transportation Department.

Background Traffic from Other Projects and Ambient Growth Rate

Other projects within the vicinity of the project that have received approvals, shall be identified and their traffic generation included as cumulative traffic in the TA. Proposed projects in the study area that have been submitted to the County for processing, but not yet approved, may also be included at the discretion of the Transportation Department. The traffic from the other approved projects or projects in review shall be included in Cumulative analysis scenario identified previously.

Unless otherwise directed, the TA should utilize an ambient growth rate of two percent (2%) to be applied to existing volumes to account for other general traffic growth in and around the study area.

Build-out Analyses for General Plan Amendments and Specific Plans

Traffic projections for General Plan Build-out scenarios shall utilize RIVTAM/RIVCOM or other approved models and shall be identified in the scoping agreement. The Engineer shall use the model projections as the basis for determining turning- movement volumes for the required intersection analysis. A manual assignment of the project traffic added to the Build-out traffic may typically be used to determine total future traffic, as approved by the Transportation Department.

Certain large-scale Specific Plans and General Plan Amendments have the potential to create traffic deficiencies that are significantly greater than the traffic projections used in the traffic model, which may also affect the modeling assumptions. For these projects, the Transportation Department may request that the Build-out analysis utilize RIVTAM/RIVCOM or other model approved by the Transportation Department be used to develop more detailed focused model runs in order to determine the projected Build-out traffic. The following are guidelines of projects considered to be significant and subject to the revised modeling requirements:

- 1,500 dwelling units or greater.
- 25 acres of commercial or greater.
- 150 acres of industrial or greater.
- Any project producing 15,000 daily trips or greater.

GENERAL PLAN CONSISTENCY REQUIREMENTS

Intersections

Consistent with the acceptable LOS in the Riverside County General Plan, the Transportation Department considers the following criteria for application in the TA to identify infrastructure improvements required to provide acceptable operations. Note that this analysis will be completed to demonstrate general plan consistency. Specific CEQA thresholds, which are based on VMT requirements, are described later in these guidelines and shall be the sole basis for determining CEQA-related transportation impacts.

Operational improvements would be required under the following conditions:

1. When existing traffic conditions (Analysis Scenario 1) exceed the General Plan target LOS.

2. When project traffic, when added to existing traffic (Analysis Scenario 2), will deteriorate the LOS to below the target LOS.

3. When cumulative traffic (Analysis Scenario 3) exceeds the target LOS.

Improvements may be provided through the TUMF network (or other funding mechanism), project conditions of approval, or other implementation mechanisms. The General Plan allows the Board of Supervisors to approve development projects even in instances where the target LOS is exceeded, if the project has overriding benefits. Examples include projects that provide jobs in a local area, projects that provide needed transportation improvements that otherwise would not be constructed, projects that provide habitat conservation, projects that implement non-motorized transportation systems, or projects that provide some unique benefits to the County which outweigh the traffic deficiencies. These projects are required to provide operational improvements to the extent that it is economically feasible as determined by the Board of Supervisors, based on a value engineering analysis.

Roadway Segments

Intersections typically provide the transportation constraint on operational capacity. As such, these guidelines focus on the evaluation of intersections. However, in some instances, roadway segment evaluation may be appropriate and may be requested by the Transportation Department. Roadway segment requirements should be considered, and improvements recommended if the project exceeds the operational goals noted in the County's General Plan.

SITE ACCESS, SAFETY, AND OTHER ANALYSES

The TA may be required to analyze site access and safety around the project and on adjacent streets. The following topics may need to be considered in the TA.

Site Access Analysis

a) **Intersection Sight Distance**. All on-site intersections, project access driveways or streets to public roadways should provide adequate sight distance. Adequate intersection sight distance should be determined using Ordinance No. 461, Std. No 821.

b) **Driveway Length and Gated Entrance**. Primary project driveways should have a throat of sufficient length to allow vehicles to enter the project area without causing subsequent vehicles to back up into the public street system.

c) **Limit Driveway Impacts**. Driveway and local street access on arterial streets should be limited to minimize the impacts on arterial streets. Driveways should be located to maintain a reasonable distance from an adjacent intersection and/or driveway. Whenever possible, driveways should be consolidated with adjacent properties. When proposed driveways are located across from an existing driveway, the centerlines of the driveways should be aligned with each other.

d) **Corner Clearance**. A driveway should be a sufficient distance from a signalized intersection so that right-turn egress movements do not interfere with the right-turn queue at the intersection. In addition, every effort should be made to provide right-turn egress movements with sufficient distance to enter the left-turn pocket at the adjacent intersection.

e) **Right Turn Lanes at Driveways**. If the project right turn peak hour volume is 50 or more vehicles, a right-turn deceleration lane should be reviewed for appropriateness on all driveways accessing major arterial and secondary streets. The length of the right turn lane should be sufficient to allow a vehicle traveling at the posted speed to decelerate before entering the driveway as outlined in the Caltrans Highway Design Manual.

f) **Adequacy of pedestrian facilities**. Access to/from the project site providing convenient and direct access for those users.

g) **Bicycle accessibility**. Access to/from nearby bike routes to the project site.

h) **Accessibility from adjacent transit stops**. Access to/from the project site providing convenient and direct access for those users.

Safety and Operational Analysis

The TA shall examine existing roadway conditions to determine if safety and/or operational improvements are necessary due to an increase in traffic from the project or cumulative conditions. The types of improvements to be identified may include, but are not limited to:

- Need for turning lanes.
- Intersections needing future sight distance studies.
- Parking restrictions.
- Measures to reduce cut-through traffic in adjacent residential areas and/or assessment of needed traffic calming measures.
- Potential impacts to adjacent schools, parks, and/or trails.

- Queue lengths and deficiencies to adjacent intersections.
- Need for signal interconnect systems.

Intersection Turn Lane Queuing Analysis

The TA shall examine the impacts on queue lengths, need for additional queuing area, and access to turn lanes at intersections and/or site access driveways.

Traffic Signal Warrant Analysis

The Engineer shall review intersections within the study area, including the project access points, to determine if signal warrants are met for any of the study year scenarios (Existing, Project Completion, Cumulative, etc.) Traffic signal warrant analysis should be performed using the latest edition of the California MUTCD. The warrant analysis should be included in the study appendices. The warrant analysis worksheets shall be included in the study appendices.

In determining the location of a new traffic signal on an arterial street or approaching an arterial street, traffic progression and simulation analysis may be required using Synchro/SimTraffic software or equivalent at the direction of the Transportation Department.

If the TA states that "a traffic signal is warranted" (or "a traffic signal appears to be warranted," or similar statement) at an existing unsignalized intersection under existing conditions, 8-hour approach traffic volume information must be submitted in addition to the peak hourly turning movement counts for that intersection. This information will enable the County to assess whether a traffic signal should be installed at the intersection.

IMPROVEMENTS TO ADDRESS LOS DEFICIENCIES

Level of Service Improvements

As described in the **Analysis Scenarios** section, the Project Completion will be the basis for determining transportation-related deficiencies caused by the project. Any deficiencies identified in the TA as a result of the project shall be accompanied by recommendations to address said deficiencies. The Transportation Department will evaluate the recommendations and determine if they will be included as part of the conditions of approval.

The TA is also required to identify improvements necessary to address cumulative deficiencies. Within the TA, the Engineer will need to evaluate and determine if the improvements are eligible facilities in the WRCOG/CVAG TUMF or other approved funding mechanism (DIF, Road and Bridge Benefit District, etc.). If the improvements can provide the target LOS, payment into the TUMF (and/or other adopted funding program) will be considered as the project's cumulative contribution towards the identified improvements and will be implemented through conditions of approval. The project's

proportionate share shall be identified based on the project's share of new traffic for other improvements needed beyond those eligible within an adopted funding program (such as localized improvements to non-TUMF facilities) or improvements that are not fully "funded" through an adopted funding program. The proportionate share shall be determined using the following formula:

$$\text{Fair Share} = \frac{\text{Project Traffic}}{\text{Total Traffic} - \text{Existing Traffic}}$$

The Transportation Department may, at its discretion, condition the project to construct the identified improvement(s) should it be deemed necessary for the approval and operation of the project.

CEQA ASSESSMENT - VMT ANALYSIS

CEQA analysis requires an evaluation of project impacts related to VMT. This section provides the process to assist in determining VMT impacts for various land use projects. The process contains a stepped approach that includes screening criteria, identifying significance measure and threshold, VMT analysis, and mitigation measures.

ANALYSIS PROCESS

The following series of analytical steps for SB-743 compliance should be conducted for land use projects as deemed necessary by the Transportation Department. **Figure 2** provides a graphical representation of this analysis process.

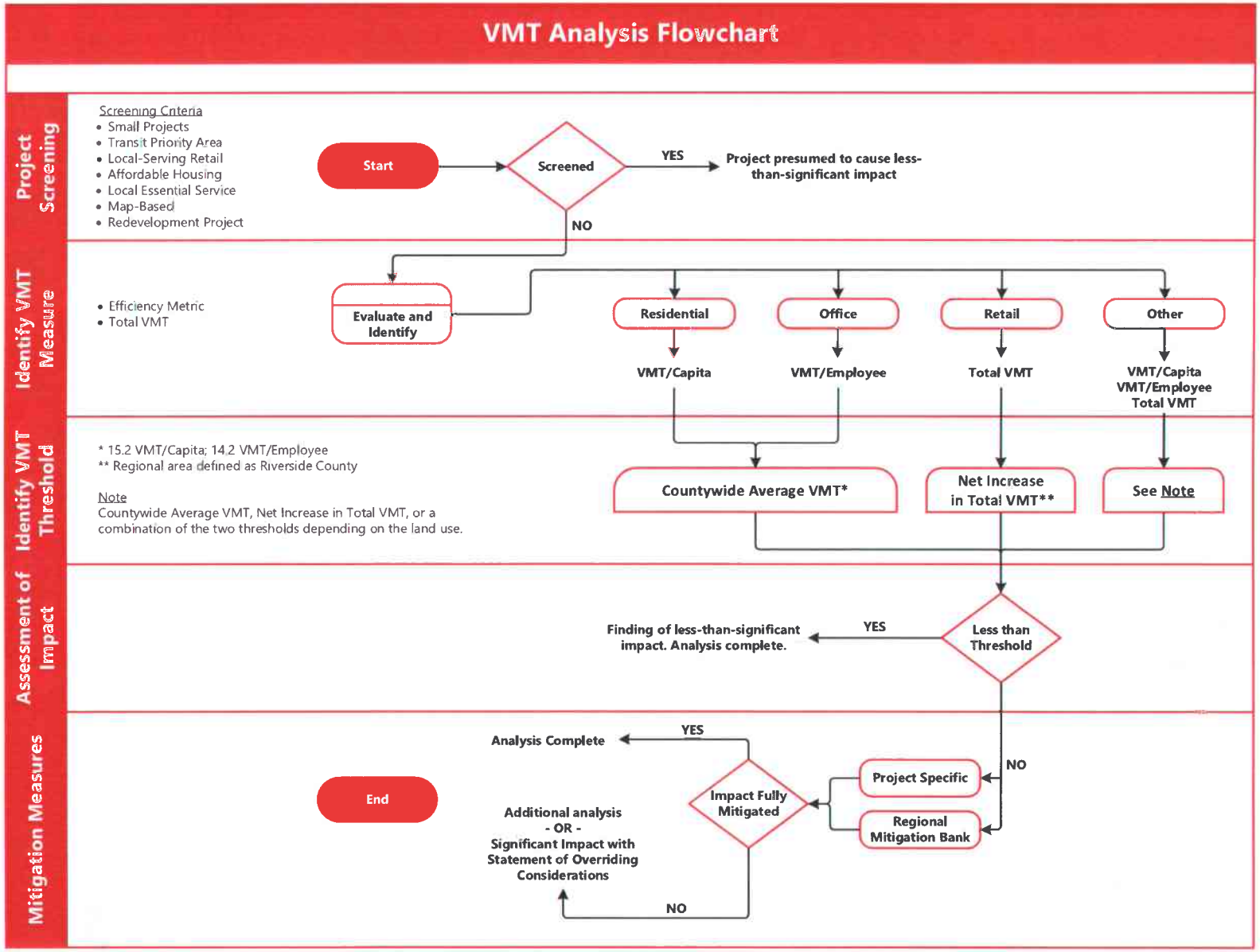
VMT Analysis Flowchart
Project Screening
Identify VMT Measure
Identify VMT Threshold
Assessment of Impact
Mitigation Measures
Screening Criteria
• Small Projects
• Transit Priority Area
• Local-Serving Retail
• Affordable Housing
• Local Essential Service
• Map-Based
• Redevelopment Project
Start
Screened
YES
Project presumed to cause less-than-significant impact
NO
Evaluate and Identify
• Efficiency Metric
• Total VMT
Residential
Office
Retail
Other
VMT/Capita
VMT/Employee
Total VMT
VMT/Capita
VMT/Employee
Total VMT
* 15.2 VMT/Capita; 14.2 VMT/Employee
** Regional area defined as Riverside County
Note
Countywide Average VMT, Net Increase in Total VMT, or a combination of the two thresholds depending on the land use.
Countywide Average VMT*
Net Increase in Total VMT**
See Note
Less than Threshold
YES
Finding of less-than-significant impact. Analysis complete.
NO
Project Specific
Regional Mitigation Bank
Impact Fully Mitigated
YES
Analysis Complete
End
Additional analysis
- OR -
Significant Impact with Statement of Overriding Considerations
NO

Figure 2

Step 1: Evaluate Land Use Type

During the initial step the land use projects will need to be evaluated for the following considerations:

- **Land use type**. For the purposes of analysis, the Institute of Transportation Engineers (ITE) land use codes serve as the basis of land use definitions. Although it is recognized that VMT evaluation tools and methodologies are typically not fully sensitive to some of the distinctions between some ITE categories, the use of ITE land use codes is useful for maintaining consistency across analyses, determining trip generation for other planning level tools, and maintaining a common understanding of trip making characteristics amongst transportation professionals. The ITE land use code is also used as an input into the sketch planning tool.

- **Mixed Use**. If there are multiple distinct land uses within the project (residential, office, retail, etc.), they will be required to be analyzed separately unless they are determined to be insignificant to the total VMT. Mixed use projects are permitted to account for internal capture, which depending on the methodology may require a distinct approach not covered in this documentation.

- **Redevelopment projects**. As described under the Non-Significant Screening Criteria section, redevelopment projects which have lower VMT than the existing on-site use can be determined to have a non-significant impact.

Step 2: Screen for Non-Significant Transportation Impact

The purpose of this step is to determine if a presumption of a non-significant transportation impact can be made on the facts of the project. The guidance in this section is primarily intended to avoid unnecessary analysis and findings that would be inconsistent with the intent of SB-743. A detailed CEQA assessment will not be required for land use elements of a project that meet the screening criteria shown in **Figure 3**. If a project is mixed use in nature, only those elements of the project that do not comply with the elements in **Figure 3** would require further evaluation to determine transportation significance for CEQA purposes. There are certain exceptions to the screening criteria contained in **Figure 3**. In cases where these exceptions apply, the Transportation Department will inform the traffic consultant.

Figure 3 – Screening Criteria for Development Projects

Project Type	Screening Criteria
SMALL PROJECTS[1] *This applies to projects with low trip generation per existing CEQA exemptions or based on the County Greenhouse Gas Emissions Screening Tables, result in a 3,000 Metric Tons of Carbon Dioxide Equivalent (MTCO2e) per year screening level threshold.* *CalEEMod runs were conducted for a variety of land uses to determine land uses units under the screening threshold level.*	**Presumed to cause a less-than-significant impact:** • Single Family Housing projects less than or equal to 110 Dwelling Units; or • Multi Family (low rise) Housing projects less than or equal to 147 Dwelling Units; or • Multi Family (mid-rise) Housing projects less than or equal to 194 Dwelling Units; or • General Office Building with area less than or equal to 165,000 SF; or • Retail buildings with area less than or equal to 60,000 SF; or • Warehouse (unrefrigerated) buildings with area less than or equal to 208,000 SF; or • General Light Industrial buildings with area less than or equal to 179,000 SF • Project GHG emissions less than 3,000 Metric Tons of Carbon Dioxide Equivalent (MTCO2e) as determined by a methodology acceptable to the Transportation Department; or • Unless specified above, project trip generation is less than 110 trips per day per the ITE Manual or other acceptable source determined by Riverside County.
PROJECTS NEAR HIGH QUAILITY TRANSIT[2] *High quality transit provides a viable option for many to replace automobile trips with transit trips resulting in an overall reduction in VMT.*	**Presumed to cause a less-than-significant impact:** • Within a ½ mile of an existing major transit stop; and • Maintains a service interval frequency of 15 minutes or less during the morning and afternoon peak commute periods.

[1] *Based on substantial evidence for thresholds for small projects, APPENDIX G.*
[2] *2018 OPR Technical Advisory, pg. 13.*

LOCAL-SERVING RETAIL[3] *The introduction of new Local-serving retail has been determined to reduce VMT by shortening trips that will occur.*	**Presumed to cause a less-than-significant impact:** • No single store on-site exceeds 50,000 SF; and • Project is local-serving as determined by the Transportation Department
AFFORDABLE HOUSING[4] *Lower-income residents make fewer trips on average, resulting in lower VMT overall.*	**Presumed to cause a less-than-significant impact:** • A high percentage of affordable housing is provided as determined by the Riverside County Planning and Transportation Departments
LOCAL ESSENTIAL SERVICE[5] *As with Local-Serving Retail, the introduction of new Local Essential Services shortens non-discretionary trips by putting those goods and services closer to residents, resulting in an overall reduction in VMT.*	**Presumed to cause a less-than-significant impact:** • Project is local-serving as determined by the Transportation Department; and • Local-serving and Day care center; or • Police or Fire facility; or • Medical/Dental office building under 50,000 square feet; or • Government offices (in-person services such as post office, library, and utilities); or • Local or Community Parks
MAP-BASED SCREENING[6] *This method eliminates the need for complex analyses, by allowing existing VMT data to serve as a basis for the screening smaller developments. Note that screening is limited to residential and office projects.*	**Presumed to cause a less-than-significant impact:** • Area of development is under threshold as shown on screening map as allowed by the Transportation Department

[3] *2018 OPR Technical Advisory, pg. 16.*
[4] *2018 OPR Technical Advisory, pg. 14.*
[5] *Based on assumption that, like local-serving retail, the addition of necessary local in-person services will reduce VMT given that trips to these locations will be made irrespective of distance given their non-discretionary nature.*
[6] *2018 OPR Technical Advisory, pg. 12.*

REDEVELOPMENT PROJECTS[7] *Projects with lower VMT than existing on-site uses, can under limited circumstances, be presumed to have a non-significant impact. In the event this screening does not apply, projects should be analyzed as though there is no existing uses on site (project analysis cannot take credit for existing VMT).*	**Presumed to cause a less-than-significant impact:** • Project replaces an existing VMT-generating land use and does not result in a net overall increase in VMT

Step 3: Identify Significance Measure and Threshold

The purpose of this step is to determine the VMT measure and threshold of significance for application to a land use project. Significance thresholds are based on land use type, broadly categorized as efficiency and net change metrics. Efficiency metrics include VMT/capita and Work VMT/employee[8]. As described in **Figure 4**, "Net Change" refers to the net change in regional VMT. "Net Change" is used for elements that include a significant customer base, such as commercial uses although it can extend to a variety of uses that have similar characteristics as shown in **Figure 4**.

Figure 4 – Threshold Basis

Threshold Basis	Efficiency	Net Change
Example Land Use	Residential, Office, Industrial	Retail, Medical Office, Sports Venue
Measure for VMT Threshold	Per capita, per employee	Regional VMT change
Customer Component	No	Yes
Allowable Methods	Non-Significant Screening Criteria, The Riverside County Sketch Planning Tool, Travel Demand Model, Other methods as deemed appropriate by the Transportation Department	Non-Significant Screening Criteria, Travel Demand Model, Other methods as deemed appropriate by the Transportation Department

The County adopted the county-wide average VMT as threshold of significance. This approach was adopted consistent with several jurisdictions within the County as well as to address the significant housing needs as identified in the SCAG regional housing needs assessment (RHNA). The thresholds of significance, as they relate to the Riverside County, are summarized in **Figure 5**.

[7] *2018 OPR Technical Advisory, pg. 18.*

[8] *Work VMT specifically applies to commute trips as represented by the attractions in the Travel Demand Model. Refer to* ***Appendix E*** *for additional information.*

Figure 5 - Measure for VMT Threshold

Land Use	Threshold of Significance
Residential	Existing county-wide average VMT per capita
Office	Existing county-wide average VMT per employee
Retail	Net increase in total VMT

Based on these criteria the VMT thresholds of significance shown in **Figure 6** have been established. A project would result in a significant project-generated VMT impact if its VMT exceeds the VMT threshold shown in **Figure 6** based on its respective land use.

Figure 6 – VMT Threshold of Significance

Land Use	VMT Threshold	Basis
Residential	15.2 VMT/capita	Existing county-wide average VMT per capita.
Office	14.2 Work VMT/employee	Existing county-wide average Work VMT per employee
Retail	Net regional change	Using the county as the basis or other area determined appropriate by the Transportation Department
Other Employment	14.2 Work VMT/employee	Existing county-wide average Work VMT per employee for similar land uses
Other Customer	Net regional change	Using the county as the basis or other area determined appropriate by the Transportation Department

Note that the inclusion of "Other Employment" and "Other Customer" refers to all other service and goods providers that are not included in the basic office/retail categories.

For projects with a significant customer basis it is typically appropriate to separate employee trip characteristics from the customer base unless the customer base is minimal in nature. Under these circumstances, it is most appropriate to evaluate the total of the delta in regional VMT resultant from the customer base plus the delta of VMT resultant from employees based on the following formula:

$$\Delta = \mathrm{E} \times (VMT_E - VMT_T)$$

$\Delta =$ Delta
$\mathrm{E} =$ Number of Employees
$\mathrm{VMT_E} =$ Estimated VMT/employee
$\mathrm{VMT_T} =$ Threshold VMT/employee

As provided for under Allowable Methods in **Figure 4**, some projects may require approaches and analysis methods not described within this document given their unique locations or the proposed land use is not appropriately represented in the Travel Demand Model. This can also be the case if there is unique data associated with a project such as a market study or other relevant data.

Sketch Planning Tool. Riverside County has developed a sketch planning tool for use in SB-743 land use project analysis. The purpose of the tool is to calculate VMT for a land use project. The source data of the tool was developed from the RIVTAM travel demand model using the methodology described in **APPENDIX E**. As with any sketch planning tool, there are distinct limitations in terms of its application including limits on the type and size of development that it can be applied to. Note that it is anticipated that the tool will continue to evolve in response to updates to travel demand model data or methodological changes adopted by the County and as such it is important that the most current version of the tool be utilized. Broadly, the sketch planning tool provides the following information:

- Institute of Transportation Engineers Trip Generation
- VMT Threshold Analysis
- Greenhouse Gas Estimation
- Transportation Demand Management Evaluation

The VMT Analysis methodology is summarized in **APPENDIX E**.

Step 4: VMT Analysis for Non-Screened Development

Most projects that require a detailed VMT assessment will use one of two methods for assessing a project's VMT: (1) Riverside County Sketch Planning Tool; or (2) RIVTAM/RIVCOM or other approved travel demand forecasting model.

For non-residential or non-office projects, very large projects, or projects that can potentially shift travel patterns, the sketch tool would not be appropriate or adequate for the VMT assessment. In such cases, the RIVTAM/RIVCOM model may be required based on a preliminary review of the project. Refer to the **VMT Calculations** section of **APPENDIX E** for detailed steps to calculate a project's VMT using RIVTAM.

There may be projects for which neither the Sketch Planning Tool nor the RIVTAM/RICOM model is appropriate for VMT assessment. In this scenario, the transportation consultant should coordinate with the Transportation Department to determine the appropriate methodology for the analysis.

Step 5: Mitigation Measures

When project VMT exceeds the threshold(s) of significance, the project will need to mitigate its CEQA transportation impact. Projects must propose measures to reduce project VMT and can include the

following VMT reducing strategies – project characteristics, multimodal improvements, parking, and transportation demand management (TDM). The type and size of the project will determine the most appropriate mitigation strategies for VMT impacts. For large projects such as general plans or specific plans, VMT mitigations should concentrate on the project's density and land use mix, site design, regional policies, and availability of transit, bicycle, and pedestrian facilities. For smaller projects such as an individual development project, VMT mitigations will typically require the preparation of a TDM program. A TDM program is a combination of strategies to reduce VMT. The program is created by an applicant for their land use project based on a list of strategies agreed to with Riverside County.

Riverside County has developed a list of potential TDM strategies and the magnitude of VMT reduction that could be achieved. The selection process was guided by the California Air Pollution Control Officers Association (CAPCOA) recommendations found in the 2010 publication Quantifying Greenhouse Gas Mitigation Measures. The area context of Riverside County also influenced the type of TDM strategies that were selected. CAPCOA has found strategies with the largest VMT reduction in rural areas include vanpools, telecommute or alternative work schedules, and master planned communities with design and land-use diversity to encourage intra-community travel. Based on empirical evidence, CAPCOA found the cross-category maximum for all transportation-related mitigation measures is 15% for suburban settings.

APPENDIX F summarizes available TDM strategies along with the maximum VMT reduction, applicable land use application, and complementary strategies. The Sketch Planning Tool includes the TDMs summarized in **APPENDIX F**.

TRANSPORTATION PROJECTS

Depending on the specific nature of a transportation project; it can alter trip patterns, trip lengths, and even trip generation. Research has determined that capacity-enhancing projects can and often do increase VMT. This phenomenon is commonly referred to as "induced demand." While methods are generally less developed for the analysis of induced demand compared to other areas of transportation analysis, there is still the need to quantify and understand its impact to the transportation system considering the requirements of SB-743.

Similarly, to land use projects, the approach to transportation project analysis closely align with the 2018 OPR Guidance. In terms of analysis, the analyst should first determine whether the transportation project has been prescreened and determined to have a non-significant impact as described in the following section.

Screen for Non-Significant Transportation Impact

The following non-significant impact examples are provided directly from the 2018 OPR Guidance:

- 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
- 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 nonmotorized 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

Significance Threshold and Methodology

For projects that increase roadway capacity and are not identified under the Non-Significant Screening Criteria in the prior section, the significance criterion should be changed to regional VMT. A finding of a significant impact would be determined if a transportation project results in a net increase in regional VMT. Note that for transportation improvements within Caltrans right-of-way, it is required that the analysis of those improvements be consistent with Caltrans SB-743 analysis guidelines.

APPENDIX A

GLOSSARY OF TERMS

TERM	DEFINITION
Active Transportation	A means of getting around that is powered by human energy, primarily walking and biking.
Impact	Refer to a project's impacts as determined by the transportation standards or CEQA thresholds of significance established by the County.
Improvement	A change that addresses the effects, particularly adverse effects, of a project on elements of the transportation system for which no transportation standards or CEQA thresholds of significance have been established by the Transportation Department. Distinct from "mitigation."
Mitigation	A change that addresses the CEQA impacts of a project on elements of the transportation system for which transportation standards or CEQA thresholds of significance have been established. Distinct from "improvement."
Mixed-Use Project	A development project that combines two or more land uses.
Net Change (in Total VMT)	Difference in total VMT in the area with and without the project. Performance metric for regional retail projects and transportation projects.
Peak Hour	The highest morning or evening hour of travel reported on a transportation network or street.
Project VMT	Calculated VMT generated by a development project.
Transportation Demand Management (TDM)	Programmatic measures that discourage drive-alone trips and encourage pedestrian, bicycle, and transit use. One of the four VMT reduction strategies for development projects.
Trip Assignment	An assignment of vehicle-trips to transportation facilities based on trip distribution percentages.
Trip Distribution	A forecast of the travel direction of vehicle-trips to and from a project.

Trip Generation	The estimated total number of vehicle-trips to and from a project.
VMT per Capita	The sum of VMT for personal motorized vehicle-trips made by all residents of a development project, divided by the total number of residents of the project.
VMT per Employee	The sum of VMT for personal motorized vehicle-trips made by all workers of an office or industrial development project, divided by the total number of workers at the project.

APPENDIX B

TRAFFIC ANALYSIS EXEMPTIONS

Under Level of Service (LOS) Analysis

The following types of development proposals are generally exempt from Traffic Analysis requirements per Board of Supervisor's action November 5, 1996 (Item No. 3.27):

1. All Residential Parcel Maps.
2. Single Family Residential Tracts of less than 100 lots.
3. Apartments and other Multiple Family projects of less than 150 units.
4. Plot Plan and Uses Cases for projects of one acre or less.
5. Preschools, Elementary Schools and Middle Schools.
6. Churches, Lodges, Community Centers, Neighborhood Parks and Community Parks.
7. Mini Storage Yards
8. Congregate Care Facilities that contain significant special services, such as medical facilities, dining facilities, recreation facilities and support retail facilities.
9. Level 1 projects (100-200 peak hour trips) in areas where a comprehensive traffic analysis has been performed and road improvement infrastructure funding mechanisms are in place. The Transportation Department may, however, require a traffic analysis for projects that are anticipated to exhibit potential adverse deficiencies on the circulation system.
10. Any use which can demonstrate, based on the most recent edition of the Trip Generation Report published by the Institute of Transportation Engineers (ITE) or other approved trip generation data, trip generation of less than 100 vehicle trips during the peak hours.

These exemptions will apply in most cases, however, the Transportation Department reserves the right to require a traffic analysis for any development regardless of size and/or type. The level of analysis shall be determined on an individual basis. The following are examples of conditions under which an exemption would not be granted.

a. The presence of an existing or potential safety problem.
b. The location of the development in an environmentally or otherwise sensitive area, or in an area that is likely to generate public controversy.
c. The presence of a nearby substandard intersection or street. This is normally considered to be an existing Level of Service "D" or worse, or substandard improvements.
d. The need for a focused study for access/operational issues.
e. A request from an affected agency, such as Caltrans or an adjacent city, which is deemed by the Transportation Department to be reasonable and rational.

APPENDIX C

ANALYSIS INPUT PARAMETERS

SIGNALIZED INTERSECTION ANALYSIS INPUT PARAMETERS

PARAMETER	VALUE
Base Saturation Flow Rate	1,900 pc/hr/ln
Heavy Vehicle Factor	Determine % heavy vehicle in existing traffic stream based on count data or consultation with County Transportation Dept. Projects with truck intensive uses must convert project trips to passenger car equivalents (PCE=1.5, 2, and 3 for 2-axle, 3-axle, and 4+-axle trucks, respectively). Truck intensive uses include heavy industrial, warehousing or as determined by the Transportation Department.
Grade	Include as appropriate
Exclusive left-turn lane	Peak hour volume > 100
Dual left-turn lanes	Peak hour volume > 300
Protected left-turn phasing	Left-turn volumes > 240 vph
Minimum green time	7 seconds each movement in areas of light pedestrian activity. In areas of heavy pedestrian activity, the minimum green shall be calculated based on the methodology in the Highway Capacity Manual.
Cycle length	60 sec to 120 sec
Lost time	Per Highway Capacity Manual Exhibit 10-17 (below)

Major street	Minor Street	Number of Phases	L (s)
Protected	Protected	4	16
Protected	Permitted	3	12
Permitted	Protected	3	12
Permitted	Permitted	2	8

* All above values are from HCM, 6th Edition. Any deviation from these parameters requires prior approval from Riverside County Transportation Department. Refer to HCM, 6th Edition for any default values not specifically identified here.

Intersection analyses should be conducted utilizing acceptable software based on HCM methodology. Closely spaced intersections are to be analyzed using analysis tools capable of accounting for turn lane storage, queue length, blockage, etc. such as Synchro.

Actual signal timing and peak hour factors should be collected in the field and utilized in the existing and near-term analyses. In cases where traffic is added from a significant number of cumulative projects, the consultant shall use their engineering judgment in the application of peak hour factors to maintain consistency with the existing conditions analyses. A peak hour factor of 1.0 shall be applied to buildout traffic conditions.

APPENDIX D

LEVEL OF SERVICE TARGETS

Level of Service for Riverside County Roadways[1]

Roadway Classification	Number of Lanes	Maximum Two-Way Traffic Volume (ADT)[2]		
		Service Level C	Service Level D	Service Level E
Collector	2	10,400	11,700	13,000
Secondary	4	20,700	23,300	25,900
Major	4	27,300	30,700	34,100
Arterial	2	14,400	16,200	18,000
Arterial	4	28,700	32,300	35,900
Mountain Arterial[3]	2	12,900	14,500	16,100
Mountain Arterial	3	16,700	18,800	20,900
Mountain Arterial	4	29,800	33,500	37,200
Urban Arterial	4	28,700	32,300	35,900
Urban Arterial	6	43,100	48,500	53,900
Urban Arterial	8	57,400	64,600	71,800
Expressway	4	32,700	36,800	40,900
Expressway	6	49,000	55,200	61,300
Expressway	8	65,400	73,500	81,700
Freeway	4	61,200	68,900	76,500
Freeway	6	94,000	105,800	117,500
Freeway	8	128,400	144,500	160,500
Freeway	10	160,500	180,500	200,600
Ramp[4]	1	16,000	18,000	20,000

NOTES:

[1] All capacity figures are based on optimum conditions and are intended as guidelines for planning purposes only.

[2] Maximum two-way ADT values are based on the 1999 Modified Highway Capacity Manual Level of Service Tables as defined in the Riverside County Congestion Management Program.

[3] Two-lane roadways designated as future arterials that conform to arterial design standards for vertical and horizontal alignments are analyzed as arterials.

[4] Ramp capacity is given as a one-way traffic volume.

APPENDIX E

VMT ANALYSIS METHODOLOGY

The following provides guidance regarding required Baseline and Cumulative scenarios as it applies to land development and transportation projects, Specific Plans, and Community Plans. This analyses approach is based on guidance provided within the 2018 OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018 OPR Guidance).

Land Development and Transportation Projects

Typically, the comparison between Baseline and Baseline Plus Project scenarios results in an evaluation of the worst-case scenario whether it be under an efficiency metric (per capita or per employee) or a net change metric (such as for retail or for a transportation improvement). This is a result of the fact that Cumulative analyses include additional developments, which typically have the effect of shortening trips as the proximity of complimentary land uses improve with increasing densities (i.e. houses are closer to shopping opportunities, houses are closer to employment opportunities, etc.). Accordingly, it can be presumed that a land development project or transportation project will not have a significant impact under Cumulative conditions if it is not determined to have one under Baseline conditions unless there are known circumstances, as determined by Transportation Department, that might alter this outcome. Unless specifically required by the Transportation Department, Project analysis for Cumulative conditions is only required if there is a finding of a significant impact under the Baseline Plus Project conditions.

When a significant impact is determined under Baseline Plus Project conditions, 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. If feasible mitigation measures cannot be identified to mitigate the impact of the Project, a Cumulative analysis will be required. A land development project or transportation project that can be sufficiently mitigated to not have a significant impact under Baseline Plus Project conditions would not have to undertake Cumulative analysis.

If Cumulative analysis is determined to be required, the Cumulative analysis should consider the effect of any planned mitigation measures identified during the Baseline analysis even if those mitigation measures do not fully mitigate the impact. If the Cumulative conditions analysis also results in a finding of a significant impact with previously identified mitigation measures, this Cumulative impact shall result in a finding of a significant and unavoidable impact and must therefore be called out in the project's EIR and subject to a Finding of Overriding Consideration.

Specific Plans and Community Plans

Specific Plans and Community Plans require the same analysis and mitigation approach to Project analysis as described above, with unique Land uses (residential, office, retail, etc.) being required to be analyzed in the aggregate against established Riverside County thresholds. Transportation improvements associated with Specific Plans or Community Plans are also analyzed in the same manner as described in this guidance. However, for Specific Plans and Community Plans, Riverside County requires that Cumulative analysis be completed irrespective of the findings of the Baseline Plus Project conditions. Additionally, No Project and Plus Project conditions under both the Baseline and Cumulative must provide total Regional VMT values. Note that the Regional VMT values are for informational purposes and are not used as the basis for the determination of a significant impact.

Analysis Methodology

Travel Demand Models (TDMs) are broadly considered to be amongst the most accurate of available tools to assess regional and sub-area VMT. While the Southern California Association of Governments (SCAG) maintains the regional travel demand model as a part of the Regional Transportation Plan/Sustainable Communities Strategy program (RTP/SCS), Riverside County maintains its own travel demand model (Riverside County Transportation Analysis Model, RIVTAM) in support of travel forecasting needs of the various agencies and jurisdictions within the County. The latest available version of RIVTAM (developed in 2009 based on the SCAG 2008 RTP Model structure) was determined to be the best fit for developing the VMT thresholds as it has the most up to date land use information for the County, as well as refined zonal structure within the County.

The 2012 Base Year model scenario was used for the baseline conditions and 2040 Future Year model scenario was used for the cumulative conditions in the County. Out of the five other counties included in the model (Ventura County, Los Angeles County, Orange County, San Bernardino County, and Imperial County), San Bernardino is a major contributor of the trips to Riverside County during a typical weekday.

As many of the County's daily trips originate from or have destinations in areas outside of the County such as San Diego County and the State of Arizona (external trips), their total length could not be computed solely using RIVTAM, additional analysis was required. The length of these trips was determined using two main processes, using Big Data and RIVTAM output files. Data was obtained from Teralytics that summarized the number of trips to and from the County to the surrounding Counties at the Census Tract level for the entire month of October 2019. The distance between each Census Tract was determined by using the TransCAD software, the modeling platform that RIVTAM runs on. The multipath analysis function within the TransCAD software was used to determine the point to point distance between the centroid of each Census Tract using the internal pathing algorithm that determines the shortest path along the roadway network between the centroid of each Census Tract pair. The shortest path between each County Census Tract and each non-County Census Tract that contained at least one trip was multiplied by the share of the total trips to and from each

Census Tract within the County to determine the average trip length to and from the County Census Tract. The big data average trip lengths within the County were compared against the RIVTAM model internal trip lengths. The big data average trip lengths within the County were found to be slightly lower than the internal average trip lengths in the RIVTAM model. This was the basis of big data calibration and the external average trip lengths were adjusted. The calibrated average trip length was applied to each TAZ based on the TAZ to Census Tract association and multiplied by the number of external trips to and from that TAZ to determine the total external VMT by TAZ.

These average external trip lengths by TAZ are also available in a spreadsheet form to compute additional VMT outside the model region if required for a project.

Before beginning the Countywide VMT analysis, the zonal structure and various components of RIVTAM were thoroughly reviewed to make the best use of model results to determine the VMT thresholds. Some of the major roadway improvements in the County that occurred after the year 2012 were also included in the model network to compute trip lengths that reflect the most recent travel patterns.

Model Zone Structure. VMT was computed at Traffic Analysis Zone (TAZ) level to determine the thresholds as well as to allow for comparisons among different areas throughout the County. There are 1807 TAZs within the County, including 623 TAZs within the unincorporated parts of the County.

Socio-Economic Data. Socioeconomic data (SED) and other model inputs are associated with each TAZ. Out of several different variables in the model SED, the VMT analysis mainly focused on population, number of households and types of employment that are used in the trip generation component. VMT computation was focused on the fact that the model uses employment variables by 3 income levels to determine commute trips and only some of the employment variables by industry type to determine the rest of the trips. Employment variables used in the model are listed below.

Employment by Income Level:

1. Low Income Employment (less than $25,000)
2. Medium Income Employment ($25,000 to $50,000)
3. High Income Employment ($50,000 or more)

Employment by Industry type:

1. Agriculture and mining
2. Construction
3. Manufacturing
4. Wholesale trade
5. Retail trade
6. Transportation, warehousing, and utility
7. Information

8. Financial activities
9. Professional and business services
10. Education and health services
11. Leisure and hospitality services
12. Other services
13. Public administration

It should be noted that not all the employment variables by industry type in the model are used for trip generation, therefore commute VMT was calculated for the land use types where trip generation rates were available in the model.

Trip Generation. The model runs a series of complex steps to estimate daily trip productions and attractions by various trip purposes for each TAZ. The trip purposes are listed below.

Model Trip Purpose:

1. Home-Based Work Direct (HBWD)
2. Home-Based Work Strategic (HBWS)
3. Home-Based School (HBSC)
4. Home-Based College and University (HBCU)
5. Home-Based Shopping (HBSH)
6. Home-Based Serving-Passenger (HBSP)
7. Home-Based Other (HBO)
8. Work-Based Other (WBO)
9. Other-Based Other (OBO)

The production model uses several variables such as number of workers, household income, age, household size and car availability depending on the trip purpose. Trip productions for every TAZ in the model were compiled separately by each trip purpose. The attraction model uses income categories of employment for the HBW trip purpose, whereas it uses some of the employment categories for all non-HBW trip purposes. The attraction model estimates trip attractions to each TAZ by regression coefficients that vary by employment type. Trip attractions for every TAZ were compiled by each purpose and by each employment type based on these regression coefficients.

Person Trips, Vehicle Occupancy, Trip Distance. Trip productions and attractions were compiled after the mode choice step, and only auto trips were used for the analysis. Since these auto trips are person trips, vehicle occupancy factors were applied for carpool 2 and carpool 3+ auto person trips. The model uses separate factors for carpool 3+ for each trip purpose. After the vehicle trip productions and attractions were computed for each trip purpose, trip lengths were applied for each zone pair from the respective skim matrices in the model to compute the production and attraction VMT by purpose.

VMT Calculations. The residential VMT was computed by combining the production VMT for all the Home-Based trip purposes. Commute VMT was computed from the attraction VMT by Home-Based Work trip purposes.

Residential and commute VMT by each TAZ were computed and average VMT were determined by County levels to determine the thresholds. A step-by-step process is described below to recalculated average VMT using the RIVTAM model if required.

Steps to Recalculate average VMT:

1. Run the RIVTAM model with desired network and SED data
2. Compile Population and Total Employment by each TAZ from SED
3. Use peak and off-peak person trip matrices by trip purpose and combine into daily person trips. These matrices are saved in \msplit\Outputs\. The files are "MS_PK_HBWD.mtx", "MS_PK_HBWS.mtx", "MS_PK_HBOALL.mtx", "MS_PK_HBSH.mtx", "MS_PK_HBSP.mtx ", "MS_PK_OBO.mtx", "MS_PK_WBO.mtx", "MS_PK_HBSC.mtx ", "MS_PK_HBCU.mtx", and similarly for off-peak.
4. Use the occupancy factors used in the model for each trip purpose to convert the daily person trips to vehicle trips.
5. Use lengths from the respective Skim matrices and multiply to the daily vehicle trips for Drive Alone, Carpool 2, and Carpool 3+ trips to compute daily VMT by purpose. These skim matrix files are "SPMATPK_DA.mtx", "SPMATPK_SR2.mtx", "SPMATPK_SR3.mtx", and similarly for off-peak.
6. Extract the daily VMT sum of productions by each TAZ and by trip purpose.
7. Extract the daily VMT sum of attractions by each TAZ and by trip purpose.
8. Combine the sum of productions by each TAZ for all the Home-Based trip purposes, i.e. "HBWD", "HBWS", "HBOALL", "HBSH", "HBSP", "HBSC", "HBCU". This will be the **Residential VMT** for internal trips.
9. Combine the sum of attractions by each TAZ for only the Home-Based-Work trip purposes, i.e. "HBWD", "HBWS". This will be the **Work VMT** for internal trips.
10. For the external VMT, directly use vehicle trips from the Origin-Destination tables. The files are "AM_OD.mtx", "PM_OD.mtx", "MD_OD.mtx", "NT_OD.mtx". Combine these vehicle trips to daily trips.
11. Extract daily OD trips sum of productions only for the external vehicle trips.
12. Extract daily OD trips sum of attractions only for the external vehicle trips.
13. Since the OD vehicles trips are for all purposes, multiply the share of Home-Based trip purpose and Home-Based-Work purpose from the mode choice person trips tables to derive the external Residential and Work external trips.
14. Multiply these external trips to the average lengths provided separately by the County.
15. Add external VMT to the internal VMT to get the final VMT for each TAZ.

APPENDIX F

RIVERSIDE COUNTY TDM MEASURES

#	Transportation Demand Management Measure	Description	TDM Type	Riverside County Max VMT Reduction
Parking Strategies				
3	Parking Cash-Out	Provide employees a choice of forgoing current parking for a cash payment to be determined by the employer. The higher the cash payment, the higher the reduction.	Incentive	2.0%
4	Price Workplace Parking	Implements workplace parking pricing for employees at employment locations for all land-use contexts and all types of development that include employment where trips originate at home and terminate at work.	Incentive	5.0%
6	Parking Management Strategies	Strategies to encourage efficiency in parking facilities and improve the quality of service to parking users	-	3.0%
Transit Strategies				
5	Transit Rerouting	Coordinate with local transit agency to provide or reroute existing transit services near the site	Infrastructure	1.0%
6	Transit Stops	Coordinate with local transit agency to provide bus stop near the site	Infrastructure	1.0%
7	Safe and Well-Lit Access to Transit	Enhance the route for people walking or bicycling to nearby transit (typically off-site). Provide Emergency 911 phones along these routes to enhance safety.	Infrastructure	1.0%
8	Implement Neighborhood Shuttle	Implement project-operated or project-sponsored neighborhood shuttle serving residents, employees, and visitors of the project site	Incentive	3.0%
9	Transit Subsidies	Involves the subsidization of transit fare for residents and employees of the project site. This strategy assumes transit	Incentive	3.0%

		service is already present in the project area.		
Communication & Information Strategies				
10	Mandatory Travel Behavior Change Program, Promotions & Marketing	Involves the development of a travel behavior change program that targets individuals' attitudes, goals, and travel behaviors, educating participants on the impacts of their travel choices and the opportunities to alter their habits. Provide a web site that allows employees to research other modes of transportation for commuting. Involves the use of marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices with passive educational and promotional materials.	Incentive	1.0%
11	Promotions & Marketing	Involves the use of marketing and promotional tools to educate and inform travelers about site-specific transportation options and the effects of their travel choices with passive educational and promotional materials.	Incentive	1.0%
Commuting Strategies				
12	Required Commute Trip Reduction Program	Employee-focused travel behavior change program that targets individuals' attitudes, goals, and travel behaviors, educating participants on the impacts of their travel choices and the opportunities to alter their habits.	Incentive	1.0%
13	Employer Sponsored Vanpool or Shuttle	Implementation of employer-sponsored employee vanpool or shuttle providing new opportunities for access to connect employees to the project site.	Incentive / Infrastructure	3.0%
14	Preferential Carpool / Vanpool Parking Spaces	Reserved carpool / vanpool spaces closer to the building entrance.	Infrastructure	1.0%
15	On-site Carts or Shuttles	Provide on-site cart or shuttle for employees to travel across campus.	Incentive / Infrastructure	3.0%
16	Emergency Ride Home (ERH) Program	Provides an occasional subsidized ride to commuters who use alternative modes. Guaranteed ride home for people if they need to go home in the middle of the day due to an emergency or stay late	Incentive	3.0%

		and need a ride at a time when transit service is not available.		
17	Alternative Work Schedule or Telework (Telecommuting, Distance-Learning, etc.)	Flextime, Compressed Work Week (CWW), staggered shifts, and use of telecommunications as a substitute for physical travel.	Incentive	10.0%*
18	On-site Childcare	Provides on-site childcare to remove the need to drive a child to daycare at a separate location.	Infrastructure	2.0%
Shared Mobility Strategies				
19	Designated Parking Spaces for Car Share Vehicles	Reserved car share spaces closer to the building entrance.	Infrastructure	1.0%
20	School Carpool Program	Implements a school carpool program to encourage ridesharing for students.	Incentive	15.0%
Bicycle Infrastructure Strategies				
21	Bike Share	Implement bike share to allow people to have on-demand access to a bicycle, as-needed.	Incentive / Infrastructure	0.25%
22	Implement/Improve On-street Bicycle Facility	Implements or provides funding for improvements to corridors and crossings for bike networks identified within a one-half mile buffer area of the project boundary, to support safe and comfortable bicycle travel.	Infrastructure	0.625%
23	Include Bike Parking in Excess of City Code	Implements short and long-term bicycle parking to support safe and comfortable bicycle travel by providing parking facilities at destinations	Infrastructure	0.625%
24	Include Secure Bike Parking and Showers	Implements additional end-of-trip bicycle facilities to support safe and comfortable bicycle travel.	Infrastructure	0.625%

Neighborhood Enhancement Strategies				
25	Traffic Calming Improvements	Implements traffic calming measures throughout and around the perimeter of the project site that encourage people to walk, bike, or take transit within the development and to the development from other locations.	Infrastructure	1.0%
26	Pedestrian Network Improvements	Implements pedestrian network improvements throughout and around the project site that encourages people to walk.	Infrastructure	2.0%
Miscellaneous Strategies				
27	Virtual Care Strategies for Hospitals	Resources to allow patients to access healthcare services or communicate with healthcare staff through online or off-site programs.	Infrastructure	6.0%
28	On-site Affordable Housing	Provides on-site affordable housing.	Infrastructure	4.0%

** Percentage may be increased if demonstrated by substantial evidence. This may be in the form of published research studies or similar.*

APPENDIX G

UNIT-BASED SCREENING THRESHOLDS FOR SMALL PROJECTS

The Riverside County Greenhouse Gas Emissions Screening Tables document (July 17, 2018) identifies a 3,000 Metric Tons of Carbon Dioxide Equivalent (MTCO2e) per year screening level threshold to identify projects that require the use of the Screening Tables or a project-specific technical analysis to quantify and mitigate project emissions.

The County determined the size of development that is too small to be able to provide the level of greenhouse gas (GHG) emission reductions expected from the Screening Tables or alternate emission analysis method. To do this the County determined the GHG emission amount allowed by a project such that 90 percent of the emissions on average from all projects would exceed that level and be "captured" by the Screening Table or alternate emission analysis method. The GHG emissions calculations from the VMT Tool should be used in conjunction with the County's GHG emissions screening tables.

California Emissions Estimator Model (CalEEMod version 2016.3.2) was used to determine the maximum number of dwelling units or square footage that would remain within the 3,000 MTCO2e per year screening threshold. CalEEMod is a statewide land use emissions computer model designed to quantify potential criteria pollutant emissions associated with both construction and operations from a variety of land use projects. This model was selected because it is provided by the California Air Resources Board (CARB) to be used statewide for developing project-level GHG emissions. CalEEMod was used with the built-in default trip lengths and types.

CalEEMod runs were conducted for a variety of land uses in order to determine the land use units that trigger SCAQMD threshold of 3,000 MT CO2e/year, as well the CO2e emissions on a per-unit (dwelling unit or thousand square feet) rate that could be used in the VMT Tool. The land uses and corresponding CO2e emissions rates are shown in **Table 1**.

Table 1 - Land Uses and CO_2e Emissions Rates

Land Use	DU or TSF	Total $MTCO_2e$	$MTCO_2e$ per DU or TSF
Single Family	110	2,997	27.25
Multi-Family (low-rise)	147	2,989	20.34
Multi-Family (mid-rise)	194	2,997	15.45
General Office Building	165	2,989	18.11
Retail	60	2,983	49.72
Warehouse (Unrefrigerated)	208	2,995	14.40
General Light Industrial	179	2,997	16.74

DU = dwelling unit, TSF = Thousand Square Feet

CalEEMod relies on known emissions data associated with certain activities or equipment (i.e. default values) that can be used if site-specific information is not available. CalEEMod contains default values to use in each specific local air district region or county. Input values were selected to be specific to the South Coast portion of Riverside County as the majority of future development that would utilize the screening thresholds is anticipated in this area of the County.

The following outlines the assumptions used in the CalEEMod calculations:

- CalEEMod uses Institute of Transportation Engineers (ITE) 9th Edition daily trip generation rates by default. Modeling for the VMT Tool updated CalEEMod defaults to use ITE 10th Edition rates.
- Rural trip lengths are longer than urban trip lengths and were conservatively used.
- The CalEEMod mobile source (vehicle) emissions are based on emissions rates from CARB's EMissions FACtor Model (EMFAC). The CalEEMod default EMFAC2014 emissions rates were updated with EMFAC2017 emissions rates, which are the latest available from CARB.
- The CalEEMod carbon intensity factor was adjusted within the model to represent Southern California Edison's (SCE) current emissions rate. The electricity emission intensity factor in CalEEMod was revised to use the SCE's reported rate in their 2018 Corporate Responsibility and Sustainability Report. As of 2017, SCE's power mix was at 32 percent renewable energy and will be required to achieve the 60 percent renewable energy goal by 2030 established by SB 100.
- Energy savings from water conservation resulting from the Green Building Code Standards for indoor water use and California Model Water Efficient Landscape Ordinance for outdoor water use are not included in CalEEMod. Conservatively, no updates were made to CalEEMod to account for these measures.
- The 2019 Building Energy Efficiency Standards (adopted on May 9, 2018) took effect on January 1, 2020. Under the 2019 standards, homes would use about 53 percent less energy and

nonresidential buildings would use about 30 percent less energy than buildings under the 2016 standards. Conservatively, no updates were made to CalEEMod to account for these reductions under the 2019 Building Energy Efficiency Standards.

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.

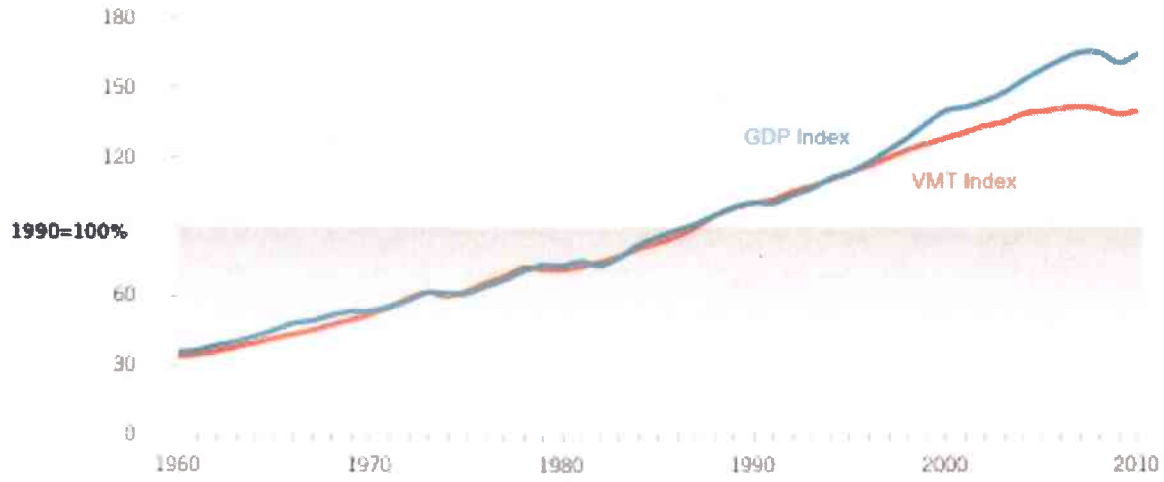

Figure 1. Kooshian and Winkelman (2011) *VMT and Gross Domestic Product (GDP), 1960-2010.*

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.

[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

[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.

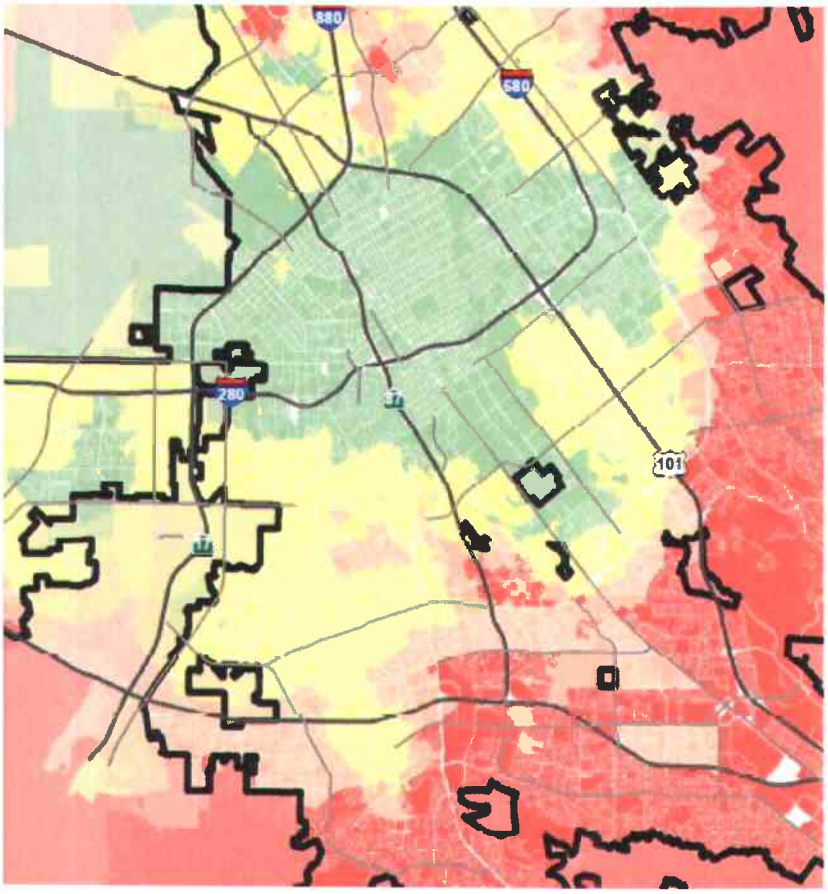

Figure 2. Example map of household VMT that could be used to delineate areas eligible to receive streamlining for VMT analysis. (Source: City of San José, Department of Transportation, draft output of City Transportation Model.)

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-

[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

[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.

[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.

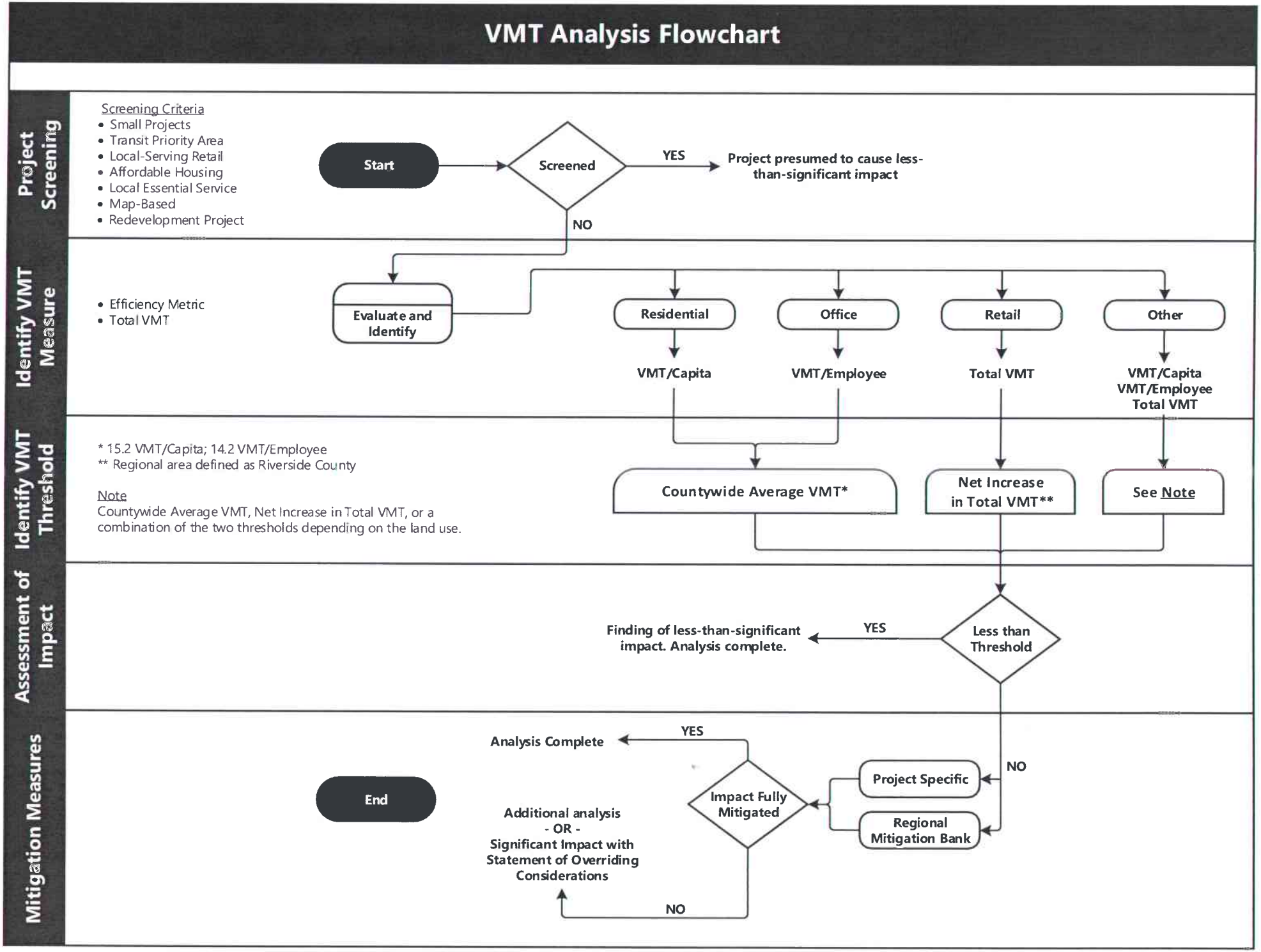
the overall induced travel effect. Options for estimating and incorporating the VMT effects that are caused by the subsequent land use changes include:

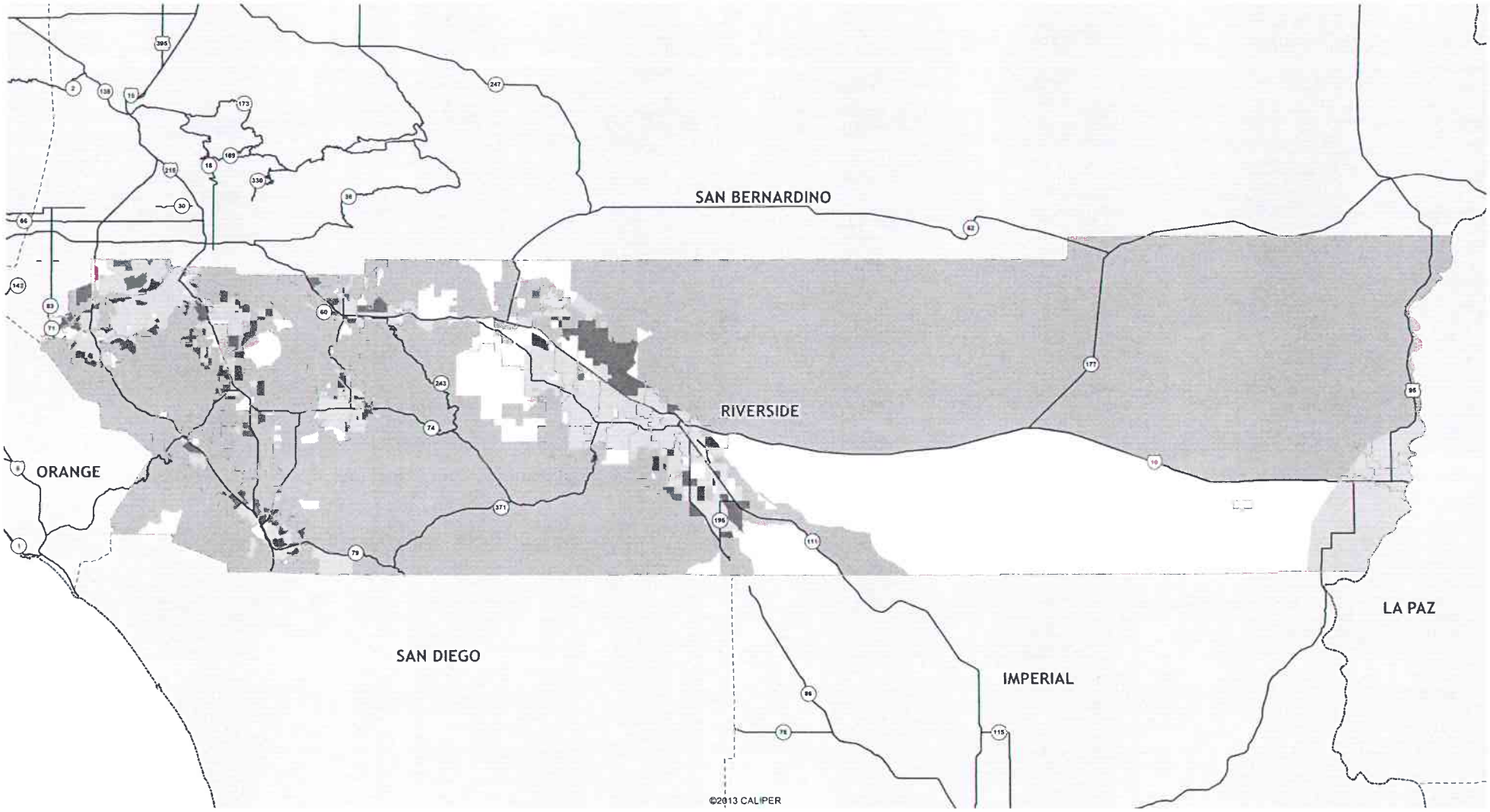
1. *Employ an expert panel.* An expert panel could assess changes to land use development that would likely result from the project. This assessment could then be analyzed by the travel demand model to assess effects on vehicle travel. Induced vehicle travel assessed via this approach should be verified 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.

VMT Analysis Flowchart





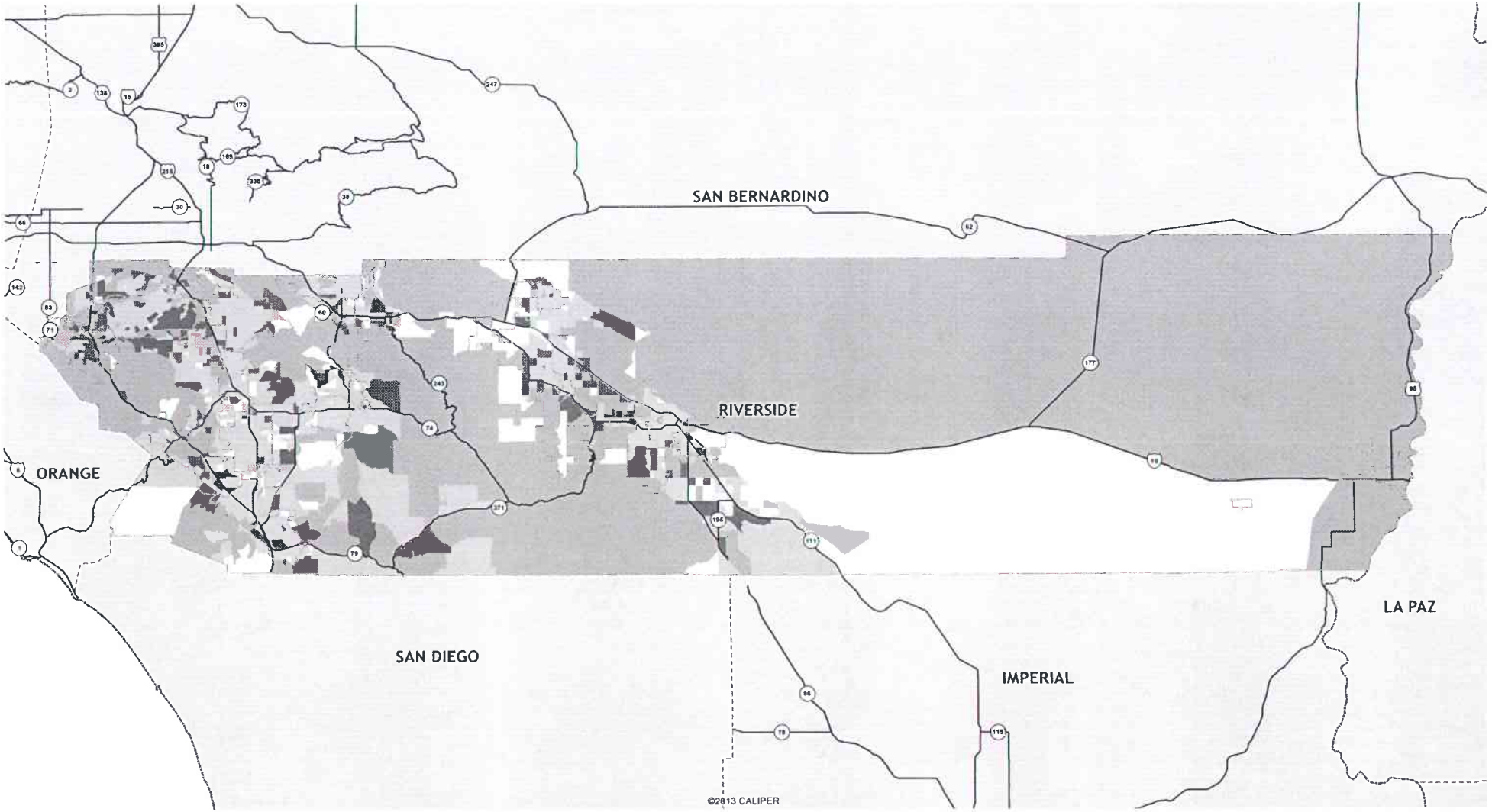
Kimley»Horn

Less than County Average
0 to 15% over the County Average
More than 15% over the County Average
No data available

Note
Threshold based on County Average
Includes External Trips

County Boundary
City Limits

RIVTAM Model (2012)
Daily Residential Home Based VMT per Capita
Comparison to Riverside County Average



Less than County Average
0 to 15% over the County Average
More than 15% over the County Average
No data available

Note:
Threshold based on County Average
Includes External Trips

County Boundary
City Limits

Kimley»Horn

RIVTAM Model (2012)
Daily Home Based Work VMT per Worker
Comparison to Riverside County Average