TRANSPORTATION ANALYSIS GUIDELINES for

Level of Service
Vehicle Miles Traveled

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT

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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.

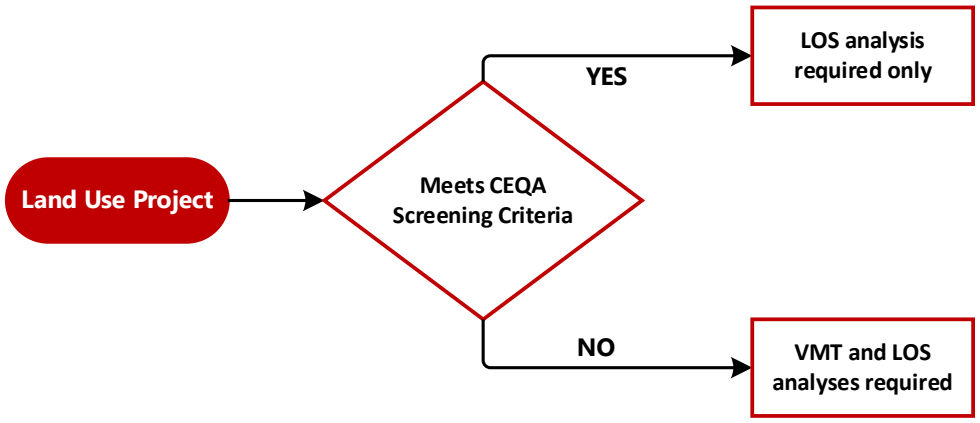

Figure 1

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.

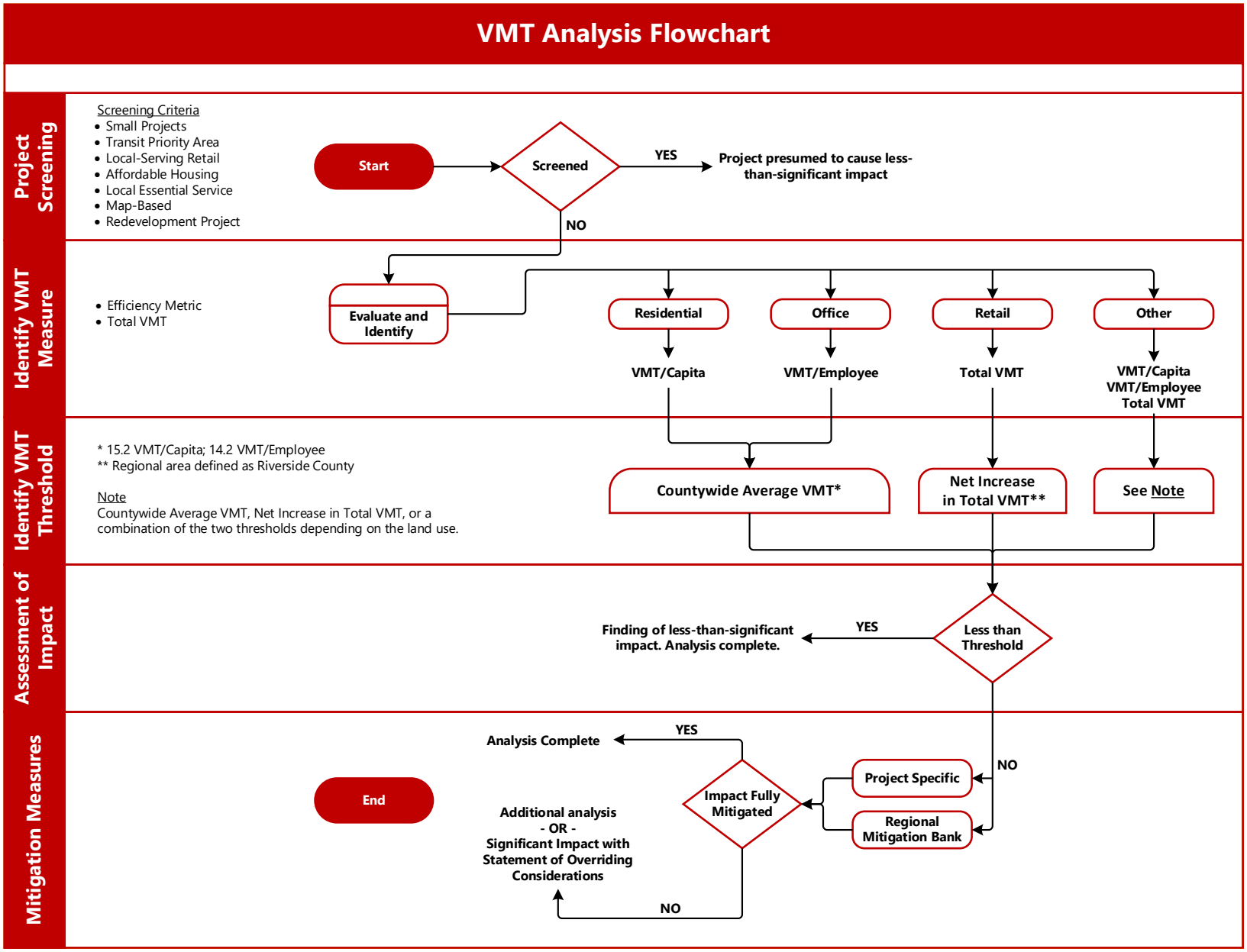
VMT Analysis Flowchart
Project Screening
Screening Criteria
• Small Projects
• Transit Priority Area
• Local-Serving Retail
• Affordable Housing
• Local Essential Service
• Map-Based
• Redevelopment Project
Start
Screened
YES
Project presumed to cause less-than-significant impact
NO
Identify VMT Measure
• Efficiency Metric
• Total VMT
Evaluate and Identify
Residential
Office
Retail
Other
VMT/Capita
VMT/Employee
Total VMT
VMT/Capita
VMT/Employee
Total VMT
Identify VMT Threshold
* 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
Assessment of Impact
Less than Threshold
YES
Finding of less-than-significant impact. Analysis complete.
Mitigation Measures
NO
Project Specific
Regional Mitigation Bank
Impact Fully Mitigated
YES
Analysis Complete
Additional analysis - OR - Significant Impact with Statement of Overriding Considerations
NO
End

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]	Presumed to cause a less-than-significant impact:
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).	• 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.