City of Long Beach
Working Together to Serve

Memorandum

Date: June 30, 2020

To: Thomas B. Modica, City Manager

From: Oscar W. Orci, Director of Development Services

For: Mayor and Members of the City Council

Subject: **Vehicle Miles Traveled (VMT) Standards for Development Review**

In 2013, the State Legislature adopted SB 743, a measure requiring all California cities to change long-standing methods for analyzing transportation-related impacts of projects, as a means of complying with the requirements of the California Environmental Quality Act (CEQA). As of July 1, 2020, cities will be required to analyze the transportation-related impacts of development projects, land use plans, and transportation projects using a metric known as Vehicle Miles Travelled (VMT), replacing the former method of analysis Level of Service (LOS). This memorandum is provided to inform the City Council how this change will be implemented by City staff.

Staff from the Development Services and Public Works Departments have collaborated with a traffic consultant to develop the City's VMT CEQA Guidelines and Traffic Impact Analysis (TIA) requirements. These guidelines were presented to, and approved by, the Planning Commission on June 4, 2020. In accordance with Section 1002(f) of Article X of the City Charter, the Planning Commission is the appropriate body to approve guidelines related to the review of development projects. As the guidelines are not a legislative requirement, no action by the City Council is required. The approved guidelines are attached. While the City is shifting to VMT for CEQA purposes, some LOS information will still be required as part of the development review process.

Analyzing transportation impacts for CEQA purposes using VMT represents a shift from measuring and prioritizing the flow of vehicular traffic on City streets (LOS), as has been the practice since the advent of CEQA. VMT analysis is intended to minimize the greenhouse gas impacts of transportation by factoring a project's location, design, and access to transit, to achieve an overall reduction of vehicles miles traveled per capita or per employee (depending on the type of use). VMT addresses the land use and transportation barriers to shorter commutes, as well as safety and design considerations that influence individual choices commuters make as to where to live, shop and work, and how they travel between those destinations.

The use of VMT as a metric is also designed to encourage modes of transportation other than driving alone, facilitates and completements incorporation of urban design principles that improve a project's walking and biking environment and access to transit. By using VMT, potential mitigation measures are expanded to include activities that reduce VMT—such as improvements to bicycle infrastructure, electric vehicle charging stations, and work-

place funded transit passes—rather than limiting mitigation measures to vehicular roadway improvements, such as widenings and additional traffic turn lanes, that are often no longer feasible in the context of built-out urban areas, like Long Beach.

For typical development projects, the shift to VMT will mean a more streamlined development review process with fewer studies and standardized conditions for development projects. For other projects located further away from transit, and with high traffic generation potential, the shift to VMT may require supplemental traffic or environmental analysis. However, this will also provide the applicant and the City a more flexible approach to mitigate traffic impacts through the use demand management programs, bike, pedestrian and transit infrastructure, as well as appropriate project design. While impacts vary across the state, the shift to VMT in Long Beach will result in a streamlined development review process, better aligned planning goals, and positive development outcomes.

If you have questions regarding this matter, please contact Patricia A. Diefenderfer, Advance Planning Officer, at (562) 570-6261 or Patricia.Diefenderfer@LongBeach.gov.

OWO CK:HF

ATTACHMENTS: TRAFFIC IMPACT ANALYSIS GUIDELINES
CEQA TRANSPORTATION THRESHOLDS OF SIGNIFICANCE GUIDE

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City of Long Beach

Traffic Impact Analysis Guidelines

June 2020

City of Long Beach

Traffic Impact Analysis Guidelines

Updated by Cambridge Systematics and LSA

June 2020

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1 Introduction

1.1 Background

The City of Long Beach (City) Department of Public Works requires Applicants to analyze the traffic and circulation impacts of proposed development projects, General Plan Amendments (GPAs), Specific Plans (SPs), and other planned development to comply with the California Environmental Quality Act (CEQA) and City regulations. These requirements shall be satisfied through the preparation of a Traffic Impact Analysis (TIA) document prepared in conformance with Department of Public Works, Traffic Engineering Division requirements as described in this document.

These TIA Guidelines provide direction for this review consistent with the General Plan Mobility Element vision that "*Plans, maintains, and operates mobility systems consistent with the principles of complete streets, active living, and sustainable community design*." These TIA Guidelines identify the suggested format and methodology that is generally required to be utilized in the study preparation, subject to amendment. The purpose of these guidelines is to establish procedures to ensure consistency of analysis and the adequacy of information presented regarding the proposed development project. In many cases, coordination with City staff will be required to provide further specific guidance regarding the scope and content of the TIA.

1.2 Purpose

TIAs are an integral part of the environmental review process required for all proposed projects that are not categorically exempt under CEQA. In 2013, new Senate Bill (SB) 743 became law. Under SB 743 requirements, evaluation of transportation impacts in CEQA will no longer allow measuring automobile delay and level of service (LOS) for the purpose of CEQA traffic studies. SB 743 directs agencies to develop new guidelines that provide a transportation performance metric that can help promote: the reduction of greenhouse gas emissions, the development of multimodal networks, and diversity of land uses. In December 2018, the California Office of Administrative Law cleared the revised CEQA Guidelines for use and the Governor's Office of Planning and Research (OPR) published the *Technical Advisory on Evaluating Transportation Impacts in CEQA*. As currently adopted, the CEQA Guidelines indicate that vehicle miles traveled (VMT) generated by a land use project is generally the most appropriate measure of transportation impacts. These guidelines include procedures for analyzing land development projects consistent with SB 743.

While consistency with SB 743 is required, the City will also continue to require traffic studies in accordance with prior procedures (including assessment of capacity and LOS); however, LOS and motorist delay will not in the future be applicable to CEQA. SB 743 preserves local government authority to make planning decisions, and LOS and congestion can still be measured for planning purposes and to determine conformity with General Plan requirements. LOS may also still be used to measure roadway performance and project impacts or as an input in air quality or noise analyses. While traffic studies may be required for planning approvals, those studies will no longer be part of the CEQA process except where deemed necessary to determine whether a proposed project would result in hazards due to geometric design features or inadequate emergency access. An LOS analysis conducted for these planning purposes may be undertaken over a smaller study area and number of intersections than prior LOS assessments under CEQA.

While traffic studies have traditionally focused on the movement of automobiles through the roadway system, these revised guidelines also address other important modes of travel in conformance with principles from the City's Mobility Element. The ability of Long Beach to balance and facilitate the different components of its transportation system is important to the creation and preservation of a quality living and business environment. The function of the transportation system is to provide for the movement of people and goods, including pedestrians, bicyclists, transit, and other vehicle traffic flows, within and through the community.

The Mobility Element of the City's General Plan sets forth goals and policies to improve overall transportation in Long Beach. The Mobility Element is based on approaches that address the needs of multimodal corridors and streets as well as community neighborhoods that are affected by traffic. These guidelines have been developed to comply with CEQA as well as to ensure that transportation system improvements necessary to support new development while maintaining quality of life within the community are identified prior to project approval and funded prior to construction.

1.3 When Transportation Impact Studies Are Required

The decision to require a TIA will be made by the City's Traffic Engineer based on these guidelines. Transportation impact studies are required whenever there is potential for a significant impact under a local policy or CEQA. Generally, a TIA may be required for any project in Long Beach that is expected to generate 500 or more net new daily trips, including both inbound and outbound trips.

The Department of Public Works may also require that a TIA be prepared for any project regardless of size, nature, or location, if there are concerns over safety or operational issues, or if the project is located in an area significantly impacted by traffic.

The TIA will be required to fulfill CEQA requirements per SB 743 guidelines. As mentioned elsewhere in this document, the City may also require traffic studies in accordance with prior procedures to measure roadway performance, the project's impact on transportation infrastructure, or as input in air quality or noise analyses. Section 2 provides instructions for preparing a TIA per SB 743 guidelines (for CEQA purposes), and Section 3 provides instructions for preparing a TIA per the traditional process, which measures congestion, delay, and LOS (for safety and General Plan conformity). Section 2 fulfills the CEQA requirements per SB 743 guidelines, and Section 3 is required for the City's General Plan compliance. Note that projects may have a less than significant impact under CEQA VMT requirements but may still have other requirements imposed as part of the General Plan compliance. Those requirements would be outside of CEQA, except where deemed necessary to determine whether a proposed project would result in hazards due to geometric design features or inadequate emergency access, and would not affect the findings of significance under the CEQA VMT analysis.

2 VMT Analysis to Satisfy SB 743 Requirements and CEQA Guidelines Section 15064.3, Subdivision (b)

Senate Bill (SB) 743, signed in 2013, changes the way transportation studies are conducted in California Environmental Quality Act (CEQA) documents. In January 2019, the Natural Resources Agency and the Governor's Office of Planning and Research (OPR) codified SB 743 into the Public Resources Code (PRC) and the *State CEQA Guidelines*. Vehicle miles traveled (VMT) replaces motorist delay and level of service (LOS) as the metric for impact determination. For land development projects, VMT is simply the product of the daily trips generated by a new development and the distance those trips travel to their destinations.

To provide consistency with SB 743, this section of the traffic study guidelines provides the significance criteria, thresholds of significance, screening criteria, and methodologies related to VMT for analysis in CEQA transportation studies in Long Beach and is informed by the research conducted in preparation of the CEQA Transportation Thresholds of Significance Guide. Figure 1 demonstrates the process for determining whether a project is in conflict with or inconsistent with CEQA Guidelines Section 15064.3, subdivision (b). It provides the path from application filing through the determination of impacts. It is presented as the standard process; each development application is considered unique and may create alternative or modified steps through the process. Each step that diverges from this standard process should be accompanied by substantial evidence demonstrating compliance with other climate change and greenhouse gas (GHG) emission reduction laws and regulations.

2.1 Project Initiation

At the outset of the project development process, the Applicant should seek a meeting with City of Long Beach (City) staff to discuss the project description, the transportation study content, and the analysis methodology. Key elements to address include a description of the project in sufficient detail to determine project trip generation and to identify the potential catchment area (i.e., trip lengths if no modeling is undertaken), estimate project VMT, discuss project design features that may reduce the VMT from the project development, and discuss the project location and associated existing regional VMT percentages. As a result of the meeting, the Applicant or its consultant shall prepare a transportation analysis scope of work for review and approval by the City. The City will complete the review within 2 weeks of submittal of the draft scope of work.

2.2 Screening Thresholds

The OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* acknowledges that conditions may exist that would presume a land development project has a less than significant impact. These may be size, location, proximity to transit, or trip-making potential. CEQA gives the lead agency discretion to determine thresholds, including screening thresholds. The City of Long Beach has reviewed the recommendations and examples in the OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* and has established several screening thresholds. Land development projects that have one or more of the following attributes may be presumed to create a less than significant impact pursuant to CEQA Guidelines Section 15064.3, subdivision (b).

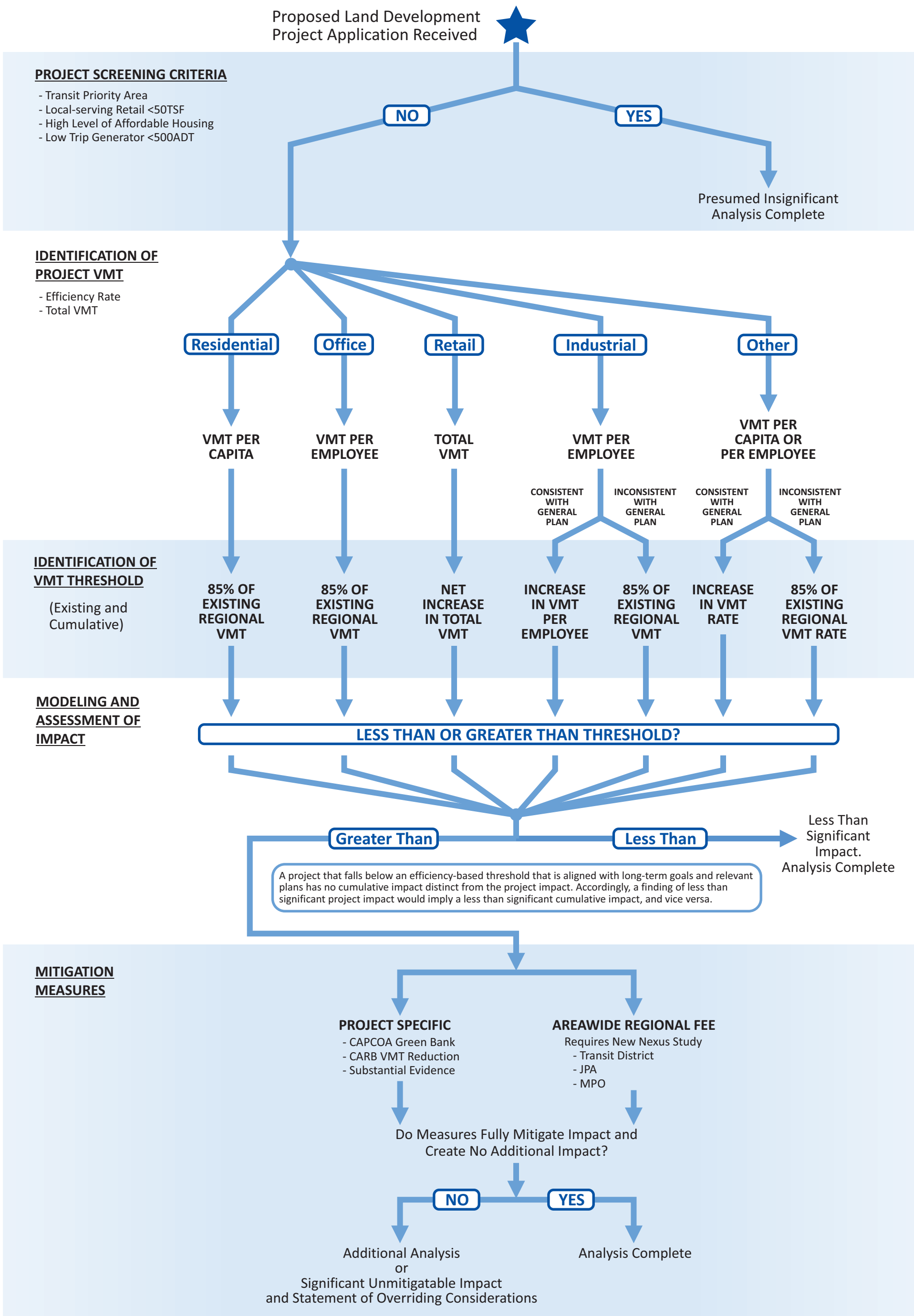
Proposed Land Development Project Application Received
PROJECT SCREENING CRITERIA
- Transit Priority Area
- Local-serving Retail <50TSF
- High Level of Affordable Housing
- Low Trip Generator <500ADT
NO
YES
Presumed Insignificant Analysis Complete
IDENTIFICATION OF PROJECT VMT
- Efficiency Rate
- Total VMT
Residential
Office
Retail
Industrial
Other
VMT PER CAPITA
VMT PER EMPLOYEE
TOTAL VMT
VMT PER EMPLOYEE
VMT PER CAPITA OR PER EMPLOYEE
CONSISTENT WITH GENERAL PLAN
INCONSISTENT WITH GENERAL PLAN
CONSISTENT WITH GENERAL PLAN
INCONSISTENT WITH GENERAL PLAN
IDENTIFICATION OF VMT THRESHOLD
(Existing and Cumulative)
85% OF EXISTING REGIONAL VMT
85% OF EXISTING REGIONAL VMT
NET INCREASE IN TOTAL VMT
INCREASE IN VMT PER EMPLOYEE
85% OF EXISTING REGIONAL VMT
INCREASE IN VMT RATE
85% OF EXISTING REGIONAL VMT RATE
MODELING AND ASSESSMENT OF IMPACT
LESS THAN OR GREATER THAN THRESHOLD?
Greater Than
Less Than
Less Than Significant Impact. Analysis Complete
A project that falls below an efficiency-based threshold that is aligned with long-term goals and relevant plans has no cumulative impact distinct from the project impact. Accordingly, a finding of less than significant project impact would imply a less than significant cumulative impact, and vice versa.
MITIGATION MEASURES
PROJECT SPECIFIC
- CAPCOA Green Bank
- CARB VMT Reduction
- Substantial Evidence
AREAWIDE REGIONAL FEE
Requires New Nexus Study
- Transit District
- JPA
- MPO
Do Measures Fully Mitigate Impact and Create No Additional Impact?
NO
YES
Additional Analysis or Significant Unmitigatable Impact and Statement of Overriding Considerations
Analysis Complete

FIGURE 1

2.2.1 Presumption of Less Than Significant Impact for Small Projects

The City of Long Beach has historically established a screening threshold of 50 peak-hour trips for requiring a TIA. For most land use types, approximately 10 percent of daily trips occur during the busiest peak hour. Therefore, a project generating fewer than 50 peak-hour trips would generate approximately 500 average daily trips (ADT).[1] GHG emissions resulting from this level of vehicle traffic would be less than comparable GHG emissions thresholds. Therefore, this threshold of 500 ADT is being retained to screen small projects.

2.2.2 Presumption of Less Than Significant Impact for Residential and Office Projects in Low-VMT Areas

The OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* states that residential and office projects that have similar density, mix of uses, and transit accessibility as surrounding similar uses will likely have similar VMT generation as those uses. Therefore, maps showing VMT-efficient areas can be used to screen residential and office projects from further analysis. Figure 2 presents a map of VMT per capita for all existing Long Beach residential areas. These data were obtained from the 2016 Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) travel demand model. VMT per capita in each area is compared to the regional average VMT per capita for Los Angeles County to identify VMT-efficient areas for future residential development (shown in green), where average VMT per capita is lower than the County average by 15 percent or more. In these green areas, projects with similar characteristics to the surrounding development would be presumed to have a less than significant transportation impact. Areas of Long Beach shown in yellow have a VMT per capita between 15 percent below and 15 percent above the County average; therefore, project design features or mitigation may result in a less than significant impact. Red areas indicate that VMT per capita is greater than 15 percent above the County average, indicating that VMT impacts are likely to remain significant. For residential development proposed in the green areas of Figure 2, City staff will review the project's characteristics to determine whether they are similar to those of surrounding development. Those projects found to be similar to surrounding development would be presumed to have a less than significant transportation impact related to CEQA Guidelines Section 15064.3, subdivision (b). Projects in all other locations would be subject to City review and the preparation of a VMT transportation analysis.

Figure 3 presents a map of VMT per employee throughout Long Beach. Again, these data were obtained from the 2016 SCAG RTP/SCS travel demand model and are compared to the regional average VMT per employee for Los Angeles County to identify VMT-efficient areas for future office development (shown in green) where average VMT per employee is lower than the County average by 15 percent or more and projects with similar characteristics would be presumed to have a less than significant transportation impact. Yellow areas indicate a VMT per employee between 15 percent below and 15 percent above the County average, where project design features or mitigation may result in a less than significant impact. Red areas indicate a VMT per employee higher than 15 percent above the County average. In these areas, VMT impacts are likely to remain significant. For office development proposed in the green areas of Figure 3, City staff will review the project's characteristics to determine whether they are similar to surrounding development. Those projects found to be similar to surrounding development would be presumed to have a less than significant transportation impact related to CEQA

[1] City of Long Beach, *CEQA Transportation Thresholds of Significance Guide,* May 2020.

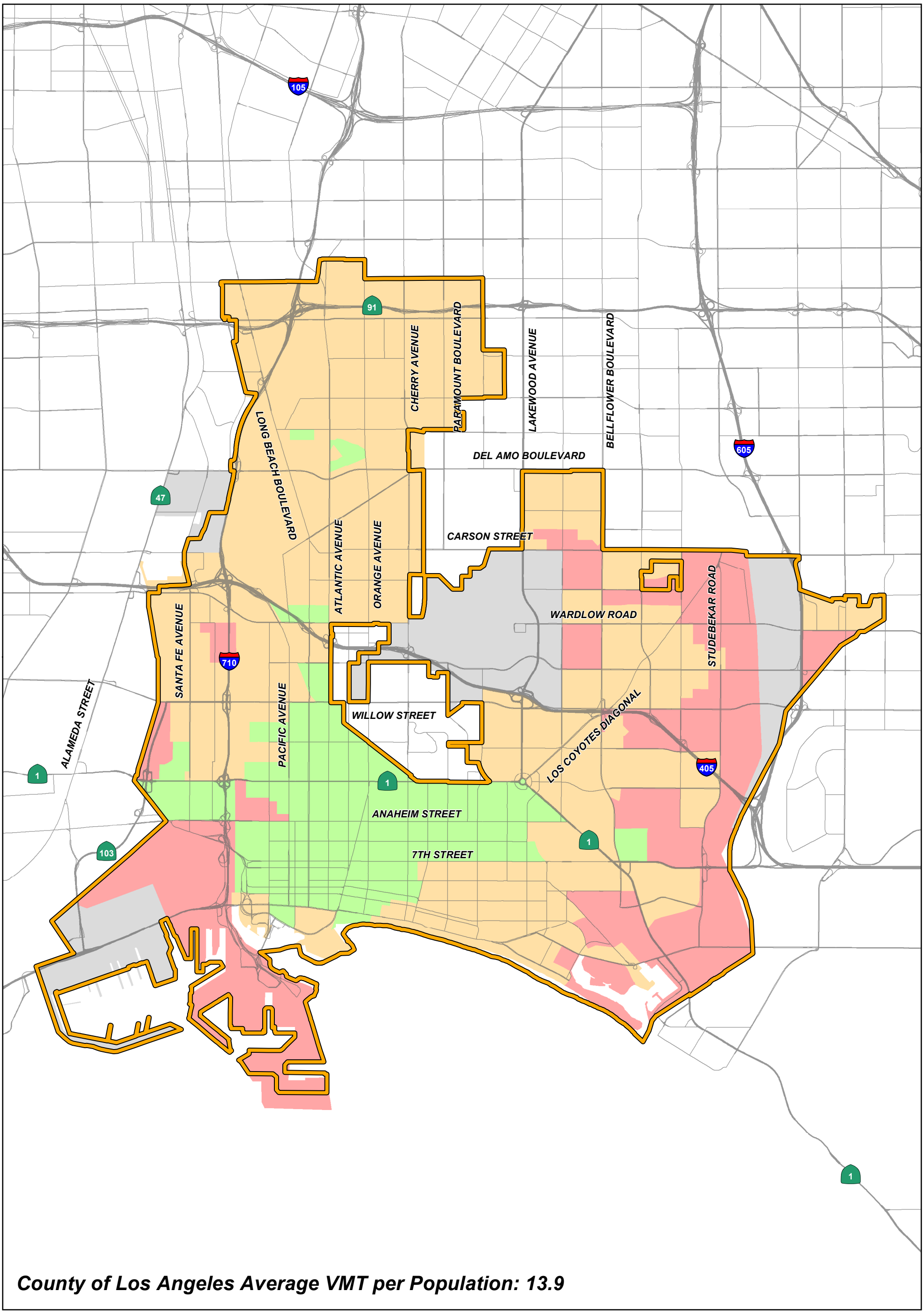

FIGURE 2

VMT per Population

- No Population
- Less than 11.8 (less than 85% of the regional average)
- 11.8 - 16.0 (85% to 115% of the regional average)
- Greater than 16.0 (greater than 115% of the regional average)

City of Long Beach

N

0 3000 6000
FEET

SOURCE: SCAG RTP/SCS Model; ESRI Streetmap, 2013.

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Traffic Impact Analysis Guidelines

Existing VMT per Population Compared to Regional Average

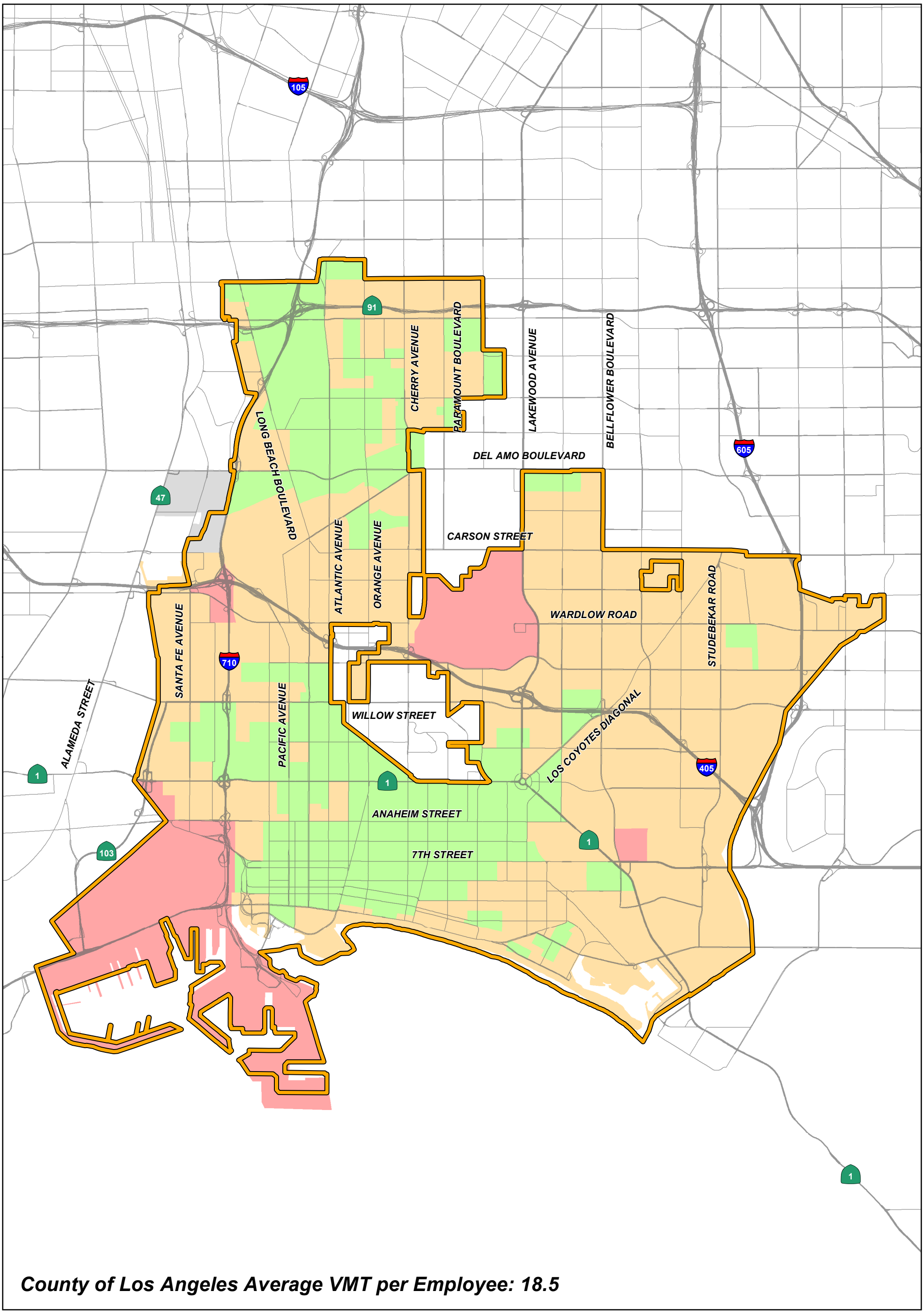

FIGURE 3

VMT per Employee

- No Employee
- Less than 15.7 (less than 85% of the regional average)
- 15.7 - 21.3 (85% to 115% of the regional average)
- Greater than 21.3 (greater than 115% of the regional average)

City of Long Beach

N

0 3000 6000
FEET

Traffic Impact Analysis Guidelines

Existing VMT per Employee Compared to Regional Average

SOURCE: SCAG RTP/SCS Model; ESRI Streetmap, 2013.

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Guidelines Section 15064.3, subdivision (b). Projects in all other locations would be subject to City review and the preparation of a VMT transportation analysis.

Figures 2 and 3 may be updated as new traffic model data reflect changing travel habits.

2.2.3 Presumption of Less Than Significant Impact near Transit Stations

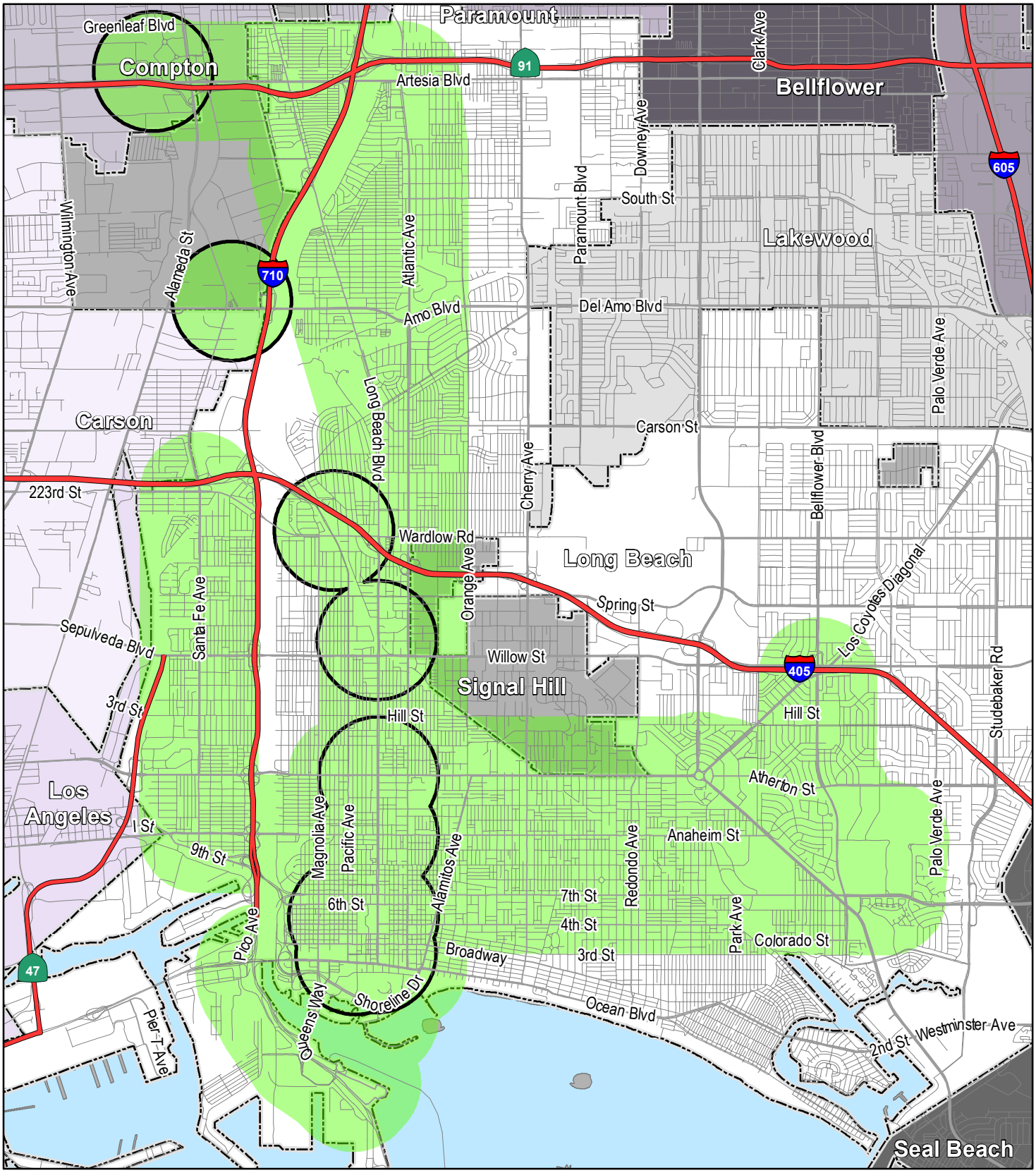
CEQA Guidelines Section 15064.3, Subsection (b), states that "generally, [land use] projects within one-half mile of either an existing major transit stop or an existing high quality transit corridor should be presumed to cause a less than significant transportation impact." The OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* identifies four criteria for which the presumption would not apply. Figure 4 displays the transit priority areas of Long Beach based on the California PRC definitions for major transit stops or high-quality transit corridors. Any project located in these transit priority areas will be presumed to have a less than significant transportation impact related to CEQA Guidelines Section 15064.3, subdivision (b), unless the project:

- Has an overall Floor Area Ratio (FAR) of less than 0.75;
- Includes more parking for use by residents, customers, or employees of the project than required (if parking minimums pertain to the site) or allowed without a conditional use permit (if minimums and/or maximums pertain to the site);
- Is inconsistent with the Long Beach Land Use Element or the SCAG RTP/SCS; or
- Replaces affordable residential units with a smaller number of moderate- or high-income residential units.

2.2.4 Screening and Thresholds for Other Land Uses

The following identifies screening criteria and thresholds of significance used to determine if other types of land uses reviewed by the City would result in significant impacts related to VMT.

- Retail development that is 50,000 square feet (sf) or less is likely to be local-serving and tends to shorten trips within Long Beach. Therefore, any retail project 50,000 sf or less will be presumed to have a less than significant transportation impact related to CEQA Guidelines Section 15064.3, subdivision (b).
- Affordable residential development in areas with inadequate affordable housing has the potential to shorten commute distances and/or increase the proportion of residents using transit, which would reduce VMT. Residential projects (or the residential portion of mixed-use projects) with 100 percent affordable dwelling units will be presumed to have a less than significant transportation impact related to CEQA Guidelines Section 15064.3, subdivision (b).
- The development of institutional/government and public service uses that support community health, safety, and welfare will be presumed to have a less than significant transportation impact related to CEQA Guidelines Section 15064.3, subdivision (b). These facilities (e.g., police stations, fire stations, community centers, refuse stations) are already part of the community and, as public service uses, their VMT is accounted for in the existing regional average. Additionally, many of these facilities generate fewer than 500 ADT and/or use vehicles other



LEGEND

Half mile from High Quality Transit Corridor or Major Transit Stop

Half mile from Major Transit Stop

FIGURE 4

N

0 3000 6000
FEET

SOURCE: Esri (2008); City of Long Beach (3/16/2020)

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Traffic Impact Analysis Guidelines

Long Beach Transit Priority Areas

than passenger cars or light-duty trucks. These other vehicle fleets are subject to regulation outside of CEQA, such as California Air Resources Board (CARB) and the South Coast Air Quality Management District.

- **Uses within the Harbor District.** The Harbor District is an area administered by the Port of Long Beach (Port). The Port has established a permitting process for projects within the Harbor District. Within this area, the Port may also be the lead agency under CEQA where the Port would be ultimately responsible for analysis, review, and approval of land development projects. However, the City remains a responsible agency and will review project analysis for consistency with the procedures outlined in this section. Projects within the Harbor District would not be subject to VMT analysis of truck trips as indicated under CEQA Guidelines §15064.3(a), which states: *"…'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project."* As such, VMT analysis of truck trips is not a prescribed method to assess Port projects' transportation impacts under CEQA. The amount of trip generation and distance traveled by heavy-duty on-road trucks, which are the primary motor vehicle activity for Port projects, is not a factor of the land use type itself, but is driven by external economic forces that can increase or decrease trip-making activity regardless of land use. Projects within the Harbor District will analyze automobile and light-duty truck VMT (including employee VMT) and intersection LOS as required by Sections 2 and 3 of this document.

2.3 Project VMT Analysis

All land development projects that are not presumed to have a less than significant transportation impact related to CEQA Guidelines Section 15064.3, subdivision (b), according to the screening criteria provided above must conduct an analysis of the project's VMT. The VMT analysis will determine the appropriate VMT metric, identify the appropriate threshold of significance, calculate project VMT, identify the impact significance, and recommend appropriate mitigation. For the purposes of SB 743 and these guidelines, VMT to be analyzed is generated by on-road passenger vehicles, specifically cars and light-duty trucks. Heavy-duty trucks can be addressed in other CEQA sections (e.g., air quality, noise, GHG) and are subject to regulation in a separate collection of rules under CARB jurisdiction. While heavy-duty truck trips generated by Port or industrial activity are outside SB 743 regulation, all passenger vehicle trips generated by employees, including employees of the Port or industrial activities, are subject to VMT standards.

2.3.1 Determine Metric

- **Residential Uses—**VMT per capita calculated as the total home-based productions VMT divided by the population of the project.

- **Office Uses—**VMT per employee calculated as the total home-based work attractions VMT divided by the employment of the project.

- **Retail Uses—**Total VMT calculated as the total project traffic times the average trip length.

- **Industrial Uses—**VMT per employee calculated as the total home-based work attractions divided by the employment of the project.

- **Other Uses—**VMT per capita if a project is most similar to a residential use (e.g., assisted living) or VMT per employee if it is predominantly a source of employment.

For mixed-use projects, the predominant use may be used, or each project component could be analyzed separately.

2.3.2 Thresholds of Significance

The OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* recommends a threshold for residential and office development that is 15 percent below existing conditions, measured against a regional average. The region for Long Beach is Los Angeles County. As calculated from the 2016 SCAG RTP/SCS travel demand model, the average daily VMT per capita in Los Angeles County is 13.9 and the average daily VMT per employee in Los Angeles County is 21.2.

Accordingly, the thresholds of significance for VMT impacts are:

- **Residential**—15 percent below the existing regional average VMT per capita (13.9 x 0.85 = 11.8 VMT)

- **Office**—15 percent below the existing regional average VMT per employee (21.2 x 0.85 = 18.0 VMT)

- **Retail**—No net change in total VMT

- **Industrial**—No net change in total VMT if consistent with the General Plan Land Use Element; 15 percent below the existing regional average VMT per employee (21.2) if inconsistent with the General Plan Land Use Element

- **Other Land Uses**—No net change in VMT per capita or VMT per employee if consistent with the General Plan Land Use Element; 15 percent below the regional average if seeking a General Plan Amendment

2.3.3 Moderate Project VMT Analysis

For smaller projects (i.e., those generating between 500 and 1,000 ADT) or those with one predominant use, the determination of project VMT may be identified manually as the product of the daily trip generation (land use density/intensity multiplied by agency-approved trip generation rate) and the trip length in miles for that specific land use. Trip lengths can be found in other related air quality tools, such as CalEEMod. Identification of project population or employment for calculation of per capita or per employee rates should be consistent with the Population and Housing discussion in the project's environmental analysis.

2.3.4 Large Project VMT Analysis

For large or multi-use projects, use of the City's traffic-forecasting tool should be required. For purposes of City review, a project generating 1,000 ADT or more should use a traffic-forecasting tool (such as the SCAG RTP/SCS travel model). At this level of trip generation, the probability of trip fulfilment expands to an area greater than the immediate project location and may include a greater regional attraction.

A traffic-forecasting tool (such as the SCAG RTP/SCS travel model) can more accurately define the select links used and the total VMT generated by the project.

Next, the appropriate project metric is compared to the appropriate significance threshold. If the project VMT metric is less than the significance threshold, the project is presumed to create a less than significant impact and no further analysis is required. If the project is greater than the significance threshold, mitigation measures are required.

2.3.5 Identify Mitigation Measures

The Applicant is required, per CEQA, to identify feasible offsets to completely mitigate the impact created by the project. These can come from the mitigation strategies provided by the City (see Appendices A and B) or can be selected based on the Applicant and its CEQA team experience. Appendices A and B provide ranges of VMT reduction based on published observations of some of the mitigation strategies. These ranges are provided for informational purposes only. It will be the Applicant's responsibility to identify the anticipated VMT reduction based on substantial evidence and in consideration of its project's features and location. Although it is the Applicant's responsibility to identify potential mitigation measures that are appropriate for its project and would reduce the impact to VMT, the City must accept and approve the ultimate mitigation and the related VMT percent reduction.

Appendix A provides a summary of the different VMT mitigation measures and project alternatives stated in the California Air Pollution Control Officers Association (CAPCOA) Green Book (only those strategies directly attributed to transportation) and the *Technical Advisory on Evaluating Transportation Impacts in CEQA* for land development projects. The table also refers to mitigation measures listed in other sources, such as the VMT Measurement Calculator for the City of Los Angeles, the transportation analysis guidelines for the City of San Jose and the San Diego region, and the memorandum *Analysis of VMT Mitigation Measures Pursuant to SB 743*, prepared for the Los Angeles County Metropolitan Transportation Authority. Appendix B provides a list of mitigation measures for land development projects based on the research work performed by Deborah Salon, Marlon G. Boarnet, Susan Handy, Steven Spears, and Gil Tal with the support of CARB.

Examples of types of mitigation measures include:

- Increase access to or improve transit.
- Increase access to common goods and services, such as groceries, schools, and daycare.
- Incorporate affordable housing into the project.
- Orient the project toward transit, bicycle, and pedestrian facilities.
- Improve pedestrian or bicycle networks, or transit service.
- Provide traffic calming.
- Provide bicycle parking.
- Unbundle parking costs.

- Provide parking cash-out programs.
- Implement or provide access to a commute reduction program.
- Provide car-sharing, bike sharing, and ride-sharing programs.
- Provide transit passes.

In addition, project features and project alternatives could provide mitigation. Examples of project alternatives that may reduce VMT 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 its surroundings.
- Increase connectivity and/or intersection density on the project site.

If the mitigation measures reduce the project's impact to a level of less than significant, the project is presumed to have an impact mitigated to a less than significant level. No further analysis is required. If the project's VMT impact cannot be fully mitigated, the City may (1) request the project be redesigned, relocated, or realigned to reduce the VMT impact, or (2) prepare a Statement of Overriding Considerations (SOC) for the transportation impacts associated with the project. All feasible mitigation measures must be assigned to and carried out by the project even if an SOC is prepared.

2.4 Other CEQA Significance Criteria

In addition to the VMT analysis described above, pursuant to CEQA Guidelines Section 15064.3, subdivision (b), the project may have a significant impact on transportation if it would:

- Conflict with a plan, ordinance, or policy addressing the circulation system, including transit, roadways, and bicycle and pedestrian facilities;
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Result in inadequate emergency access.

Determining the potential for a significant impact in these categories may benefit from the analysis described in the following section.

3 Level of Service-Based Traffic Impact Analysis

This section of the Traffic Impact Analysis (TIA) Guidelines provides step-by-step instruction for preparing a TIA using traditional practices of assessing capacity and level of service (LOS). Depending on the project location and type, it may expand the TIA analysis beyond roadways and intersections to other modes in conformance with the City of Long Beach's (City) Mobility Element. It is important to note that with new California Environmental Quality Act (CEQA) Guidelines to include alternative criteria for significant impacts (vehicle miles traveled [VMT]), auto delay is no longer considered a significant impact under CEQA (Id. at subd. (b)(2)). Transportation impacts related to air quality, noise, and safety must still be analyzed under CEQA where appropriate (Id. at subd. (b)(3)). With implementation of the Senate Bill (SB) 743 guidelines, the LOS analysis requirements will not affect the CEQA transportation impacts analysis and will be fully separate from CEQA except where deemed necessary to determine whether a proposed project would result in hazards due to geometric design features or inadequate emergency access.

3.1 Study Scoping

Depending on the scale and extent of the proposed project, the scope of a TIA could range from a focused study, such as a simple intersection control-type selection analysis for a proposed intersection, to a large-scale study, such as a complete analysis of all transportation facilities within a defined study area.

In order to streamline the TIA preparation and review process, input and approval from the City is required prior to preparing a draft TIA document. The following key points shall be addressed in a written scoping agreement prior to initiating the TIA. The scoping agreement is included in Appendix C. It shall be filled in by the project Applicant, reviewed with City staff, and approved in writing by the City before preparation of the TIA begins. The scoping agreement shall provide sufficient information for agreement on the following key points before the TIA is initiated:

- Project description and location.
- Determination of study area and intersections to be analyzed.
- Project trip generation and directional distribution.
- Project opening year and build out year.
- Identification of other proposed/approved projects for cumulative traffic, ambient traffic growth assumption, or use of the travel demand model.
- For the study area, which includes State highways or may significantly affect a State highway, coordination with the California Department of Transportation (Caltrans) may be required.

3.2 Extent of Study

The TIA study area should include all transportation facilities that could be degraded by traffic generated by the project. This is generally determined by conducting an initial trip generation estimate to

preliminarily assess the volume and distribution of project traffic. The following outlines the guidelines for determining the study area.

3.2.1 Auto

The City will establish the study area on a case-by-case basis depending on the unique characteristics of each individual project. At a minimum, the area to be studied shall generally include streets on which the proposed project would add 50 or more peak-hour trips. Additional intersections of concern, which include but are not limited to project driveways, may also require analysis.

3.2.2 Bicycle

All bicycle facilities that provide direct access to the project site shall be included in the study area. The analysis of each bicycle facility will extend in each direction to the nearest intersection.

3.2.3 Pedestrian

All pedestrian facilities that are directly connected to the project and pedestrian facilities adjacent to the project development site that provide direct pedestrian access to the project site shall be included in the study area. The analysis of each pedestrian facility will extend in each direction to the nearest intersection.

3.2.4 Transit

All existing transit lines and transit stops within a 0.5-mile walking distance of the project site shall be included in the study area.

The study area and TIA scope shall be amended if, during the study, ongoing results of the trip generation and distribution analyses indicate that fewer intersections could be potentially degraded by the project.

3.3 Analysis Scenarios

Analysis scenarios shall be determined on a case-by-case basis depending on the unique characteristics of each project. If the project has the potential to affect neighborhood traffic conditions or modal priorities as established in the City's General Plan, an analysis of those will also be required. The typical scenarios for analysis include:

1. **Existing Conditions**—This constitutes the environmental setting for a traffic analysis. The most recent available traffic conditions and physical geometry will be used to determine existing conditions.

2. **Opening Year**—Traffic conditions at the proposed opening year of the project without the project. This scenario will include traffic generated by other proposed and/or pending projects in the study area.

3. **Opening Year with Project Conditions**—Traffic conditions at the proposed opening year of the project with the project. This scenario will include the opening year as well as project-generated traffic.

4. **Opening Year with Project Conditions and Roadway Modifications**—Traffic conditions of Scenario 3 with proposed roadway modifications incorporated.

3.4 Methodology

3.4.1 Data Collection

The TIA shall use traffic volumes taken from new/recent counts, as approved by the City's Traffic Engineer. Counts should be conducted on Tuesdays, Wednesdays, or Thursdays during weeks not containing a holiday and should be conducted in favorable weather conditions. Counts taken near a school must be done while school is in session. Ideally, no counts would be taken in the months of June, July, and August, when volumes are typically lower due to schools being out of session and residents and workers being out of town for vacation. The traffic volume counts should not be older than 1 year. The traffic volume counts are to be included in the study appendices.

Generally, both morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak periods should be used in the analysis to identify LOS deficiencies. In some cases, an off-peak period or weekend analysis may be required as directed and approved by the City Traffic Engineer. Depending on location, the peak hours may be required to be verified by 24-hour volume counts.

Vehicle classification counts should be collected at intersections on truck routes and at all study locations in the Port of Long Beach (Port) area. All truck trips should be converted into passenger car equivalent (PCE) for the analysis. For intersections in the Port, the following PCE factors should be used:

- **Port Container Trucks and other Heavy-Duty Trucks**—2.0
- **Port Bobtails (Port trucks with no chassis or container)**—1.1
- **Port Chassis (Port trucks with a chassis but no container)**—1.5

For the rest of the City, a PCE factor of 2.0 should be used for all heavy-duty trucks.

Field visits should be conducted to verify transportation infrastructure, including the number of lanes, intersection control type, signal phasing, bike lanes, pedestrian crossings, and bus stops.

3.4.2 Project Traffic Analysis

Trip Generation

The most current edition of the Institute of Transportation Engineers' (ITE) Trip Generation Manual shall be used for trip generation forecasts unless otherwise directed by the City. Approval must be obtained from the City Traffic Engineer prior to using any other source to establish the project trips.

Internal trip reduction can only be applied for mixed-use types of developments and pass-by trip reduction for retail/commercial types of developments. Pass-by trips are those made as intermediate stops on the way from an origin to a primary trip destination. They do not affect the driveway or site access volumes but do affect the amount of traffic added to the adjacent street system. Pass-by trips can be estimated for certain types of commercial developments using the most current version of the ITE's Trip Generation Manual. The City must approve pass-by trip estimates for each development on a case-by-case basis, and reserves the option of not allowing pass-by trip reductions if sufficient supporting data are absent.

Internal or pass-by trip reduction assumptions will require analytical support based on verifiable actual similar developments to demonstrate how the figures were derived and will require approval by the City.

Trip Distribution

Diagrams showing the percentages and volumes of the project and nearby projects' AM and PM peak-hour trips logically distributed on the roadway system should be provided. Trip distribution may be based on data from the PortTAM travel demand model, the Southern California Association of Governments (SCAG) regional travel demand model, or other relevant source, as approved by the City Traffic Engineer.

3.4.3 Future Traffic Forecasts

Cumulative Projects

A list of projects in close proximity to the project site that are reasonably expected to be in place by the project's opening year should be included in the report. The list shall include all pending, approved, recorded, or constructed projects that are not operational at the time of the existing traffic counts. The consultant should contact the City for the list of applicable projects.

Future Base Year Volume

The future project opening year base traffic volumes shall be estimated using an annual growth factor of 0.4 percent per year (based on analysis of SCAG model growth projections on the City of Long Beach arterial system).

3.4.4 Recommended Analysis Methods

Intersection

Methodologies from the most recent version of the Highway Capacity Manual (HCM) shall be used to determine operating conditions on signalized and unsignalized intersections. At intersections controlled by a traffic signal, existing traffic signal timing data shall be used for all analysis conditions and are available from the City or Caltrans depending on location. Table 1 provides a description of the different LOS performance measures for intersections.

Table 1: Levels of Service for Intersections

LOS	Delay per Vehicle (sec / vehicle)	Description
A	>=10	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	> 10–20	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	> 20–35	GOOD. Occasionally, drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	> 35–55	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	> 55–80	POOR. Represents the most vehicles that intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	>=80	FAILURE. Backups from nearby intersections or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Source: Highway Capacity Manual, 6th Edition

All intersection analysis shall be based on the latest version of the HCM. Intersection LOS should be determined using the current version of Synchro/SimTraffic or similar software consistent with current HCM methodologies. Intersection analysis periods should include AM and PM peak hours unless otherwise specified. Existing scenarios should assume actual traffic signal timing unless otherwise directed. The network should be geometrically correct and include peak-hour factors recorded with the traffic counts by approach.

- **Signalized Intersections:** LOS and delay at signalized intersections should be reported for the overall intersection. Vehicle queues should be reported for each lane group at signalized intersections.

- **Unsignalized Intersections:** LOS and delay for unsignalized intersections should be reported for the overall intersection at all-way stop control intersections and for the worst street approach for two-way stop control intersections. If an unsignalized intersection exceeds the minimum LOS thresholds (LOS E/F), a signal warrant analysis shall be conducted.

Other Modes Analysis

Depending on the location and type of the project, the City Traffic Engineer may require an additional analysis of effects to other transportation modes (including transit, bicycle, and pedestrian modes) within the analysis area outlined in this section. The analysis may include assessment of potential degradation of other modes in the project vicinity, such as transit stops, bicycle facilities, and pedestrian facilities. If required, the report shall identify any quantifiable degradation to the transit, bicycle, and pedestrian facilities that can be attributed to the project. The analysis shall address project effects on existing transit facilities, bicyclists, and pedestrians, as well as the effects and benefits of site development and associated roadway improvements on bicycle/pedestrian infrastructure, circulation, and conformance to existing plans and policies.

Transit Analysis

The TIA report shall identify existing and planned transit facilities and discuss the potential changes in the transit facilities or changes to transit access, if any, due to the proposed project.

On-Site Circulation Analysis

Depending on project type and size, the TIA may require an evaluation of the proposed on-site circulation for the project and address the adequacy of the proposed circulation. The TIA shall include a brief discussion on internal circulation and proposed on-site parking. It would include discussion on how vehicles would enter and exit via the main access driveways and identify any potential on- or off-site circulation problems. If the project is larger, the City may require a more detailed on-site and access point review.

Traffic Signal Warrant Analysis (if needed)

A traffic signal warrant analysis shall be performed for all studied unsignalized intersections that are projected to operate at an unsatisfactory LOS E/F with the project. Traffic signal warrant analysis shall be performed using the latest adopted California Manual on Uniform Traffic Control Devices (MUTCD). The warrant analysis shall be included in the study appendices. The peak-hour warrant analysis shall be completed. If the intersection meets the peak-hour traffic signal warrant, all other applicable warrants must also be assessed.

3.5 Identifying Level of Service Consequences

This section describes the different transportation analyses the City may require as part of a TIA to ensure the proposed project is consistent with State and local policies.

3.5.1 Study Intersections

The City has identified LOS D as the threshold for acceptable operating conditions for intersections. The following criteria shall be used to determine if the addition of project traffic would be responsible for LOS deficiencies and whether feasible roadway improvements should be identified to improve performance.

- **Signalized Intersections**
    - If, under without project conditions, the intersection operates at LOS D or better and the addition of project trips results in unacceptable LOS (LOS E/F). On occasion, LOS E may be allowed for peak periods in very dense urban conditions (such as in downtown Long Beach) per the City's discretion. The intersections specified in the City of Long Beach General Plan Mobility Element already operating at LOS E/F will be allowed to operate at existing levels (refer to Table 2).
    - If, under without project conditions, an intersection operates at LOS E or F and the project increases average control delay at the intersection by 2.5 seconds or more.

- If, under project conditions, the 95th percentile queue length exceeds the available storage length at any turn bay.

- **Unsignalized Intersections**
  - If, under project conditions, the intersection operates at an unacceptable LOS (LOS E/F). On occasion, LOS E may be allowed for peak periods in very dense urban conditions (such as in downtown Long Beach) per the City's discretion.
  - If the intersection meets the peak-hour traffic signal warrant after the addition of project traffic. If the intersection meets the peak-hour traffic signal warrant, all other applicable warrants must also be assessed.

Table 2: Intersections with Current LOS E/F Conditions

Intersection	AM Peak-Hour LOS	PM Peak-Hour LOS
Alamitos Ave. and 7th St.	E	
Alamitos Ave. and 3rd St.	F	
Alamitos Ave. and Broadway		E
Alamitos Ave./Shoreline Ave. and Ocean Blvd.	F	F
Alamitos Ave. and Anaheim St.		E
Long Beach Blvd. and Artesia Blvd.		F
Santa Fe Ave. and Pacific Coast Hwy.	E	E
Santa Fe Ave. and Wardlow Rd.		E
Atlantic Ave. and Del Amo Blvd.		E
Atlantic Ave. and Artesia Blvd.		E
Cherry Ave. and Wardlow Rd.		E
Cherry Ave. and Del Amo Blvd.		E
Cherry Ave. and Artesia Blvd.	E	F
Paramount Blvd. and Artesia Blvd.		E
Redondo Ave. and Ocean Blvd.		E
Redondo Ave. and 7th St.	E	E
Lakewood Blvd. and Del Amo Blvd.		F
Livingston Dr. and 2nd St.		E
Pacific Coast Hwy. and Anaheim St.		E
Bellflower Blvd. and Carson St.		E
Los Coyotes Diagonal and Carson St.		F
Pacific Coast Hwy. and 2nd St.		F

Source: City of Long Beach General Plan Mobility Element, October 2013.

3.5.2 Congestion Management Program Transportation Impact Analysis

The 2010 Congestion Management Program (CMP) for Los Angeles County includes the "Guidelines for CMP Transportation Impact Analysis" (Appendix D of the 2010 CMP), which are intended to assist local agencies in evaluating the impacts of development projects on the CMP system through preparation of a regional TIA. A CMP TIA is necessary for all projects required to prepare an Environmental Assessment based on local determination. The geographic area examined in the TIA must include, at a minimum, the following:

- All CMP arterial monitoring intersections, including freeway on- and off-ramp intersections, where a proposed project is expected to add 50 or more trips during either the weekday AM or PM peak hours (of adjacent street traffic)

- Mainline freeway monitoring locations where a project is expected to add 150 or more trips, in either direction, during either the weekday AM or PM peak hours

Based on these criteria, if the TIA does not identify any affected regional facilities, further CMP traffic analysis is not required.

3.5.3 Freeway Impact Analysis Screening Criteria

All projects for which a TIA is required shall conduct a freeway impact screening analysis. The screening analysis should be submitted to the City along with the Study Screening Agreement and should include the project's trip generation and distribution estimates. Based on these estimates, the screening analysis shall also include a morning and afternoon peak-hour project trip assignment to determine the amount of project traffic expected to be assigned to the freeway system. The freeway impact screening analysis shall investigate whether the project meets any of the following screening criteria:

- The project's peak-hour trips would result in a 1 percent or more increase in trips based on the freeway mainline capacity of a freeway segment operating at LOS E or F (based on an assumed capacity of 2,000 vehicles per hour per lane);

- The project's peak-hour trips would result in a 2 percent or more increase in trips based on the freeway mainline capacity of a freeway segment operating at LOS D (based on an assumed capacity of 2,000 vehicles per hour per lane);

- The project's peak-hour trips would result in a 1 percent or more increase in trips based on the capacity of a freeway off-ramp operating at LOS E or F (based on an assumed ramp capacity of 850 vehicles per hour per lane); or

- The project's peak-hour trips would result in a 2 percent or more increase in trips based on the capacity of a freeway off-ramp operating at LOS D (based on an assumed ramp capacity of 850 vehicles per hour per lane).

If the proposed project meets any of the screening criteria, the Applicant will be directed to Caltrans Intergovernmental Review (IGR) for a determination on the need for analysis beyond the CMP TIA and, if necessary, the methodology to be utilized for a freeway impact analysis. To assist in the evaluation of impacts on State facilities, the project's transportation consultant should refer to the most recent Caltrans guidance.

3.6 Preventing Level of Service Degradation

When project traffic is responsible for LOS deficiencies, as defined in Section 3.4.4, the project consultant should discuss the potential roadway improvement options with the City. Prior to completion of the TIA, City staff may require a memorandum summarizing proposed roadway improvements. This memorandum will be used by City staff to determine the appropriateness of roadway improvements

prior to submission of the draft transportation study. The need for a roadway improvements memorandum should be confirmed as part of the scoping memorandum.

The City reserves the right to assess and determine the appropriateness of continuing to impose previously adopted roadway improvements from previously certified transportation studies related to vehicle LOS.

Only feasible roadway improvements shall be recommended. Consideration should be made for existing right-of-way, availability of receiving lanes for additional through or turn lanes, environmental constraints, utility conflicts, and economically feasible improvement costs. The TIA should discuss roadway improvements determined to be infeasible and should identify the factors resulting in the roadway improvements being infeasible. The following strategies should be considered when evaluating and proposing roadway improvements:

- **Traffic Engineering Techniques**
    - Locate access points to optimize visibility and reduce potential conflict.
    - Design parking facilities to avoid queuing onto public streets during peak arrival periods.
    - Provide additional off-street parking.
    - Dedicate visibility easements to ensure adequate sight distance at intersections and driveways.
    - Signalize or modify traffic signals at intersections.
    - Install left-turn phasing and/or multiple turning lanes to accommodate particularly heavy turning movements.
    - Widen the pavement to provide left- or right-turn lanes to lessen the interference with the traffic flow.
    - Widen intersection approaches to provide additional capacity.
    - Prohibit left turns to and from the proposed development.
    - Restrict on-street parking during peak hours to increase street capacity.
- **Contribute to a Benefit District to Fund Major Capital Improvements**
    - Construct a grade separation.
    - Improve or construct alternate routes.
    - Complete proposed routes shown on the Highway Plan.
    - Improve freeway interchanges (bridges, widening, modifications, etc.).

- **Transportation System Management (TSM) Techniques**
    - Establish flexible working hours.
    - Encourage employee use of carpools and public transportation (specific measures must be indicated).
    - Establish preferential parking for carpools.
    - Restrict truck deliveries to Major and Secondary highways and encourage deliveries during the off-peak hours.
    - Establish a monitoring program to ensure that project traffic volumes are reduced
- **Other improvements as discussed with and approved by the City Traffic Engineer**

3.7 Traffic Impact Analysis Documentation

The project Applicant shall submit two copies and one electronic version (PDF) of the TIA report. The TIA report shall include the following:

1. Introduction
    a. Description of the proposed project
    b. Location of the project within the City
    c. Site plan
    d. Vicinity map with the transportation system
    e. Project phasing, including the opening year
2. Environmental Setting
    a. Roadway configuration
    b. Existing public transit, bicycle facilities, and pedestrian facilities
    c. Existing traffic volumes
    d. Cumulative project list
3. VMT Analysis Consistent with Section 2 (above)
4. Traffic Analysis
    a. Project trip generation

b. Project-generated trip distribution and assignment

c. Traffic analysis for:

i. Existing condition

ii. Cumulative condition

iii. Cumulative plus project condition

iv. Cumulative plus project with roadway improvements condition

d. CMP analysis

e. LOS degradation

f. Site circulation analysis

5. Conclusion and Recommendations

a. LOS of affected facilities with and without roadway improvements

6. Appendices

a. Traffic data

b. Data and worksheets used in traffic analyses

Appendix A

CARB and Local Jurisdiction Vehicle Miles Traveled Mitigation Measures for Land Development Projects

#	Mitigation Measure	VMT Reduction[1]	CAPCOA[2]	OPR TA[3]	Los Angeles Metro[4]	City of San Jose[5]	City of Los Angeles[6]	San Diego Region[7]	Notes
1	Improve or increase access to transit	CAPCOA TST-2: Not quantified alone, grouped strategy with TST-3 'Expand transit network' and TST-4 'Increase transit service frequency/speed'; CAPCOA LUT-5: 0.5% - 24.6%	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST-2: Implement Transit Access Improvements (applicable in urban and suburban context, and appropriate for residential, retail, office, mixed use, and industrial projects); CAPCOA LUT-5: Increase Transit Accessibility [May be grouped with CAPCOA measures LUT-3 (mixed use development), SDT-2 (traffic calmed streets with good connectivity), and PPT-1 through PPT-7 (parking management strategies); measures are applicable in urban and suburban contexts; appropriate in rural context if development site is adjacent to a commuter rail station with convenient rail service to a major employment center; appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Increase transit accessibility to improve last-mile transit connections; Improve network connectivity/design to make destinations and low-carbon travel modes accessible; both applicable for both residential and employment uses]; City of LA [Existing transit mode share (as a percent of total daily trips) (%), Lines within project site improved (<50%, >=50%)]
2	Increase access to common goods and services, such as groceries, schools, and daycare	Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use)): 9% - 30% VMT reduction and CAPCOA LUT-4 (Increase Destination Accessibility): 6.7% - 20% VMT reduction	Y	Y	Y	Y	N	Y	Notes: Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use) - Applicable in urban and suburban context; negligible in rural context (unless the project is a master-planned community; appropriate for mixed-use projects) and CAPCOA LUT-4 (Applicable in urban and suburban context, negligible in rural context, appropriate for residential, retail, office, industrial, and mixed-use projects); City of San Jose [Access to Neighborhood Schools: Applicable for residential uses only]; City of San Jose [Very similar to measure 'Increase diversity of uses' - Applicable for residential and employment uses]
3	Incorporate affordable housing into the project	0.04% - 1.2%	Y	Y	Y	Y	N	Y	Notes: Similar measure is CAPCOA LUT-6 [Integrate Affordable and Below Market Rate Housing] - [Applicable in urban and suburban contexts; negligible impact in a rural context unless transit availability and proximity to jobs/services are existing characteristics; appropriate for residential and mixed-use projects]; City of San Jose [Similar to measure 'Integrate affordable and market rate housing] - Measure is applicable for residential uses only
4	Orient project towards transit, bicycle, and pedestrian facilities	1) 0.25% - 0.5% (0.25% reduction is attributed for a project oriented towards a planned corridor and 0.5% reduction is attributed for a project oriented towards an existing corridor) (as per the Sacramento Metropolitan Air Quality Management District (SMAQMD) *Recommended Guidance for Land Use Emission Reductions*), 2) 0.5% reduction in VMT per 1% increase in transit frequency and per 10% increase in transit ridership (as per the Center for Clean Air Policy (CCAP) *Transportation Emission Guidebook*)	Y	Y	Y	N	N	Y	Notes: CAPCOA LUT-7 [Orient project toward non-auto corridor]; Grouped strategy with LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use) ; there is no sufficient evidence that the measures results in non-negotiable trip reduction unless combined with other measures, including neighborhood design, density and diversity of development, transit accessibility and pedestrian and bicycle network improvements; the measure is applicable for urban or suburban context (may be applicable in a master-planned rural community) and is appropriate for residential, retail, office, industrial, and mixed use projects
5	Provide pedestrian network improvements	0% - 2%	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-1 [applicable in urban, suburban, and rural context; appropriate for residential, retail, office, industrial, and mixed-use projects; reduction benefit only occurs if the project has both pedestrian network improvements on site and connections to the larger off-site network]. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Provide pedestrian network improvements for active transportation: applicable for both residential and employment uses]; City of LA [Included (within project and connecting off-site/within project only)]
6	Incorporate bike lane street design (on-site)	1% increase in share of workers commuting by bicycle (for each additional mile of bike lanes per square mile) (*Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them – Another Look* by Dill and Carr (2003)); 0.075% increase in bicycle commuting with each mile of bikeway per 100,000 residents (*If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities* by Nelson and Allen (1997))	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-5 [Grouped strategy, benefits of Bike Lane Street Design are small and should be grouped with the LUT-9 (Improve Design of Development) strategy to strengthen street network characteristics and enhance multi-modal environments], the measure is applicable in urban and suburban contexts and is appropriate for residential, retail, office, industrial, and mixed-use projects. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Expand the reach of bike access with investment in infrastructure: applicable for both residential and employment uses]; City of LA [Provide bicycle facility along site (Yes/No)]

7	Expand transit network		0.1% – 8.2%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST-3; Measure applicable in urban and suburban context, maybe applicable in rural context but no literature documentation available, appropriate for specific or general plans. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Increase transit accessibility to improve last-mile transit connections; Improve network connectivity/design to make destinations and low-carbon travel modes accessible; both applicable for both residential and employment uses]; City of LA [Existing transit mode share (as a percent of total daily trips) (%), Lines within project site improved (<50%, >=50%)]
8	Increase transit service frequency/speed		0.02% – 2.5%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST-4, applicable in urban and suburban context, maybe applicable in rural context but no literature documentation available, appropriate for specific or general plans. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Similar to measure 'Subsidize public transit service upgrades']; City of LA [Reduction in headways (increase in frequency) (%)]
9	Provide a Bus Rapid Transit System		0.02% – 3.2%			Y	Y	Y	N	N	Y	Notes: CAPCOA TST-1 (Applicable in urban and suburban context; negligible in rural context; appropriate for specific or general plans). This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service.'
10	Required project contributions to transportation infrastructure improvement projects		Not Quantified: Grouped strategy (with RPT-2 and TST-1 through 7)			Y	Y	Y	Y	Y	Y	Notes: CAPCOA RPT-3 (Applicable in urban, suburban and rural context; appropriate for residential, retail, office, mixed use, and industrial projects); measure similar to some of the measures discussed above. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service.'
11	Increase destination accessibility		6.7% – 20%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA LUT-4 [Destination accessibility measured in terms of the number of jobs or other attractions reachable within a given travel time, which tends to be the highest at central locations and lowest at peripheral ones; the location of the project also increases the potential for pedestrians to walk and bike to these destinations and therefore reduces VMT; applicable for urban and suburban contexts, negligible impact in a rural context; appropriate for residential, retail, office, industrial, and mixed-use projects]. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Increase transit availability to improve last-mile transit connections; Improve network connectivity/design to make destinations and low-carbon travel modes accessible; both applicable for both residential and employment uses]; City of LA [Lines within project site improved (<50%, >=50%)]
12	Provide traffic calming measures		0.25% – 1%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-2 [applicable in urban, suburban, and rural contexts; appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Applicable for both residential and employment uses]; City of LA [Streets with traffic calming improvements (%), intersections with traffic calming improvements (%)]
13	Provide bike parking in non-residential projects		0.625% (as per the Center for Clean Air Policy (CCAP) *Transportation Emission Guidebook*)			Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-6 [Bike Parking in Non-Residential projects has minimal impacts as a standalone strategy and should be grouped with the LUT-9 (Improve Design of Development) strategy to encourage bicycling by providing strengthened street network characteristics and bicycle facilities]; the measure is applicable in urban, suburban, and rural contexts; appropriate for retail, office, industrial, and mixed-use projects; City of San Jose [Provide bike parking and end-of-trip facilities such as bike parking, bicycle lockers, showers, and personal lockers (Applicable for both residential and employment uses)]; City of LA [Include bike parking/lockers, showers, & repair station (Y/N)]
14	Provide bike parking with multi-unit residential projects		Not Quantified			Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-7 [Grouped Strategy; the benefits of Bike Parking with Multi-Unit Residential Projects have no quantified impacts and should be grouped with the LUT-9 (Improve Design of Development) strategy to encourage bicycling by providing strengthened street network characteristics and bicycle facilities. The measure is applicable in urban, suburban, or rural contexts. It is appropriate for residential projects.]; City of San Jose [Provide bike parking and end-of-trip facilities such as bike parking, bicycle lockers, showers, and personal lockers (Applicable for both residential and employment uses)]; City of LA [Include bike parking/lockers, showers, & repair station (Y/N)]

15	Limit or eliminate parking supply where appropriate alternatives preserve mobility and do not result in impacts to existing land use		5% - 12.5%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA PDT-1 (applicable in urban and suburban context, negligible in rural context, appropriate for residential, retail, office, industrial, and mixed-use projects); reduction can be counted only if spillover parking is controlled (via residential permits and on-street market parking); follow multi-faceted strategy including 1) elimination/reduction of minimum parking requirements, 2) creation of maximum parking requirements, and 3) provision of shared parking; City of San Jose [Decrease project parking supply at the project site to rates lower than the standard parking minimums where allowable in the San Jose Municipal Code (applicable for employment uses)]; City of LA [City code parking provision (spaces), actual parking provision (spaces)]
16	Unbundle parking costs from property costs		2.6% - 13%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA PDT-2 (applicable in urban and suburban context, negligible in rural context, appropriate for residential, retail, office, industrial and mixed-use projects; complimentary strategies include workplace parking pricing); City of San Jose [Unbundle On-Site Parking Costs: Application for Residential Uses Only]; City of LA [Monthly cost for parking ($)]
17	Provide parking cash-out programs		0.6% – 7.7% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-15 [Implement employee parking "cash-out"; the term “cashout” is used to describe the employer providing employees with a choice of forgoing their current subsidized/free parking for a cash payment equivalent to the cost of the parking space to the employer. The measure is applicable in urban and suburban context; it is not applicable in rural context; it is appropriate for retail, office, industrial, and mixed-use projects. Restrictions are applied only if complementary strategies are in place: a) Residential parking permits and market rate public on-street parking to prevent spill over parking; b) Unbundled parking - is not required but provides a market signal to employers to forgo paying for parking spaces and “cash-out” the employee instead. In addition, unbundling parking provides a price with which employers can utilize as a means of establishing “cash-out” prices; City of San Jose [Parking cash-out: Employment uses only]; City of LA [Parking cash-out: Employees eligible (%)]
18	Implement or provide access to a commute reduction program - Voluntary		1.00% - 6.2% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-1: Commute Trip Reduction Program – Voluntary, is a multi-strategy program that encompasses a combination of individual measures described CAPCOA measures TRT-3 through TRT-9. It is presented as a means of preventing double-counting of reductions for individual measures that are included in this strategy. It does so by setting a maximum level of reductions that should be permitted for a combined set of strategies within a voluntary program. The main difference between a voluntary and a required program is: A) Monitoring and reporting is not required B) No established performance standards (i.e. no trip reduction requirements). The measure is applicable in urban and suburban contexts, negligible in a rural context, unless large employers exist and suite of strategies implemented are relevant in rural settings. The measure is appropriate for retail, office, industrial, and mixed-use projects; City of San Jose [Applicable for employment uses only]; City of LA [Employees and residents participating (%)]
19	Implement or provide access to Commute Trip Reduction Program – Required implementation/monitoring		4.2% – 21% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-2 (Commute Trip Reduction Program is a multi-strategy program that encompasses a combination of individual measures from TRT-3 through TRT-9. It is presented as a means of preventing double-counting of reductions for individual measures that are included in this strategy. It does so by setting a maximum level of reduction that should be permitted for a combined set of strategies within a program that is contractually required of the development sponsors and managers and accompanied by a regular performance monitoring and reporting program. Check examples of Tucson, Arizona and South San Francisco, CA from CAPCOA. The measure is applicable in urban and suburban contexts; it is negligible in rural context, unless large employees exist, and suite of strategies implemented are relevant in rural settings; jurisdiction level only); City of San Jose [Employment uses only]; City of LA [Employees participating (%)]
20	Provide ride-sharing program		1% – 15% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-3 [Provide Ride-Sharing Programs: applicable in urban and suburban context; Negligible impact in many rural contexts, but can be effective when a large employer in a rural area draws from a workforce in an urban or suburban area, such as when a major employer moves from an urban location to a rural location; appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Ride share for employment uses only]; City of LA [Measured in terms of employees eligible (%)]
21	Implement car-sharing program		0.4% – 0.7%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-9 [urban and suburban context, negligible in rural context, and appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Applicable for both residential and employment uses]; City of LA [Car share project setting (urban, suburban, all other)]

22	Implement bike-sharing program		Taking evidence from the literature, a 135-300% increase in bicycling (of which roughly 7% are shifting from vehicle travel) results in a negligible impact (around 0.03% VMT reduction)			Y	Y	N	Y	Y	Y	Notes: CAPCOA TRT-12 [This measure has minimal impacts when implemented alone. The strategy's effectiveness is heavily dependent on the location and context. Bike-sharing programs have worked well in densely populated areas (examples in Barcelona, London, Lyon, and Paris) with existing infrastructure for bicycling. Bike sharing programs should be combined with Bike Lane Street Design (SDT-5) and Improve Design of Development (LUT-9). The measure is applicable in urban and suburban-center context only; it is negligible in a rural context; appropriate for residential, retail, office, industrial, and mixed-use projects; City of San Jose [Bike share for employment and residential uses]; City of LA [bike share - within 600 feet of existing bike share station - OR -implementing new bike share station (Y/N)]
23	Provide transit passes		Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; for TRT-4, commute VMT reduction is 0.3% - 20%			Y	Y	Y	Y	Y	Y	Notes: Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; City of San Jose [Implement Subsidized or Discounted Transit Program]; City of LA [Employees and residents eligible (%), amount of transit subsidy per daily passenger (daily equivalent) ($)]
24	Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ride-matching or shuttle services and preferential parking at workplaces		0.3% - 13.4% commute VMT reduction (for CAPCOA TRT-11: Provide Employer-Sponsored Vanpool/Shuttle); 7.2% - 15.8% school VMT reduction (for CAPCOA TRT-10: Implement a School Pool Program)			Y	Y	Y	Y	Y	Y	Notes: Similar to CAPCOA TRT-11 (Provide employer-sponsored vanpool/shuttle) - the measure is applicable for urban, suburban, and rural context, and is appropriate for office, industrial, and mixed-use projects; Similar measure is CAPCOA TRT-10 (Implement a School Pool Program: Applicable for urban, suburban, and rural context and appropriate for residential and mixed-use projects); City of San Jose [School carpool program - residential uses only)]; City of LA [School carpool program - level of implementation (low, medium, high); Employer sponsored vanpool or shuttle (Degree of implementation (low, medium, high), employees eligible (%), employer size (small, medium, large)]
25	Implement a school pool program		7.2% - 15.8% school VMT reduction			Y	Y	N	Y	Y	Y	Notes: CAPCOA TRT-10 [This project will create a ridesharing program for school children. Most school districts provide bussing services to public schools only. SchoolPool helps match parents to transport students to private schools, or to schools where students cannot walk or bike but do not meet the requirements for bussing. The measure is applicable in urban, suburban, and rural context and is appropriate for residential and mixed-use projects.]; City of San Jose [School carpool program - residential uses only)]. This measure can be considered under the Technical Advisory Measure 'Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ridematching services.'; City of LA [School carpool program - level of implementation (low, medium, high)
26	Operate free direct shuttle service		CAPCOA TST-6 (Provide Local Shuttles): Not Quantified; 0.3% - 13.4% commute VMT reduction (for CAPCOA TRT-11: Provide Employer-Sponsored Vanpool/Shuttle)			Y	Y	N	Y	Y	Y	Notes: CAPCOA TST-6 (Provide Local Shuttles - grouped strategy with TST-5 'Provide Bike Parking Near Transit' and TST-4 'Increase Transit Service Frequency/Speed') - Applicable in urban/suburban context; appropriate for large residential, retail, office, mixed use, and industrial projects; solves the "first mile/last mile" problem; CAPCOA TRT-11 (Provide employer-sponsored vanpool/shuttle) - the measure is applicable for urban, suburban, and rural context, and is appropriate for office, industrial, and mixed-use projects. This measure can be considered under the Technical Advisory Measure 'Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ridematching services.'; City of San Jose [Employment uses only]; City of LA [Employer sponsored vanpool or shuttle (Degree of implementation (low, medium, high), employees eligible (%), employer size (small, medium, large)]
27	Provide teleworking options		0.07% - 5.5% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-6 [Applicable in urban, rural, and suburban contexts; appropriate for retail, office, industrial, and mixed-use projects]; City of San Jose [Alternative work schedules and telecommute (employment land uses only)]; City of LA [Alternative work schedules and telecommute (employees participating (%), type of program)]
28	Subsidize public transit service upgrades		Not Quantified			Y	Y	N	Y	N	Y	Notes: Similar to CAPCOA TST-2 through TST-4; City of San Jose [Subsidize transit service through contributions to the transit provider to improve transit service to the project (e.g. frequency and number of routes); applicable for both residential and employment uses]. The measure is included under the Technical Advisory Measure 'Provide incentives or subsidies that increase the use of modes other than single-occupancy vehicle.'
29	Implement subsidized or discounted transit program		0.3% – 20% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-4 [Implement subsidized or discounted transit program (the measure is applicable in urban and suburban context, negligible in a rural context, appropriate for residential, retail, office, industrial, and mixed-use projects); The project will provide subsidized/discounted daily or monthly public transit passes. The project may also provide free transfers between all shuttles and transit to participants. These passes can be partially or wholly subsidized by the employer, school, or development. Many entities use revenue from parking to offset the cost of such a project. The measure is included under the Technical Advisory Measure 'Provide incentives or subsidies that increase the use of modes other than single-occupancy vehicle.'; City of San Jose [Implement Subsidized or Discounted Transit Program]; City of LA [Transit subsidies measured by employees and residents eligible (%), and amount of transit subsidy per passenger (daily equivalent) ($)]

30	Subsidize vanpool		0.3% - 13.4% commute VMT		Y	Y	N	Y	N	Y	Notes: Similar to CAPCOA TRT-11 (Provide Employer-Sponsored Vanpool/Shuttle: applicable in urban, suburban, and rural context; appropriate for office, industrial, and mixed-use projects). The measure is included under the Technical Advisory Measure 'Provide incentives or subsidies that increase the use of modes other than single-occupancy vehicle.'; City of San Jose [Applicable for employment uses only]
31	Providing on-site amenities at places of work, such as priority parking for carpools and vanpools, secure bike parking, and showers and locker rooms		22% increase in bicycle mode share (UK National Travel Survey)/2%-5% reduction in commute vehicle trips (*Transportation Demand Management Encyclopedia*)/0.625% reduction in VMT (*Center for Clean Air Policy (CCAP) Emission Guidebook*)		Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-5 [Provide End of Trip Facilities]: End-of-trip facilities have minimal impacts when implemented alone. This strategy's effectiveness in reducing vehicle miles traveled (VMT) depends heavily on the suite of other transit, pedestrian/bicycle, and demand management measures offered. End-of trip facilities should be grouped with Commute Trip Reduction (CTR) Programs (TRT-1: Implement Commute Trip Reduction Program - Voluntary through TRT-2: Implement Commute Trip Reduction Program – Required Implementation/Monitoring) and TRT-3 (Provide Ride-Sharing Programs); City of San Jose [Similar measures include 'Provide bike parking/end of trip bike facilities', 'Implement car sharing programs']; City of LA [Include bike parking/lockers, showers, & repair station (Y/N)]
32	Provide employee transportation coordinators at employment sites		Not Quantified		Y	Y	Y	N	N	Y	Included as part of CAPCOA TRT-1 (Implement Commute Trip Reduction Program - Voluntary)
33	Provide a guaranteed ride home service to users of non-auto modes		Not Quantified		N	Y	Y	N	N	Y	
34	Locate project in an area of the region that already exhibits low VMT		10% - 65%		Y	Y	Y	N	N	Y	Notes: CAPCOA LUT-2 (Applicable in urban and suburban contexts; negligible in rural contexts; appropriate for residential, retail, office, industrial, and mixed-use projects)
35	Increase project/development density		1.5% - 30%		Y	Y	Y	Y	N	Y	Notes: CAPCOA LUT-1 (Applicable in urban and suburban contexts only; negligible in rural context; appropriate for residential, retail, office, industrial, and mixed-use projects); City of San Jose [Applicable for both residential and employment uses]
36	Increase the mix of uses within the project or within the project's surroundings		9% - 30%		Y	Y	Y	Y	N	Y	Notes: CAPCOA LUT-3: Increase Diversity of Urban and Suburban Developments (Mixed Use) [Applicable in urban and suburban context, negligible in rural context, and appropriate for mixed-use projects]; City of San Jose [Applicable for both residential and employment uses]
37	Deploy management strategies (e.g., pricing, vehicle occupancy requirements) on roadways or roadway lanes.		CAPCOA RPT-1: 7.9% - 22%		Y	Y	Y	N	N	N	Notes: Similar CAPCOA measure is RPT-1 (Road Pricing/Management: Implement Area or Cordon Pricing)
38	Price workplace parking		0.1% - 19.7% commute VMT		Y	N	N	Y	Y	N	Notes: CAPCOA TRT-14 [Urban and suburban context; Negligible impact in a rural context; Appropriate for retail, office, industrial, and mixed-use projects; Reductions applied only if complementary strategies are in place: o Residential parking permits and market rate public on-street parking - to prevent spill-over parking o Unbundled parking - is not required but provides a market signal to employers to transfer over the, now explicit, cost of parking to the employees. In addition, unbundling parking provides a price with which employers can utilize as a means of establishing workplace parking prices; City of San Jose [Price On-Site Workplace Parking (for employment uses only)]; City of LA [Daily parking charge ($), Employees subject to priced parking (%)]
39	Locate project near bike path/bike lane		0.625%		Y	N	Y	N	N	N	Notes: CAPCOA LUT-8 (Grouped strategy with 'Increase Destination Accessibility'; the measure is most effective when applied in combination of multiple design elements that encourage this use; strategy should be grouped with 'Increase Destination Accessibility' strategy to increase the opportunities for multi-modal travel; measure is applicable in urban or suburban context, may be applicable in a rural master planned community; appropriate for residential, retail, office, industrial, and mixed-use projects
40	Implement Commute Trip Reduction Marketing		0.8% - 4% commute VMT		Y	N	Y	Y	N	N	Notes: CAPCOA TRT-7 (applicable in urban and suburban context; negligible in rural context; appropriate for residential, retail, office, industrial, and mixed-use projects); City of San Jose [Employment uses only]
41	Education and encouragement - Voluntary travel behavior change program		1% - 6.2% commute VMT		Y	N	N	Y	Y	N	Notes: Similar to CAPCOA TRT-1 (Implement Commute Reduction Program - Voluntary); City of San Jose [For both residential and employment uses]; City of LA [Employees and residents participating (%)]
42	Education and encouragement - Promotions and marketing		0.8% - 4% commute VMT		Y	N	N	Y	Y	N	Notes: Similar to CAPCOA TRT-7 [Implement Commute Reduction Marketing]; City of San Jose [Similar measure might be 'Implement commute trip reduction marketing/educational campaign' (applicable for employment uses)]; City of LA [Employees and residents participating (%)]
43	Implement neighborhood shuttle		Not Quantified		Y	N	N	Y	Y	N	Notes: CAPCOA TST-6 (Provide Local Shuttles - grouped strategy with TST-5 'Provide Bike Parking Near Transit' and TST-4 'Increase Transit Service Frequency/Speed') - Applicable in urban/suburban context; appropriate for large residential, retail, office, mixed use, and industrial projects; solves the "first mile/last mile" problem; City of San Jose [Similar measure: 'Operate a free direct shuttle service' (applicable for employment uses only)]; City of LA [Degree of Implementation (low/medium/high), employees and residents eligible (%)]

44	Implement market price public parking (On-street)		2.8% – 5.5%		Y	N	Y	N	N	N	CAPCOA PDT-3 (applicable in urban and suburban context; negligible in rural context; appropriate for retail, office, and mixed-use projects; applicable in a specific or general plan context only, reduction can be counted only if spillover parking is controlled (via residential permits); studies conducted in downtown areas, and thus should be applied carefully if project is not in a central business/activity center
45	Implement area or cordon pricing		7.9%- 22%		Y	N	N	N	N	N	Notes: CAPCOA RPT-1; Applicable in Central Business District or urban center only
46	Create urban non-motorized zones		0.01% – 0.2% annual VMT reduction		Y	N	Y	N	N	N	Notes: CAPCOA SDT-4 [The project, if located in a CBD or major activity center, will convert a percentage of its roadway miles to transit malls, linear parks, or other nonmotorized zones. These features encourage non-motorized travel and thus a reduction in VMT. This measure is most effective when applied with multiple design elements that encourage this use. The benefits of Urban Non-Motorized Zones alone have not been shown to be significant. (considered grouped strategy with SDT-1 (provide pedestrian network improvements); this is applicable in urban context only and appropriate for residential, retail, office, industrial, and mixed-use projects]
47	Provide bike parking near transit		Not Quantified		Y	N	N	N	N	N	Notes: CAPCOA TST-5 (should be implemented with other two measures as mentioned to encourage multi-modal use in the area and provide ease of access to nearby transit for bicyclists (measure applicable in urban and suburban context; appropriate for residential, retail, office, mixed use, and industrial projects); Grouped strategy (with measures TST-3 'Expand transit network' and TST-4 'Increase transit service frequency/speed')
48	Dedicated land for bike trails		Not Quantified		Y	N	N	N	N	N	Notes: CAPCOA SDT-9 [Larger projects may be required to provide for, contribute to, or dedicate land for the provision of off-site bicycle trails linking the project to designated bicycle commuting routes in accordance with an adopted citywide or countywide bikeway plan. The benefits of Land Dedication for Bike Trails have not been quantified and should be grouped with the LUT-9 (Improve Design of Development) strategy to strengthen street network characteristics and improve connectivity to off-site bicycle networks. The measure is applicable in urban, suburban, or rural contexts and is appropriate for large residential, retail, office, mixed use, and industrial projects.]
49	Implement school bus program		38% - 63% school VMT reduction		Y	N	N	N	N	N	Notes: CAPCOA TRT-13 [Applicable in urban, suburban, and rural context; appropriate for residential and mixed-use projects]

Notes:

VMT = Vehicle Miles Traveled; CAPCOA = California Air Pollution Control Officers Association; OPR = Office of Planning and Research; TA = Technical Advisory; HOV = High Occupancy Vehicle; HOT = High Occupancy Toll; ITS = Intelligent Transportation System

CAPCOA Transportation Mitigation Categories (LU = Land Use/Location, SD = Neighborhood/Site Enhancements, PD = Parking Policy/Pricing, TR = Commute Trip Reduction Programs, TS = Transit System Improvements, RP = Road Pricing/Management; V = Vehicles)

[1] VMT reduction numbers obtained from *Quantifying Greenhouse Gas Mitigation Measures* published by the California Air Pollution Control Officers Association in August 2010.

[2] *Quantifying Greenhouse Gas Mitigation Measures* published by the California Air Pollution Control Officers Association in August 2010.

[3] *Technical Advisory on Evaluating Transportation Impacts in CEQA* published by the Governor's Office of Planning and Research State of California in December 2018.

[4] *Analysis of VMT Mitigation Measures Pursuant to SB 743* prepared by Iteris, Inc. in February 2018.

[5] *City of San Jose Transportation Analysis Handbook* (dated April 2018).

[6] *City of Los Angeles VMT Calculator Version 1.2*

[7] *Guidelines for Transportation Impact Studies in the San Diego Region* developed by San Diego Section of the Institute of Transportation Engineers (ITE) and the San Diego Traffic Engineers Council (SANTEC) in January 2019.

Links:

1) VMT Calculator (City of LA): https://ladot.lacity.org/what-we-do/planning-development-review/transportation-planning-policy/modernizing-transportation-analysis

Notes:

1) For City of Los Angeles, TDM strategies for VMT reduction are broadly classified into the following categories: 1) Parking, 2) Transit, 3) Education & Management, 4) Commute Trip Reductions, 5) Shared Mobility, 6) Bicycle Infrastructure, and 7) Neighborhood Enhancement

2) For City of San Jose, TDM strategies for VMT reduction are broadly classified into the following tiers: 1) Project Characteristics, 2) Multimodal Network Improvements, 3) Parking, and 4) Programmatic Transportation Demand Management

Appendix B

Vehicle Miles Traveled Mitigation Measures for Land Development Projects from Academic Research

LSA

#	Mitigation Measure[1]	VMT Reduction[2]	Notes
1	Improve or increase access to transit	1.3% - 5.8%	Variable: Various factors associated with proximity to transit stop (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
2	Land Use Mix	Elasticity: 0.02 - 0.10	Variable: Entropy - variety and balance of land-use types within a neighborhood
3	Regional Accessibility	Elasticity: 0.05 - 0.25	Variable: Various factors associated with job accessibility and distance to CBD (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
4	Job-Housing Balance	Elasticity: 0.06 - 0.31 for commute VMT	Variable: Various factors associated with job accessibility (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
5	Provide Pedestrian Network Improvements	Elasticity: 0.00 - 0.02 for sidewalk length, 0.19 for Pedestrian Environment Factor	
6	Provide Bicycling Network Improvements	No effect on VMT	
7	Implement Transit Improvements	No effect on VMT	
8	Voluntary Travel Behavior Change (VTBC) Program	5% - 12%	
9	Implement Employer-Based Trip Reduction (EBTR) Program	1.33% - 6% of commute VMT	
10	Provide telecommuting options	Home-based telecommuting: 48.1% for household VMT, 66.5% - 76.6% for all personal VMT, and 90.3% for commute VMT only; Center-based telecommuting: 53.7% - 64.8% for all personal VMT and 62% - 77.2% for commute VMT only	
11	Increase Project/Development Density	Elasticity: <=0.07 - 0.19	Variable: residential density
12	Improve network connectivity and/or increase intersection density on the project site	Elasticity: -0.46 - 0.59	Variable: Various factors associated with intersection or street density (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
13	Implement Road Pricing	10% - 14.6%	Variable: Different road prices in various parts of the US (please refer to How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
14	Implement Parking Cash-out Programs or Workplace Parking Pricing	12% of commute VMT (parking cashout); 2.3% - 2.9% for $3 per day workplace parking price; 2.8% for price increase equivalent to 60% hourly value of commuter travel time cost	

Notes:

VMT = Vehicle Miles Traveled

[1] All mitigation measures have been obtained from *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.).

[2] All VMT reduction numbers have been obtained from *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.).

Appendix C

Sample Traffic Impact Analysis Scoping Agreement

Scoping Agreement for Traffic Impact Analysis

This Scoping Agreement acknowledges the Transportation Impact Study for the following Project will be prepared in accordance with the City of Long Beach's Transportation Impact Study Guidelines:

A. Project Information

Project Name: _____

Project Location: _____

Project Description: _____

_____

Project Site Plan Attached? *(required)* ☐ Yes ☐ No

B. Trip Generation

Source of Trip Generation Rates ☐ ITE Trip Generation ☐ Other _____

	In	Out	Total
AM Trips	_____	_____	_____
PM Trips	_____	_____	_____
Daily Trips	_____	_____	_____

Internal Trips ☐ Yes ☐ No Trip Discount % _____

Pass-by Trips ☐ Yes ☐ No Trip Discount % _____

Trip Geographic Distribution N _____% S _____% E _____% W _____%

Map of Project trip distribution % at Study intersections attached? ☐ Yes ☐ No

C. Study Area and Assumptions

Project Completion Year _____ Annual Growth Rate _____ % per year

Related Projects List attached? *(obtain from City)* ☐ Yes ☐ No

List of Study Intersection (attach map)

1	_____	2	_____
3	_____	4	_____
5	_____	6	_____
7	_____	8	_____
9	_____	10	_____
11	_____	12	_____
13	_____	14	_____
15	_____	16	_____
17	_____	18	_____
19	_____	20	_____

D. Other Jusrisdictional Impacts

Is the project within any other Agency's sphere of infuence ☐ Yes ☐ No

If yes, name of Jurisdiction _____

E. Contact Information

	Consultant	Developer
Name:		
Address:		
Telephone:		
Email:		

Approved by: _____ _____

Consultant's Representative — Date

_____ _____

City of Long Beach Representative — Date

LSA

SB 743 IMPLEMENTATION

for the

CITY OF LONG BEACH

May 28, 2020

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CEQA TRANSPORTATION THRESHOLDS OF SIGNIFICANCE GUIDE

CITY OF LONG BEACH

LSA

May 2020

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CEQA TRANSPORTATION THRESHOLDS OF SIGNIFICANCE GUIDE

CITY OF LONG BEACH

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LIST OF ABBREVIATIONS AND ACRONYMS

ADT	average daily trips
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
City	City of Long Beach
CO_2e	carbon dioxide equivalent
EIR	Environmental Impact Report
EO	Executive Order
FAR	floor-to-area ratio
GHG	greenhouse gas
GWP	global warming potential
HOT	high-occupancy toll
HOV	high-occupancy vehicle
LOS	level of service
MPO	Metropolitan Planning Organizations
MT	metric ton
OPR	Governor's Office of Planning and Research
Port	Port of Long Beach
PRC	Public Resources Code
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy

RTPA	Regional Transportation Planning Agency
SB	Senate Bill
SCAG	Southern California Association of Government
SOC	Statement of Overriding Considerations
TA	Technical Advisory
TDM	transportation demand management
VMT	vehicle miles traveled

1.0 INTRODUCTION

Senate Bill (SB) 743, signed in 2013, changes the way transportation studies are conducted in California Environmental Quality Act (CEQA) documents. Vehicle miles traveled (VMT) replaces motorist delay and level of service (LOS) as the metric for impact determination. For land development projects, VMT is simply the product of the daily trips generated by a new development and the distance those trips travel to their destinations. For capital projects, impacts are identified as the new VMT attributable to the added capital project, both from the installation of the facility and the induced growth generated as a result of induced land use.

In January 2019, the Natural Resources Agency and the Governor's Office of Planning and Research (OPR) codified SB 743 into the Public Resources Code (PRC) and the *State CEQA Guidelines*. *CEQA Guidelines* Section 15064.3 subdivision (b) states:

1. **Land Use Projects.** Vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact.

2. **Transportation Projects.** Transportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements. To the extent that such impacts have already been adequately addressed at a programmatic level, such as in a regional transportation plan EIR, a lead agency may tier from that analysis as provided in Section 15152.

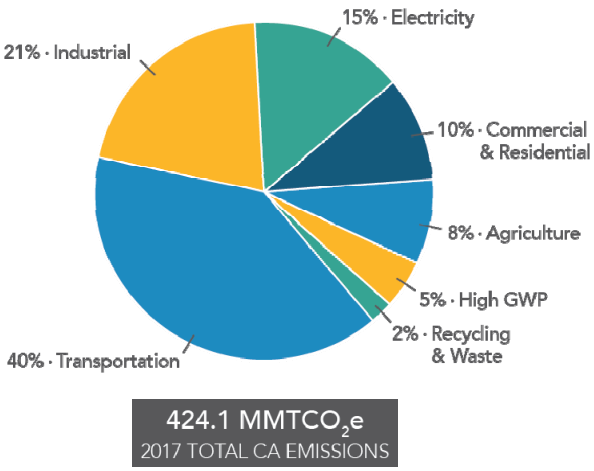
3. **Qualitative Analysis.** If existing models or methods are not available to estimate the vehicle miles traveled for the particular project being considered, a lead agency may analyze the project's vehicle miles traveled qualitatively. Such a qualitative analysis would evaluate factors such as the availability of transit, proximity to other destinations, etc. For many projects, a qualitative analysis of construction traffic may be appropriate.

4. **Methodology.** A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section.

The OPR provides a Technical Advisory (TA) as a guidance document to establish thresholds for this new VMT metric. The laws and rules governing the CEQA process are contained in the CEQA statute

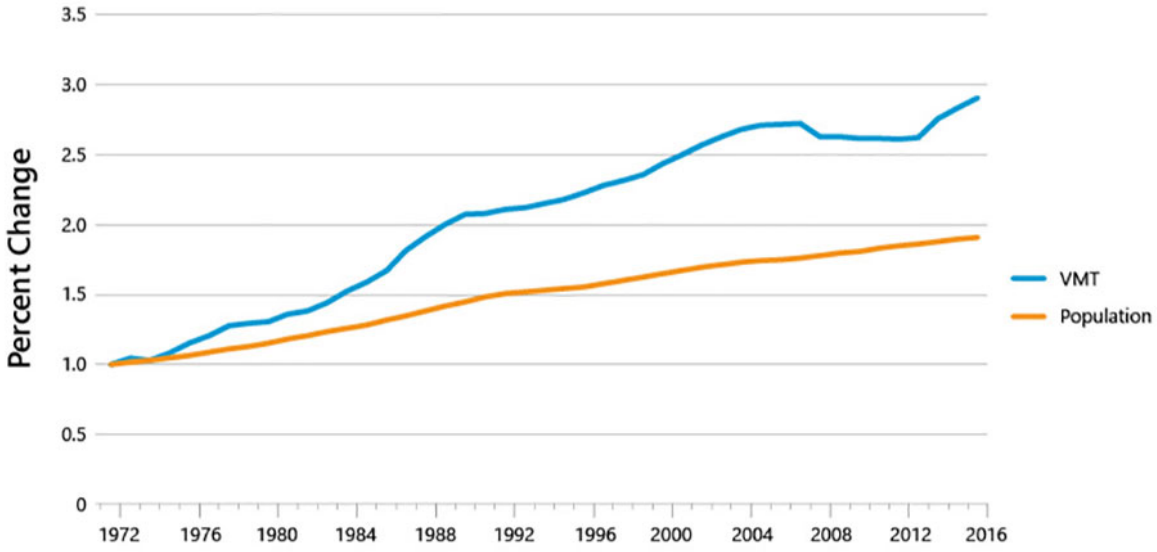
(PRC Section 21000 and following), the *State CEQA Guidelines* (California Code of Regulations, Title 14, Section 15000 and following), published court decisions interpreting CEQA, and locally adopted CEQA procedures. The TA is intended as a reference document, is the best available guidance at this time, and should only be deviated from with substantial evidence to support the agency action.

The State of California is committed to reducing greenhouse gas (GHG) emissions and achieving long-term climate change goals. To achieve these climate change goals, California needs to reduce VMT. As the chart shows, transportation is the single largest sector contributing to the State's GHG emissions. More than 40 percent of the GHG emissions come from the transportation sector, primarily passenger cars and light-duty trucks. Removing these vehicle trips and/or reducing the length of existing trips is expected to result in reduced VMT and reduced GHG emissions. As illustrated below, over the last 40 years, VMT has grown faster than population growth. The new *State CEQA Guidelines* and the establishment of VMT thresholds for CEQA analyses is linked to GHG reduction strategies and overall statewide climate change goals.



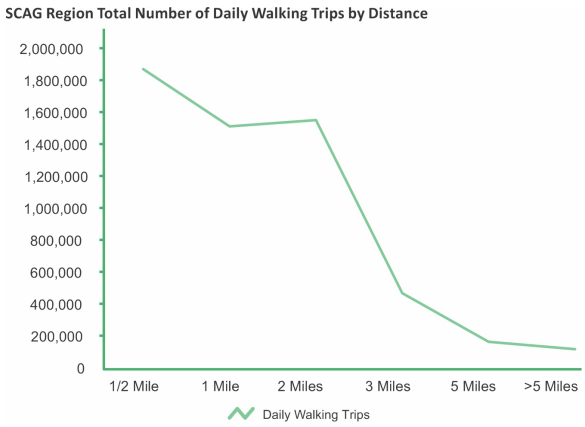
Source: California Air Resources Board.

California Statewide Population and VMT Trends



Source: https://ca50million.ca.gov/transportation/

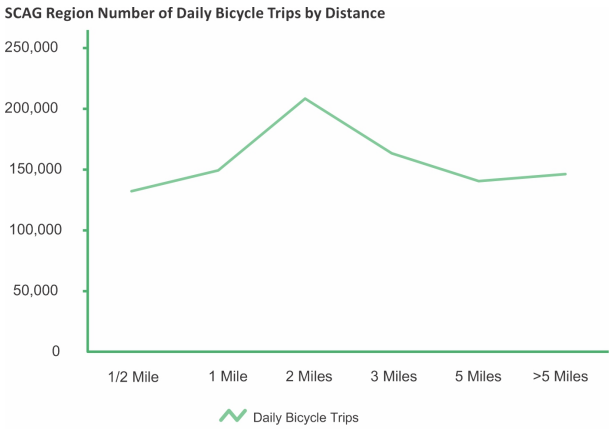
The State and the Southern California Association of Governments (SCAG), the metropolitan planning organization for Southern California, have provided guidance that the number of vehicle trips and the length of vehicle trips can be reduced by locating new development near available transit and a mix of other land uses. This is one example of a strategy to reduce project-related VMT. SB 743 intends to promote infill development, encourage multimodal transportation networks and reduce greenhouse gas emissions.



Sources: SCAG; California Household Travel Survey (2012)

In one example, the Draft Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (SCAG 2019) includes data showing that the number of walking trips declines for trips greater than ½ mile and greatly diminishes for distances longer than 2 miles. If a destination or a transit station are within ½ mile of a person's home, the person may choose a non-vehicle travel mode. The SCAG data shows that some individuals may even choose walking to a destination of up to 2 miles.

Consistent with this guidance, in 2019 the City of Long Beach (City) adopted a new Land Use Element of the General Plan that identified areas for mixed-use development in the city's Downtown and Midtown areas served by the Metro Blue Line as well as along high-frequency bus corridors throughout the city. While pedestrian trips are limited to no more than 2 miles, the data does not show a similar reduction for bicycle trips. For bicycles, infrastructure can be an important limiting factor. The City strives to be a bicycle-friendly community, has an extensive existing network of bicycle facilities, and is engaged in adding to the bicycle network. The City has the land use and transportation policy frameworks in place to reduce vehicle trips and reduce vehicle trip lengths as long as the methodology for analyzing proposed projects is consistent with these policies.



Sources: SCAG; California Household Travel Survey (2012)

This document provides a guide and substantial evidence for the City in its thresholds of significance for CEQA transportation studies. It is divided into chapters, including:

- **Chapter 2 – Definition of Region:** Here the document describes what the comparative is for analysis purposes. Each project will be compared to an existing regional average. The geographical area that defines the region is defined and described.

- **Chapter 3 – Project Screening:** OPR acknowledges that certain projects are either low VMT generators, or by virtue of their location would have a less than significant impact. The City will use these screening criteria and may offer substantial evidence for other circumstances that would lead to a less than significant impact.

- **Chapter 4 – Significance Thresholds for Land Development Projects:** In this chapter, the threshold that would define a significant CEQA impact is identified. This threshold is linked to a specific travel mode and a set of trip purposes. The actual VMT metric (either an efficiency rate [the term OPR uses to describe VMT per capita or VMT per employment] or total VMT) is described. This chapter presents a flow chart identifying the process for analyzing land development projects.

- **Chapter 5 – Significant Thresholds for Transportation Projects:** This chapter describes the method to evaluate significant CEQA impacts associated with transportation projects. Many non-vehicular capital projects are presumed to have a less than significant impact. Capacity-enhancing projects may have significant impacts and will be subject to a detailed analysis that will include measuring induced travel.

- **Chapter 6 – Significance Thresholds for Land Plans:** This chapter provides guidance and substantial evidence to support the City's treatment of land use plans and their CEQA transportation analysis.

- **Chapter 7 – Mitigation Strategies:** Potential mitigation strategies are indicated in this chapter. It is noted that this discussion is not intended as a full list of measures the City sanctions as feasible. As in previous CEQA practice, it is generally the practitioner who identifies mitigation measures to offset the specific project related impacts identified in individual environmental document. The discussion here is intended as a reference and guide for possible strategy applicants who may wish to investigate to offset their specific project-related significant impacts.

2.0 DEFINITION OF REGION: VEHICLE MILES TRAVELED CONTEXT

The question of context is the definition of the scope of the VMT analysis. The common term for this in previous delay-based LOS analyses is ***project study area***. In the delay-based LOS analyses, a project study area is generally determined based on the incremental increase in traffic from the project and its potential to create a significant LOS impact. This generally includes intersections and roadway segments where the project would add a prescribed number of peak-hour trips. Many times, lead agencies stop study area boundaries at their jurisdictional borders.

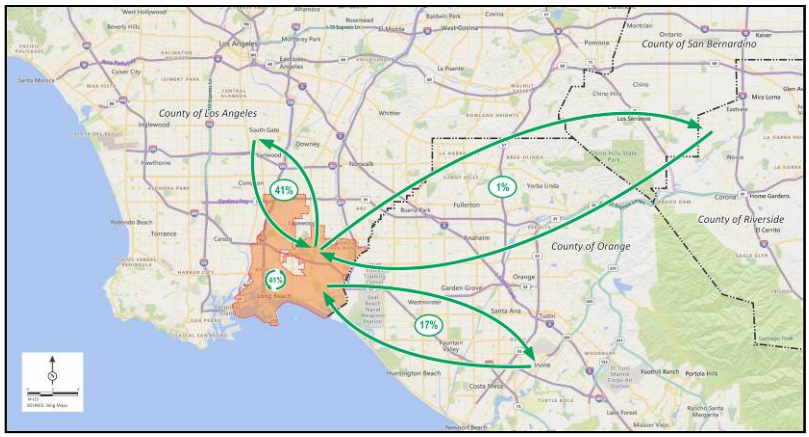
Unlike delay-based LOS analyses, VMT is a regional effect not defined by roadway, intersection, or pathway. The OPR acknowledges this in its TA (page 6), which states,

> *Lead agencies should not truncate any VMT analysis because of jurisdictional or other boundaries….*

Furthermore, the recommendations for thresholds for the primary land use types (residential and office) are based on a comparison to a ***regional average***. Region is not defined further in the TA. Instead, the OPR offers the following suggestion:

> *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 **county**, that includes the area over which nearly all workers would be expected to live (page 16).*

Distribution of Long Beach-Based Trips



LSA surveyed other large or urbanized areas around the State to identify what region has been established for VMT thresholds. In most cases, the county boundary has been identified as the region selected for VMT analysis. LSA used the SCAG RTP/SCS travel model to examine the trips into and out of Long Beach. Of the total trips, about 41 percent originate and are destined within Long Beach. Another 21 percent of trips originate or are destined within the other Gateway cities. Trips to or from the rest of Los Angeles County account for another 20 percent, for a total of 82 percent of trips to/from Long Beach contained within Los Angeles County. Long Beach borders Orange County, and it would be expected that some of the trips to/from Long Beach travel into Orange County. According to the traffic model data, approximately 17 percent of Long Beach trips have a trip end in Orange County. The remaining 1 percent of Long Beach trips have a trip end in the other counties of the SCAG region or beyond.

Because the majority of Long Beach trips are contained within Los Angeles County (approximately 82 percent) and many other large urbanized areas are defining their region as their counties, LSA recommends the use of county as the definition of region. The other OPR guidance recommends consistency in approach; once a region is established, that region should be used for all subsequent traffic analyses.

It should be recognized that the use of the county as the region defines the comparative, or the denominator, in the identification of project-related impact. The numerator is the project's VMT contribution. This project-related VMT profile may go beyond the county boundary and not be truncated by a jurisdictional boundary. For example, a new, large land development proposed in Long Beach may include VMT to Orange County. In that case, it would be the responsibility of the applicant and their traffic study preparer to include the project VMT regardless of geographical limit to the satisfaction of the City staff. This project-related VMT profile would be compared against the County of Los Angeles' regional average.

3.0 PROJECT SCREENING

The TA does acknowledge that certain activities and projects may result in a reduction in VMT and GHG emissions and therefore a less-than-significant impact to transportation and circulation. A variety of projects may be screened out of a complicated VMT analysis due to the presumption described in the TA regarding the occurrence of less than significant impacts.

3.1 Land Development Projects

The TA acknowledges that conditions may exist that would presume that a land development project has a less than significant impact. These may be size, location, proximity to transit, or trip-making potential. For example, land development projects that have one or more of the following attributes may be presumed to create a less than significant impact:

- The project is within 0.5 mile of a Transit Priority Area or a High-Quality Transit Area unless the project is inconsistent with the RTP/SCS, has a floor-to-area ratio (FAR) less than 0.75, provides an excessive amount of parking, or reduces the number of affordable residential units. In accordance with SB 743, "Transit priority areas" are defined as "an area within one-half mile of a major transit stop that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program." A 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 of 15 minutes or less during the morning and afternoon peak commute periods." A High-Quality Transit Area or Corridor is a corridor with fixed-route bus service with service intervals no longer than 15 minutes during peak commute hours.

  Figure 1 depicts transit priority areas within Long Beach, including high-quality transit corridors served by Long Beach Transit with service intervals of 15 minutes or less and major transit stops along the Metro A Line (formerly the Blue Line). Projects proposed in these areas would be presumed to have a less than significant transportation impact unless the project is inconsistent with the RTP/SCS, has an FAR less than 0.75, provides an excessive amount of parking, or reduces the number of affordable residential units.

- The project is a residential or office development located in areas with low VMT and have similar characteristics to the surrounding development (such as density or mix of uses).

  Figure 2 presents a map of VMT per capita for all existing Long Beach residential areas. These data were obtained from the 2016 SCAG RTP/SCS travel demand model. VMT per capita in each area is compared to the regional average VMT per capita for Los Angeles County to identify VMT efficient areas for future residential development (shown in green) where average VMT per capita is lower than the County average by 15 percent or more. In these green areas, projects with similar characteristics to the surrounding development would be presumed to have a less than significant transportation impact. Areas of Long Beach with VMT per capita between 15 percent below and 15 percent above the County average (where project design features or mitigation may result in a less than significant impact) are shown in yellow. Red areas indicate that VMT per capita is greater than 15 percent above the County average (and VMT impacts are likely to remain significant).

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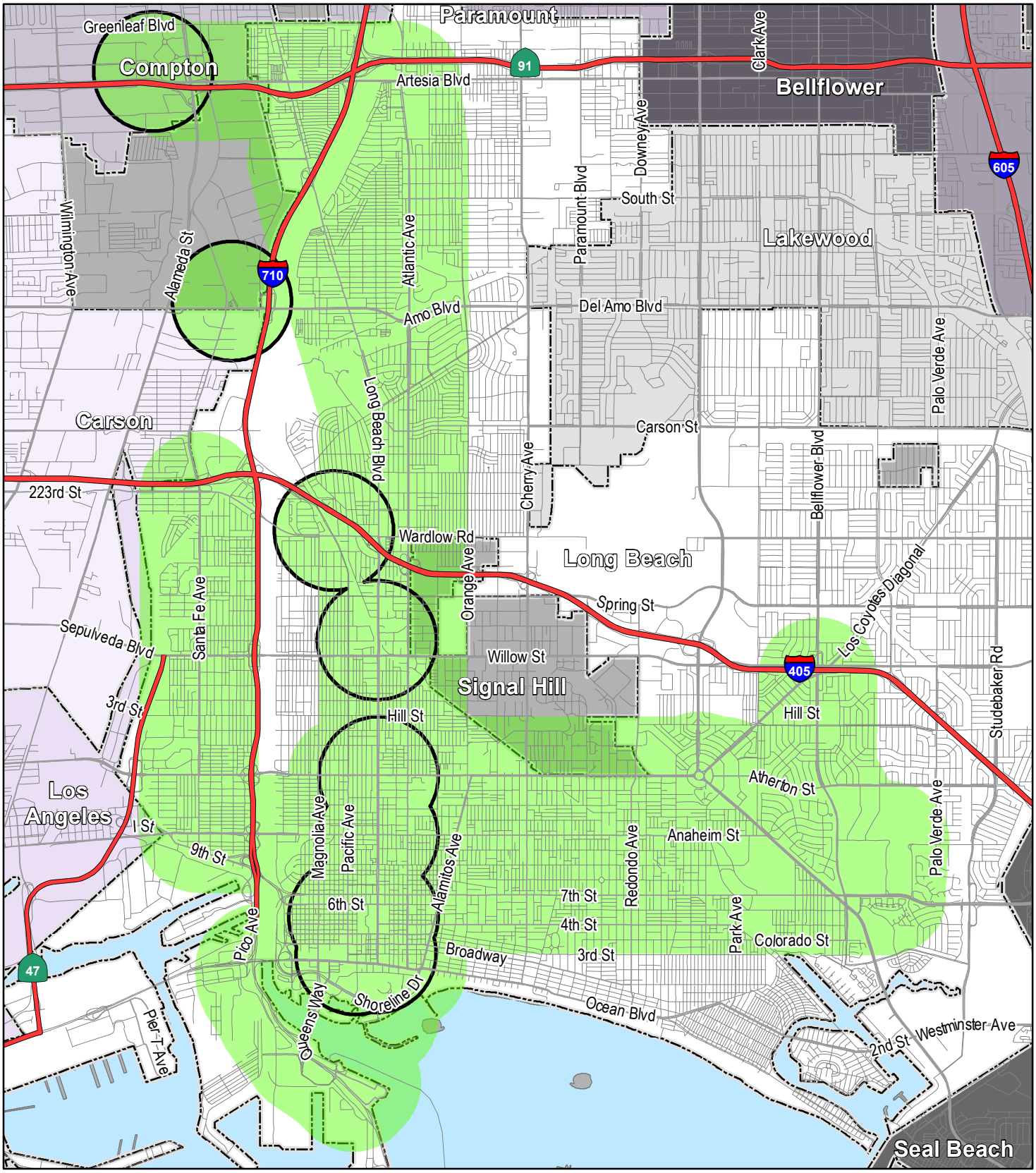

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LEGEND

Half mile from High Quality Transit Corridor or Major Transit Stop

Half mile from Major Transit Stop

FIGURE 1

0 3000 6000
FEET

CEQA Transportation Thresholds of Significance Guide

Long Beach Transit Priority Areas

SOURCE: Esri (2008); City of Long Beach (3/116/2020)

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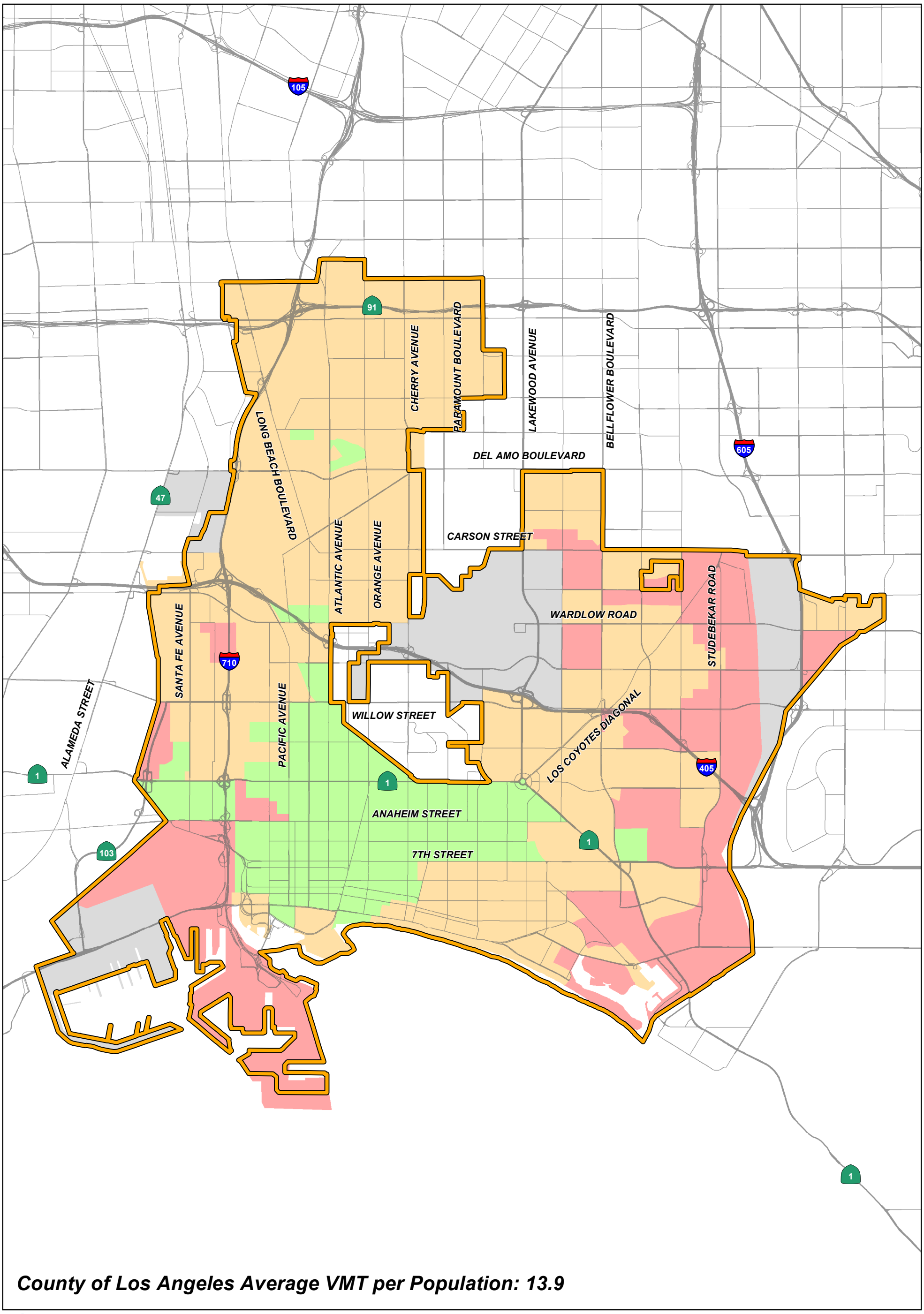

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FIGURE 2

VMT per Population

- No Population
- Less than 11.8 (less than 85% of the regional average)
- 11.8 - 16.0 (85% to 115% of the regional average)
- Greater than 16.0 (greater than 115% of the regional average)

City of Long Beach

N

0 3000 6000
FEET

SOURCE: SCAG RTP/SCS Model; ESRI Streetmap, 2013.

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CEQA Transportation Thresholds of Significance Guide

Existing VMT per Population Compared to Regional Average

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Figure 3 presents a map of VMT per employee throughout Long Beach. Again, these data were obtained from the 2016 SCAG RTP/SCS travel demand model and are compared to the regional average VMT per employee for Los Angeles County to identify VMT efficient areas for future office development (shown in green) where average VMT per employee is lower than the County average by 15 percent or more and projects with similar characteristics would be presumed to have a less than significant transportation impact. Yellow areas indicate a VMT per employee between 15 percent below and 15 percent above the County average where project design features or mitigation may result in a less than significant impact. Red areas indicate a VMT per employee higher than 15 percent above the County average. In these areas VMT impacts are likely to remain significant. Figures 2 and 3 show that most of the VMT efficient areas are within the Transit Priority Areas identified in Figure 1. For residential or office projects proposed within VMT efficient areas outside of Transit Priority Areas, the City will review the project's characteristics to determine whether they are similar to surrounding development and could be screened out from further VMT analysis.

- The project involves local-serving retail space of less than 50,000 square feet.
- The project has a high level of affordable housing units.
- A project generates a low volume of daily traffic. The OPR TA would recommend a volume of 110 ADT. This recommendation is not based on any analysis of GHG reduction, but was instead based on the potential trip generation of an office project that would be categorically exempt under CEQA. LSA prepared a deeper analysis and used the California Emissions Estimator Model (CalEEMod) to correlate the effect of changes in project-related ADT to the resulting GHG emissions. This model was selected because it is provided by the CARB to be used statewide for developing project-level GHG emissions. CalEEMod was used with the built-in default trip lengths and types to show the vehicular GHG emissions from incremental amounts of ADT. Table A shows the resulting annual VMT and GHG emissions from the incremental ADT.

Table A: Representative VMT and GHG Emissions from CalEEMod

Average Daily Trips (ADT)	Annual Vehicle Miles Traveled (VMT)	GHG Emissions (Metric Tons CO_2e per year)
200	683,430	258
300	1,021,812	386
400	1,386,416	514
500	1.703,020	643
600	2,043,623	771

Source: CalEEMod version 2016.3.2. Example project used: 50 single-family Homes in Orange County.
CalEEMod = California Emissions Estimator Model
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas

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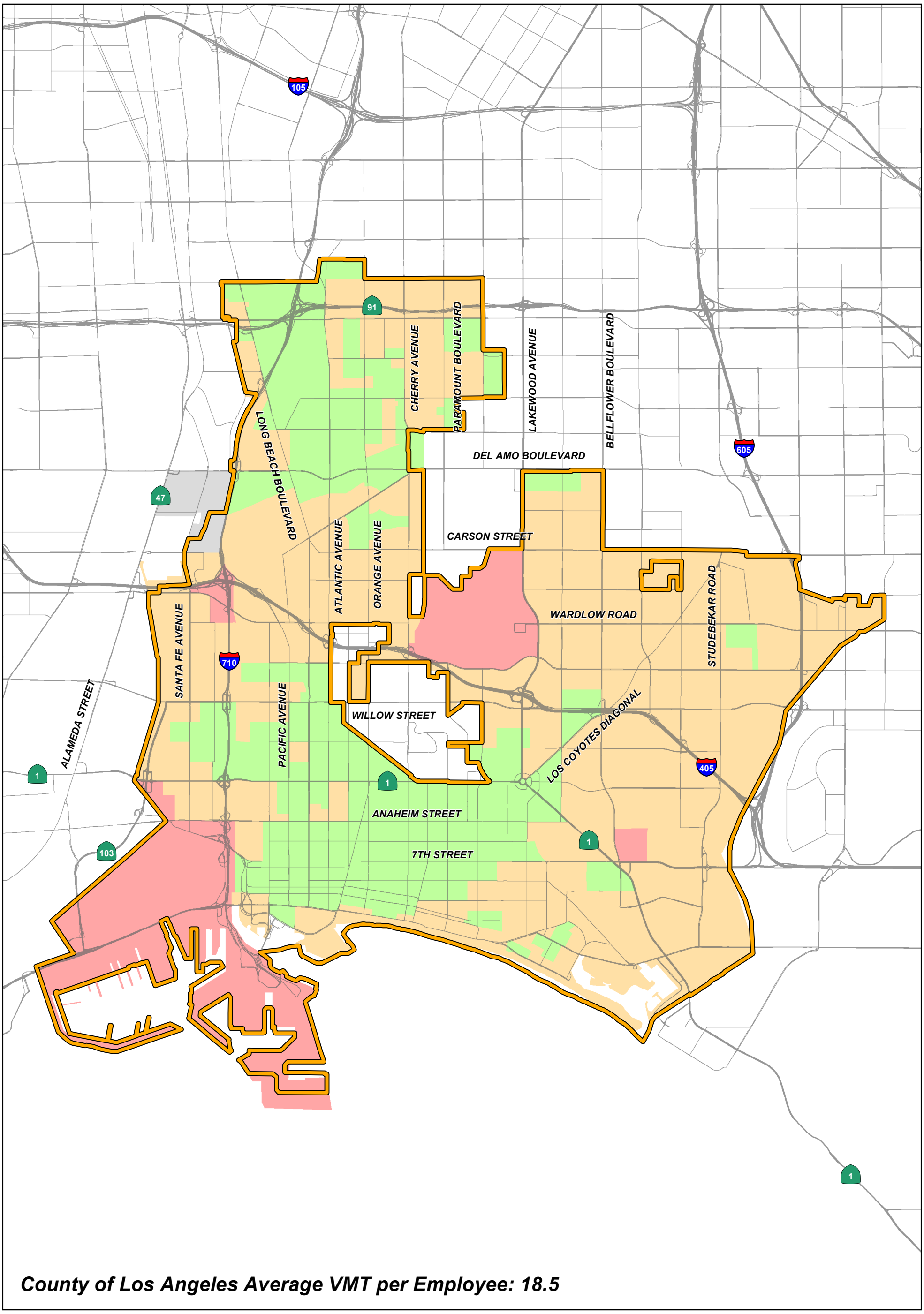

LSA

FIGURE 3

VMT per Employee

- No Employee
- Less than 15.7 (less than 85% of the regional average)
- 15.7 - 21.3 (85% to 115% of the regional average)
- Greater than 21.3 (greater than 115% of the regional average)

City of Long Beach

N

0 3000 6000
FEET

CEQA Transportation Thresholds of Significance Guide

Existing VMT per Employee Compared to Regional Average

SOURCE: SCAG RTP/SCS Model; ESRI Streetmap, 2013.

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A common GHG emissions threshold is 3,000 MT CO_2e/yr. The vehicle emissions are typically more than 50 percent of the total project GHG emissions. Thus, a project with 500 ADT would generally have total project emissions that could be less than 1,300 MT CO_2e/year (i.e., 50 percent or 643 MT CO_2e/year coming from vehicle emissions and the other 50 percent coming from other project activities). As this level of GHG emissions would be less than 3,000 MT CO_2e/year, therefore, the emissions of GHG from a project up to 500 ADT would typically be less than significant.

The City's current traffic impact analysis guidelines establish screening criteria of 100 ADT and determines a project's study area based on a 50 peak-hour trip threshold. For most land use types, approximately 10 percent of daily trips occur during the busiest peak hour. Therefore, a project generating fewer than 50 peak-hour trips would generate approximately 500 ADT. As stated above, projects generating 500 ADT or fewer are typically below the GHG emissions threshold. Therefore, the City could establish a screening criterion for small projects of up to 500 ADT. It is also recommended that the City maintain a database of projects preparing VMT impact analyses and, at regular intervals, identify the minimum ADT of projects resulting in significant VMT impacts. Once a sufficient number of data points are available to provide substantial evidence, the City could adjust this screening criterion in the future.

- The development of institutional/government and public service uses that support community health, safety and welfare are also screened from subsequent CEQA VMT analysis. These facilities (e.g. police stations, fire stations, community centers, refuse stations) are already part of the community and, as a public service, the VMT is accounted for in the existing regional average. Many of these facilities generate fewer than 500 ADT and/or use vehicles other than passenger cars or light-duty trucks. These other vehicle fleets are subject to regulation outside of CEQA, such as CARB and the South Coast Air Quality Management District.

3.2 Transportation Projects

The primary attribute to consider with transportation projects is the potential to increase vehicle travel. While the City has discretion to continue to use delay analysis for CEQA disclosure of transportation projects, changes in vehicle travel must also be quantified. However, the TA listed a series of projects that would not likely lead to a substantial or measurable increase in vehicle travel and that, therefore, would generally not require an induced travel analysis. These include the following:

- 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 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 1 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 used 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 the 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., high-occupancy vehicles [HOVs], high-occupancy toll [HOT] lane traffic, or trucks) from general vehicles
- Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority 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 a new transit service
- Conversion of streets from one-way to two-way operation with no net increase in the 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

Additionally, transit and active transportation projects generally reduce VMT and are, therefore, 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. The City may use this CEQA presumption of less than significant impact to aid in the prioritization of capital projects, as the CEQA process for any of these project types would be more streamlined than other capacity-enhancing capital projects.

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4.0 SIGNIFICANCE THRESHOLDS FOR LAND DEVELOPMENT PROJECTS

The TA states that SB 743 and all CEQA VMT transportation analyses refer to automobiles. Here, the term automobile refers to on-road passenger vehicles, specifically cars and light-duty trucks (page. 4). Heavy-duty trucks can be addressed in other CEQA sections and are subject to regulation in a separate collection of rules under California Air Resources Board (CARB) jurisdiction. While heavy-duty truck trips generated by Port of Long Beach or industrial activity are outside of SB 743 regulation, passenger vehicle trips generated by employees are subject to VMT standards.

The OPR has identified the subject of the thresholds as the primary trips in the home-based typology: specifically, home-based work trips. This includes residential uses, office uses, and retail uses. The home-based work trip type is the primary tripmaking during the peak hours of commuter traffic in the morning and evening periods.

The CEQA analysis requirement for impact of transportation has shifted from congestion to climate change, and the purpose of the CEQA analysis is to disclose and ultimately reduce GHG emissions by reducing the number and length of automobile trips. This change in CEQA analysis does not diminish the City's ability to require an LOS analysis to confirm accessibility to a project site, conformance with General Plan policies, or as a function of their general health, safety, and welfare discretion and authority. As part of the SB 375 land use/transportation integration process and the GHG goal setting, most metropolitan planning organizations and regional transportation planning agencies have agreed to reduce GHG through integrated land use and transportation planning by approximately 15 percent by 2035. Furthermore, in its 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Climate Goals, the CARB recommends total VMT per capita rates approximately 15 percent below existing conditions.

The TA therefore recommends:

> *A proposed (residential) project exceeding a level of 15 percent below existing regional average VMT per capita may indicate a significant transportation impact.*
>
> *A similar threshold would apply to office projects (15 percent below existing regional average VMT per employee).*
>
> *VMT generated by retail projects would indicate a significant impact for any net increase in total VMT.*

While regional planning documents such as the RTP/SCS calculate a single VMT rate by dividing total VMT for the region by the total service population, it should be noted that the TA identifies a different denominator for the residential and office comparison rates. If regional average VMT per capita and VMT per employee were calculated using the service population (population plus employment), the denominator would be the same, which would be inconsistent with the TA. Furthermore, using service population to calculate regional average rates would complicate future project analyses. The environmental document for a proposed land use project will identify population for a residential project and employment for an office project. These values should be used in the transportation analysis to calculate the project's VMT per capita or VMT per employee. If a project's VMT per capita (VMT/project population) or VMT per employee (VMT/project

employment) is compared to a regional average based on service rate (VMT/[regional population + employment]), the comparison is not equivalent.

To avoid this future complication in project-level analysis, LSA calculated regional average rates consistent with the descriptions in the TA. LSA separated the data categories of population-generated VMT and employment-generated VMT, separated the data categories of population and employment, and calculated two rates. As calculated by LSA using the RTP/SCS traffic model, the average daily VMT/capita in Los Angeles County is 13.9. The average daily VMT/employee in Los Angeles County is 18.5.

No discrete land use types other than residential, office, or retail are identified for threshold development in the TA. Mixed-use projects should be evaluated for each component of the project independently, or the lead agency may use the predominant land use type for the analysis. Credit for internal trip capture should be made. The TA suggests that a lead agency may, but is not required to, develop thresholds for any other use.

In December 2019, the City adopted a new Land Use Element of the General Plan. Analysis of the General Plan Land Use Element found that VMT and GHGs would be reduced compared to existing conditions. Specifically, daily VMT were reduced from 9,482,252 to 9,028,327 and GHG emissions were reduced from 2,367,487 metric tons of carbon dioxide equivalent per year (MT CO_2e/yr)[1] under existing conditions to 1,670,419 MT CO_2e/yr under the General Plan Land Use Element. Therefore, given the overall reductions anticipated to be achieved through implementation of the Land Use Element and the lack of guidance on this topic from OPR, for projects proposing other land uses that are consistent with the Land Use Element, a no net change in VMT per capita or employment is a rational threshold.

It should be mentioned that projects within the Port of Long Beach (Port) would be subject to the approval authority of the Port. Other port-related activities within the jurisdiction of Long Beach would be responsible for employee VMT. For industrial uses such as those port-related activities occurring in areas consistent with the General Plan Land Use Element, the City could adopt a threshold of no net change, as described above. For industrial activities proposed at locations inconsistent with the General Plan Land Use Element, a threshold of 15 percent below existing per employee VMT (similar to the office threshold) is appropriate.

In summary, the City's thresholds would be:

- **Residential –** 15 percent below existing regional average VMT per capita (13.9 X 0.85 = 11.8)
- **Office –** 15 percent below existing regional average VMT per employee (18.5 X 0.85 = 15.7)
- **Retail –** No net change in total VMT

[1] Carbon dioxide equivalent (CO_2e) is a concept developed to provide one metric that includes the effects of numerous GHGs. The global warming potential (GWP) of each GHG characterizes the ability of each GHG to trap heat in the atmosphere relative to another GHG. The GWPs of all GHGs are combined to derive the CO_2e.

- **Industrial –** No net change in total VMT if consistent with the General Plan Land Use Element, 15 percent below existing regional average VMT per employee (18.5) if inconsistent with the General Plan Land Use Element

- **Other Land Uses –** No net change in VMT per capita or VMT per employment if consistent with the General Plan Land Use Element or 15 percent below regional average if seeking a General Plan Amendment

Figure 4 demonstrates the potential land development entitlement process to comply with the *State CEQA Guidelines* related to VMT and transportation impacts. It provides the path from application filing through the determination of impacts. It is presented as the standard process; each development application is considered unique and may create alternative or modified steps through the process. Each step that diverges from this standard process should be accompanied with substantial evidence demonstrating compliance with other climate change and GHG emission reduction laws and regulations.

4.1 City Communication

At the outset of the project development process, the applicant should seek a meeting with City staff to discuss the project description, the transportation study content and the analysis methodology. Key elements to address include a description of the project in sufficient detail to generate trips and identify the potential catchment area (i.e., trip lengths if no modeling is undertaken), estimate project VMT, discuss project design features that may reduce the VMT from the project development and discuss the project location and associated existing regional VMT percentages. As a result of the meeting, the applicant or their consultant shall prepare a transportation analysis scope of work for review and approval by the City. The City will complete the review within 2 weeks of submittal of the draft scope of work.

4.2 Project Screening

Once a development application is filed and the meeting is held, project screening is conducted as the initial step. If the project meets any one of the screening criteria, the project may be presumed to create a less than significant impact. No further analysis is necessary. The CEQA document should enumerate the screening criteria and how the project meets or exceeds that threshold. If project screening does not apply, a VMT analysis may be required. The extent of this analysis may be a simple algebraic demonstration or a more sophisticated traffic modeling exercise. This distinction is addressed later.

4.3 Project VMT analysis

The first step is to identify the project land use type and the appropriate efficiency rate to use. If the project is residential, use the per capita (or residential population) rate. If the project is commercial office (or a similar trip generator), use the per employee rate. For retail projects, use the total VMT generated by the project. For mixed use projects, report each land use after generating trips, taking credit for internal trip capture and estimating the VMT. As an alternative, the predominant use may be reported for mixed-use projects.

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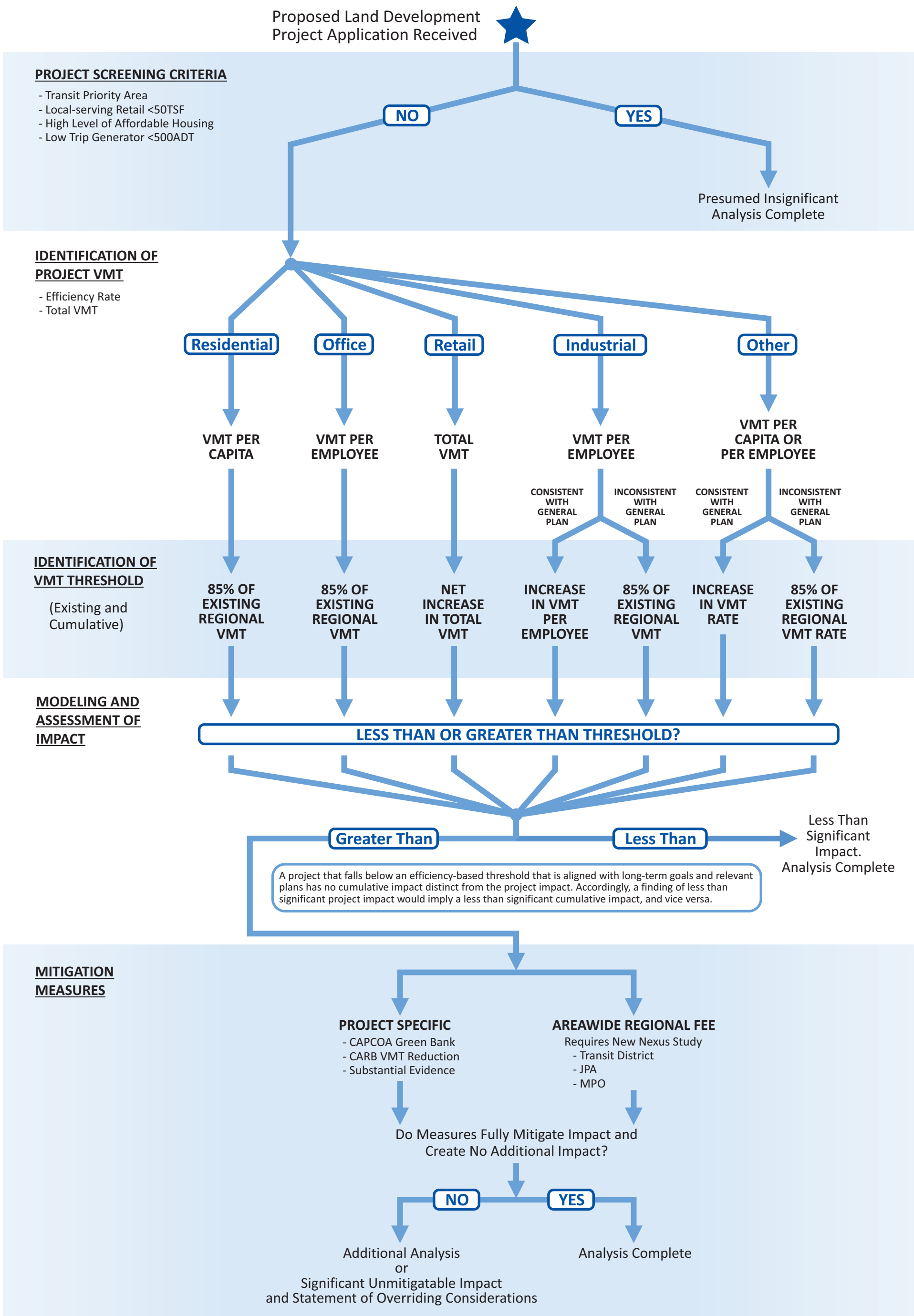

LSA

FIGURE 4

CEQA Transportation Thresholds of Significance Guide

Transportation Impacts Flow Chart for Land Development Projects

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4.3.1 Moderate Project VMT Analysis

For smaller projects or those with one predominant use, the determination of project VMT may be identified manually as the product of the daily trip generation (land use density/intensity multiplied by agency approved trip generation rate) and the trip length in miles for that specific land use. Trip lengths can be found in other related air quality tools, such as CalEEMod.

4.3.2 Large Project VMT Analysis

For large or multi-use projects, use of the City traffic-forecasting tool should be required. For purposes of City review, a project generating 1,000 average daily trips (ADT) or more should use a traffic-forecasting tool (such as the SCAG RTP/SCS travel model). At this level of trip generation, the probability of trip fulfilment expands to an area greater than the immediate project location and may include a greater regional attraction. The City traffic-forecasting tool can more accurately define the select links used and the total VMT generated by the project.

Next, the project-generated efficiency rate (or total VMT) is compared to the appropriate significance threshold. This is either 85 percent of the existing regional average per capita or employment for specific uses, or no net increase in total VMT for retail or other uses that are consistent with the General Plan. For those projects that require a General Plan Amendment, 85 percent of existing regional average is appropriate, as the project has yet to be evaluated as part of the City's ultimate land development vision.

If the project VMT (expressed as an efficiency rate or total number) is less than the significance threshold, the project is presumed to create a less than significant impact. No further analysis is required. If the project is greater than the significance threshold, mitigation measures are required.

4.4 Mitigation Measures

The applicant is required, per CEQA, to identify feasible offsets to completely mitigate the impact created by the project. These can come from the mitigation strategies provided by the City (see Appendices A and B), or selected based on the applicant and their CEQA team experience. The City must accept and approve the ultimate mitigation ascribed to the project and the related VMT percent reduction.

If the mitigation measures fully mitigate the project impact, the project is presumed to have an impact mitigated to a less than significant level. No further analysis is required. If the project's VMT impact cannot be fully mitigated, the City may (1) request the project be redesigned, relocated or realigned to reduce the VMT impact, or (2) prepare a Statement of Overriding Considerations (SOC) for the transportation impacts associated with the project. All feasible mitigation measures must be assigned to and carried out by the project, even if an SOC is prepared.

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5.0 SIGNIFICANCE THRESHOLDS FOR TRANSPORTATION PROJECTS

The 2020 CEQA Guidelines include Section 15064.3.b.(2) to address transportation projects. It reads:

> *For roadway capacity projects, agencies have the discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements.*

The City may continue to use delay and LOS for transportation projects as long as impacts related to "other applicable requirements" are disclosed. This has generally been interpreted as VMT impacts and other State climate change objectives. These other applicable requirements may be found in other parts of an environmental document (i.e., air quality, GHG), or may be provided in greater detail in the transportation section.

For projects on the State highway system, the California Department of Transportation (Caltrans) will use and will require sponsoring agencies to use VMT as the CEQA metric, and Caltrans will evaluate the VMT "attributable to the project" (Caltrans Draft VMT-Focused Transportation Impact Study Guide 2020). Caltrans' Intergovernmental Review will review environmental documents for capacity-enhancing projects for the agency's analysis of VMT change.

The assessment of a transportation project's VMT should disclose the VMT without the project and the difference in VMT with the project. Any growth in VMT attributable to the transportation project would result in a significant impact.

The primary difference in these two scenarios to OPR is related to induced growth. Current traffic models have limited abilities to forecast induced growth, as their land use or socioeconomic databases are fixed to a horizon date. OPR refers to a limited set of reports that would indicate elasticities.

The most recent major study (Duranton & Turner 2011, p. 24), estimates an elasticity of 1.0, meaning that every percentage change in lane miles results in a 1 percent increase in VMT.

The TA presents one method to identify the induced growth, as follows.

> *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 percentage change in total lane miles that will result from the project.*
> 3. *Determine the total existing VMT over that same area.*
> 4. *Multiply the percentage 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]

Caltrans has identified a computerized tool that estimates VMT generation from transportation projects. It was developed at University of California, Davis and is based on elasticities and the relationship of lane mile additions and growth in VMT. It uses Federal Highways Administration definitions of facility type and ascribes VMT increases to each facility. Output includes increases on million vehicle miles per year. Caltrans is investigating its use for all its VMT analyses of capital projects. It may be available for use by local agencies and should be investigated for its value in Long Beach.

The TA provides other options to identify induced growth- and project-related VMT. These 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.*

The TA provides a final warning:

> *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.*

6.0 SIGNIFICANCE THRESHOLDS FOR LAND PLANS

The OPR guidance has provided guidance on the treatment of CEQA traffic analyses for land use plans in the TA. The TA reiterates previous direction regarding individual land use assessments:

- Analyze the VMT outcomes over the full area over which the plan may substantively affect travel patterns (the definition of region).
- VMT should be counted in full rather than split between origins and destinations (the full impact of the project VMT).

The TA provides a single sentence as consideration for land use plans. It states, "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." This recommendation refers to 85 percent of the existing city or regional average, and no net gain for residential, office, and retail land uses.

This recommendation is confusing and contradictory to other OPR TA recommendations. OPR is recommending a focus on specific trip purposes (i.e., home-based trips for residential projects and work-based trips for office projects). Depending on the modeling platform, at least four other trip types are recognized as contributors to large-scale plan-level analyses. Home-based origins will have interactions with other non-work-based destinations. Therefore, if home-based trips are the focus of a plan-level assessment, a great deal of VMT would not be accounted for in the estimation of total VMT.

To assess a land plan, use of a traffic-forecasting tool is recommended. The total VMT for the plan should be identified for all trip types and all potential VMT contributors within the plan area. Similar traffic model runs should be conducted for the existing base year and the horizon year with No Project.

The SB 375 process and the Regional Targets Advisory Committee GHG goal setting has established a baseline GHG emissions reduction that local Metropolitan Planning Organizations (MPOs) and Regional Transportation Planning Agencies (RTPAs) can achieve. These achievements are provided in the integration of land use planning and transportation, not solely through the imposition of regulation on passenger cars and light-duty trucks. The CARB reviews the GHG reduction strategies and has approved the most recent round of GHG emission reductions for MPOs and RTPAs around the State.

Other legislative mandates and State policies speak to GHG reduction targets. A sample of these include:

- Assembly Bill 32 (2006) requires statewide GHG emissions reductions to 1990 levels by 2020 and continued reductions beyond 2020.
- SB 32 (2016) requires at least a 40 percent reduction in GHG emissions from 1990 levels by 2030.

- Executive Order (EO) B-30-15 (2015) sets a GHG emissions reduction target of 40 percent below 1990 levels by 2030.
- EO S-3-05 (2005) sets a GHG emissions reduction target of 80 percent below 1990 levels by 2050.
- EO B-16-12 (2012) specifies a GHG emissions reduction target of 80 percent below 1990 levels by 2050 specifically for transportation.

California PRC Section 15064.3(b)(4) states (in part) the following:

> *A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household, or in any other measure.*

The City is currently experiencing overcrowding according to the City's Assessment of Fair Housing. As housing is added to remediate overcrowding, modeled off-peak travel could increase. Off-peak VMT is generated by discretionary trips, which the traffic model calculates based on the number of households. In other words, the model assumes that people living in overcrowded housing conditions generate fewer trips to the grocery store than the same number of people living in less crowded, separate housing. The State and the City have concurrent goals of reducing VMT and increasing housing supply to improve affordability and accommodate the workforce. While assessing land use planning according to VMT per service population is consistent with the RTP, the City's goals of increasing housing supply while reducing VMT are supported by assessing land use plans according to their effect on VMT per household.

Therefore, the recommended methodology for conducting VMT assessments for most land plans is to compare the existing VMT per household for the land plan area with the expected horizon year VMT per household. The recommended target is to achieve a lower VMT per household in the horizon year with the proposed land plan than occurs for the existing condition. If a land plan is composed of primarily employment uses (i.e., the land plan is for an employment center or has a focus on nonresidential uses), then VMT per employee would be an appropriate metric and the target is to achieve a lower VMT per employee in the horizon year with the proposed land plan than occurs for the existing condition.

7.0 MITIGATION STRATEGIES

When the City identifies a significant CEQA impact according to the thresholds described above, the City must identify feasible mitigation measures in order to avoid or substantially reduce that impact. While previous vehicle level of service impacts could be mitigated with location-specific vehicle level of service improvements, VMT impacts will require mitigation of regional impacts through more behavioral changes. Enforcement of mitigation measures will be still be subject to the mitigation monitoring requirements of CEQA, as well as the regular police powers of the City. These measures can also be incorporated as a part of plans, policies, regulations, or project designs.

7.1 Definition of Mitigation

Section 15370 of the *2020 State CEQA Guidelines* defines mitigations as follows:

> *"Mitigation" includes:*
>
> *a. Avoiding the impact altogether by not taking a certain action or parts of an action.*
>
> *b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.*
>
> *c. Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.*
>
> *d. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.*
>
> *e. Compensating for the impact by replacing or providing substitute resources or environments, including through permanent protection of such resources in the form of conservation easements.*

Section 15097 of the *State CEQA Guidelines* states that "the public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects."

VMT mitigations are not physical improvements; rather, they are complex in nature and will significantly depend on changes in human behavior. Therefore, it will be important that lead agencies develop a proper monitoring program to ensure the implementation of these mitigation measures, throughout the life of a project, in compliance with CEQA. Lead agencies must also coordinate with other responsible agencies as part of this monitoring program to determine the feasibility of the mitigations and whether they would last in perpetuity.

Historically, mitigation measures for LOS based transportation impacts have addressed either trip generation reductions or traffic-flow-capacity enhancements. LOS mitigation measures include adding capacity to intersections, roadways, ramps, and freeways. However, transportation demand

management (TDM) actions, active transportation amenities, and other measures to reduce the number of trips creating an impact are also possible mitigation strategies.

LOS-based mitigations are mostly physical improvements whose benefits are observable, measurable, and virtually perpetual. The addition of a turn lane at an intersection will behave similarly regardless of location and will continue to perform as intended until the lane is removed or modified. A lane mile of roadway will carry a similar volume of traffic if designed consistently across most jurisdictions in California, and it will continue to do so as long as the lane exists.

The definition of VMT mitigation measures is somewhat different. Most VMT mitigations may seem feasible from a theoretical perspective, but practical implementation of these strategies in perpetuity is yet to be demonstrated. Several of these mitigations are contextual and behavioral in nature. For example, a project providing a bike share program does not necessarily guarantee a behavioral change within the project's population; the level of improvement may be uncertain and subject to the utilization of the population affected. However, the City's responsibility is only to ensure implementation of the mitigation measure by the project applicant.

LOS mitigations (such as addition of turn lanes) focus more on rectifying a physical CEQA impact (strategy "c" of *State CEQA Guidelines* Section 15370). On the contrary, the majority of VMT mitigations (such as commute trip-reduction programs) will aim at reducing or eliminating an impact over time through preservation and monitoring over the life of the project (strategy "d" of *State CEQA Guidelines* Section 15370). Additionally, some VMT mitigations (such as those focused on land use/location-based policies) will aim at minimizing impacts by reducing the number of trips generated by the projects (strategy "b" of *State CEQA Guidelines* Section 15370).

Furthermore, it may be that identified VMT impacts cannot be mitigated at the project-specific level. Most VMT impacts are in the context of the region of analysis. The incremental change in VMT associated with a project in the particular setting in which it may be located would suggest a greater VMT deficit than individual strategies can offset. Only a regional solution (e.g., completion of a transit system, purchase of more transit buses, or gap closure of an entire bicycle master plan system) may offer the incremental change necessary to reduce the VMT impact to a level of insignificance. Also, VMT, as a proxy for GHG emissions, may not require locational specificity. A project does not necessarily need to diminish the VMT at the project site to gain benefit in VMT and GHG reduction in the State. Offsets in an area where the benefit would be greater will have a more effective reduction in VMT and GHG and contribute to the State's ultimate climate goals. This is the basis for the cap-and-trade strategies.

These issues of regional scale, partial participation, and geographic ambiguity confound the certainty of agency identification of VMT mitigation measures. Section 15126.4 of the *State CEQA Guidelines* states, "Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. **Formulation of mitigation measures shall not be deferred until some future time** [emphasis added]." Certainty does not yet exist that partial participation in VMT mitigation measures is permissible. Regional VMT mitigation is considered the most effective method for large-scale VMT reduction, yet the cost and implementation barriers are greater in most cases than one project can undertake. The only

exception may be where VMT mitigation strategies are provided at a regional level in the form of mitigation banks, fees, and exchanges and the projects are subject to contribute to these fee programs consistent with applicable provision to ensure compliance and consistency with CEQA and other legal requirements.

Section 21099 (b) (4) of the California PRC states, "This subdivision [requiring a new transportation metric under CEQA] does not preclude the application of local general plan policies, zoning codes, conditions of approval, thresholds, or any other planning requirements pursuant to the police power or any other authority." Hence, despite the fact that automobile delay will no longer be considered a significant impact under CEQA, the lead agency can still require projects to meet the LOS standards designated in its zoning code or general plan. Therefore, in that case, the project might still be required to propose LOS improvements for congestion relief in addition to VMT strategies as CEQA mitigation measures.

7.2 Mitigation Measures and Project Alternatives

7.2.1 Land Development Projects and Community/General Plans

Mitigations and project alternatives for VMT impacts have been suggested by the OPR and are included in the TA. VMT mitigations can be extremely diverse and can be classified under several categories such as land use/location, road pricing, transit improvements, commute trip reduction strategies, and parking pricing/policy. However, the issue with VMT mitigations is the quantitative measurement of the relief provided by the strategies. How much VMT reduction does a TDM program, a bike share program, a transit route, or 1 mile of sidewalk provide? Improvements related to VMT reduction strategies have been quantified in sources such as the California Air Pollution Control Officers Association (CAPCOA) report *Quantifying Greenhouse Gas Mitigation Measures* (CAPCOA Green Book) and CARB sources, and are generally presented in wide ranges of potential VMT reduction percentages.

Appendix A provides a summary of the different VMT mitigation measures and project alternatives stated in the CAPCOA Green Book (only those strategies directly attributed to transportation) and the OPR TA for land development projects. The table also refers to mitigation measures listed in other sources such as the VMT Measurement Calculator for the City of Los Angeles, the transportation analysis guidelines for the City of San Jose and the San Diego Region, and the memorandum Analysis of VMT Mitigation Measures Pursuant to SB 743, prepared for the Los Angeles County Metropolitan Transportation Authority.

Appendix B provides a list of mitigations for land development projects based on the research work performed by Deborah Salon, Marlon G. Boarnet, Susan Handy, Steven Spears, and Gil Tal with the support of CARB. Unless the project applicant provides substantial evidence identifying a project-specific value, the City should apply the midpoint of provided ranges for VMT reduction. Where a mitigation strategy does not have an identified VMT reduction range, the project applicant would be required to provide a reduction estimate supported by evidence.

As for land use plans, the potential mitigation measures for community/general plans would be similar to those for land development projects, with certain modifications. The OPR TA does not

specifically state any VMT mitigations for land use plans. However, the transportation impact study guidelines for the San Diego Region list potential mitigation measures. These measures have been summarized in Appendix C along with corresponding VMT reduction percentages obtained from CAPCOA.

It must be noted that Appendices A–C provide only summaries of the mitigations stated in the sources mentioned above. The reader should refer to the original source for further details and for subsequent updates to the mitigation measures. Also, Appendices A–C do not provide an exhaustive list of mitigation measures to offset the CEQA impacts. Other measures can also be accepted by agencies based on provision of substantial evidence.

As additional mitigation measures are developed to offset VMT impacts in the future for the *State CEQA Guidelines* process, linkages between the strategy and the incremental effect and quantified offset must be made. This can be based on other sources' observations and measurements or City experience in these practices. The key to mitigation is to base its efficacy on real and substantial evidence.

7.2.2 Transportation Projects

Although OPR provides detailed guidance on how to assess induced-growth impacts associated with transportation projects, it leaves the subject of mitigation measures vague. Only four strategies are suggested as mitigation measures:

- 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 strategies to improve passenger throughput on existing lanes

No quantified reduction percentage is allocated to these strategies, and LSA could find no substantial evidence that would provide guidance to levels of significance after implementation of these strategies. Review of the four recommended strategies suggests that OPR is directing strategies away from general-purpose mixed-flow lanes on expressways, freeways, and arterial highways. Inasmuch as these are the project descriptions and Purpose and Need, the project intent and the project mitigation may be at odds. The lead agency would be subject to an SOC for the capital project VMT impact.

7.3 Funding Mechanisms

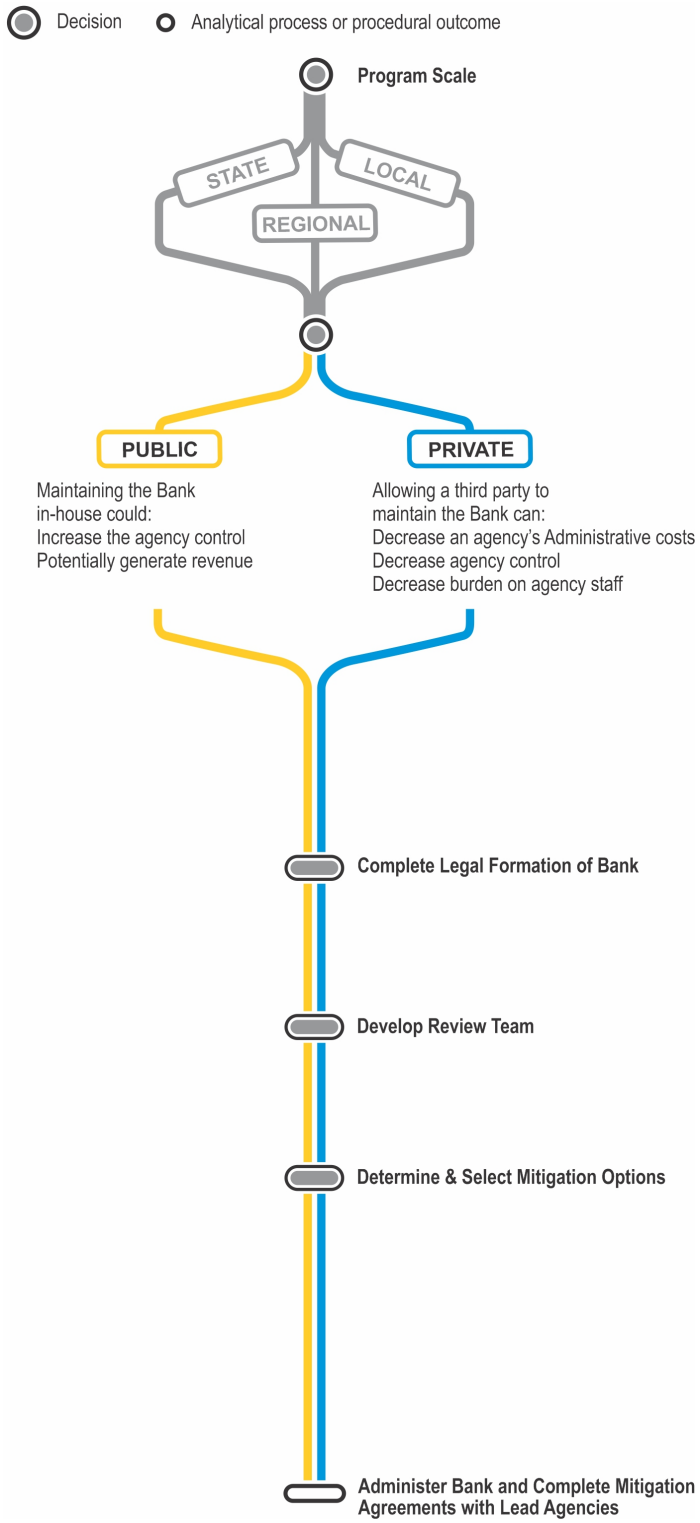
The change in the metric for transportation impacts from LOS to VMT will lead to a shift in impacts and mitigation measures from being local and project-specific to being more regional in nature. OPR acknowledges the regional nature of VMT impacts and states that regional VMT reduction programs and fee programs (in-lieu fees and development impact fees) may be appropriate forms of mitigation. Fee programs are particularly useful to address cumulative impacts. It is very important

for the agencies to coordinate with the RTPA or the MPO to develop such mitigation programs that would fund transit, develop active transportation plans, etc. These programs are regional in nature and best suited for administration by the regional agency. Regional agencies may also wish to coordinate with appropriate stakeholders, including participating local jurisdictions, developers, and other interests while conducting nexus studies and checking for rough proportionality and compliance with CEQA.

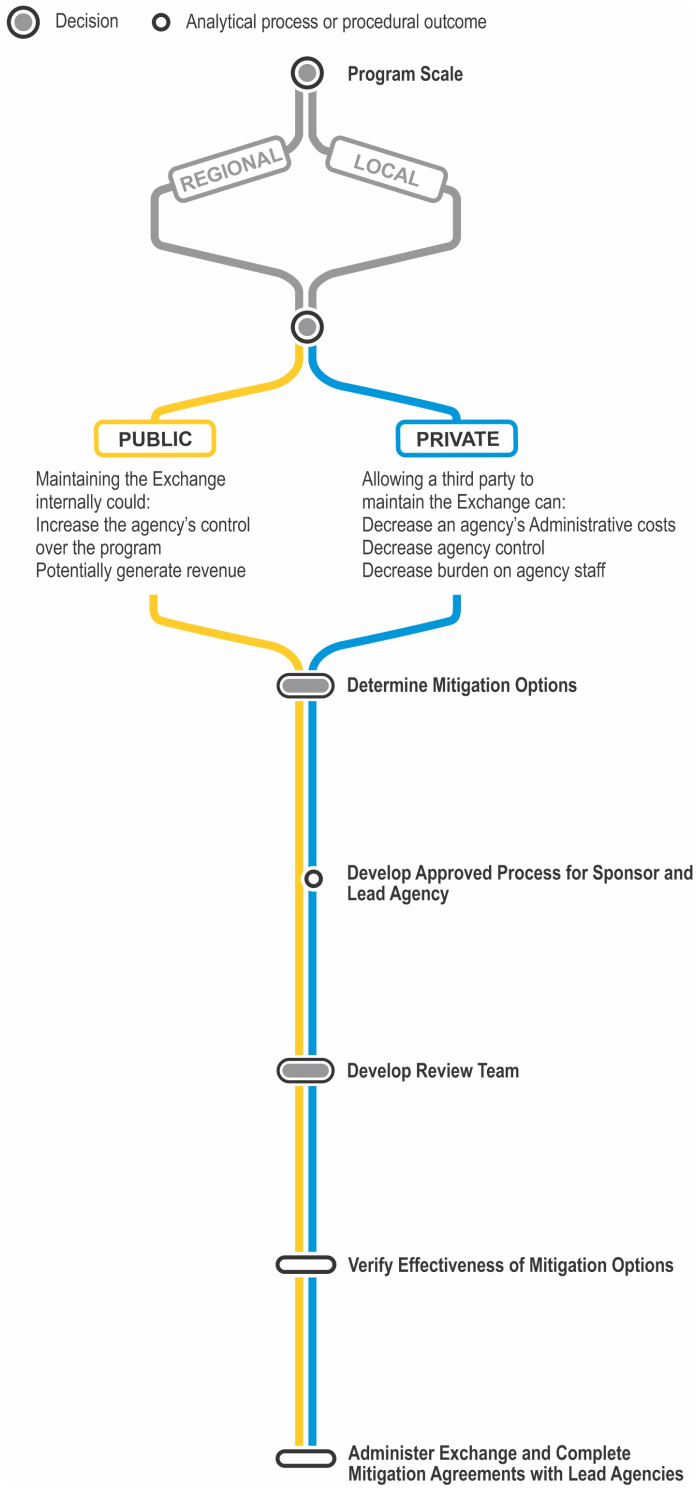
Most of the VMT mitigations included in Appendix A are applicable in urban areas. They are less effective in suburban and rural contexts, where TDM strategies may become diluted or are not applicable. Thus, site-specific strategies are more suitable in urban areas, whereas program-level strategies are more suitable for projects in suburban/rural areas. In the latter approach, cumulative contributions for development mitigations can pay for VMT reduction strategies that would not be feasible for the individual projects to implement themselves. Apart from fee programs, program-based mitigation approaches may include mitigation exchanges and mitigation banks. The mitigation exchange concept requires a developer to implement a predetermined project that would reduce VMT in order to propose a new one. On the other hand, the concept of mitigation banks seeks to establish monetary values for VMT reductions so that developers can purchase VMT reduction credits.

As previously stated, VMT impacts are more regional in nature. Hence, there might be requirements for mitigations outside the control of the lead agency, and without consent from the agency controlling the mitigations, the impacts might remain significant and unavoidable. Additionally, identification of regional improvements where projects can contribute their fair share to mitigate impacts might prove to be difficult. Therefore, LSA recommends local agencies working collaboratively within their regions to ultimately establish fee programs, mitigation banks, and exchanges as the most efficient way to establish a regional mitigation pathway where the projects can contribute. Procedural flow charts for VMT banks, exchanges, and impact fees are illustrated at the end of this chapter.

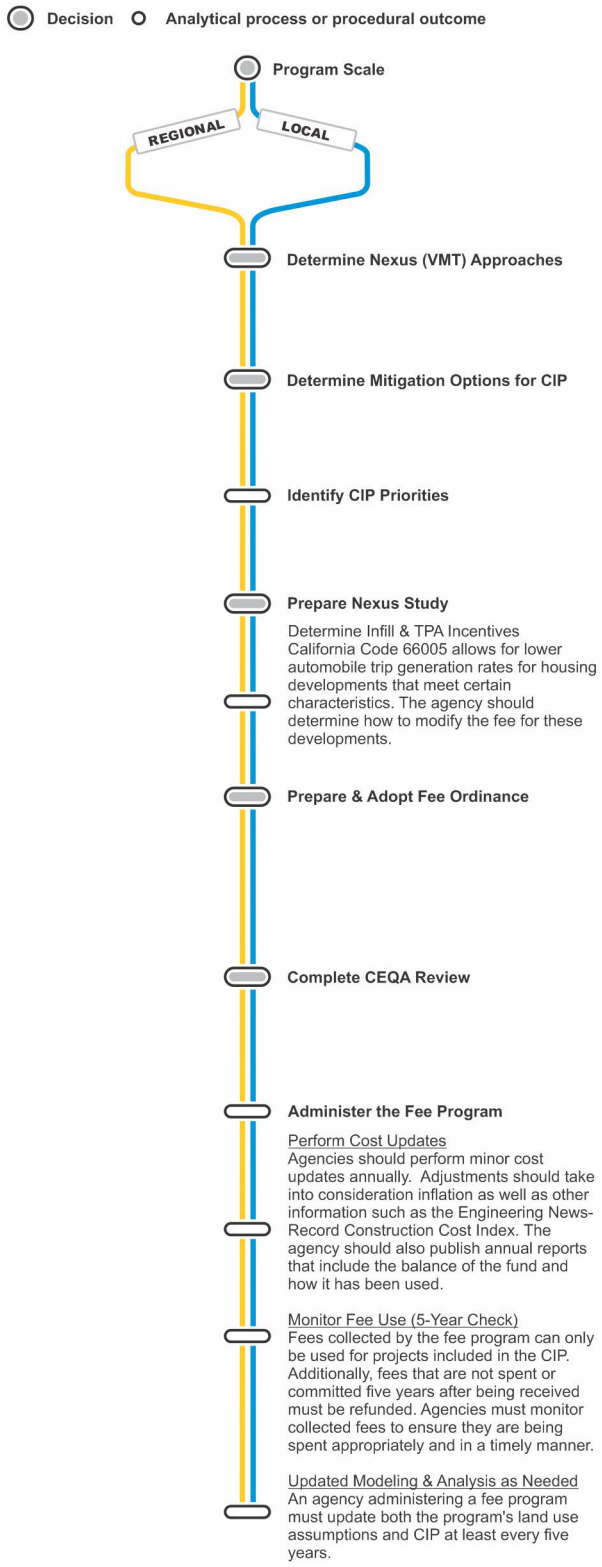
Procedural Flow Chart – VMT Bank



Procedural Flow Chart – VMT Exchange



Procedural Flow Chart – VMT Impact Fee



APPENDIX A

CARB AND LOCAL JURISDICTION VEHICLE MILES TRAVELED MITIGATION MEASURES FOR LAND DEVELOPMENT PROJECTS

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#	Mitigation Measure	VMT Reduction[1]	CAPCOA[2]	OPR TA[3]	Los Angeles Metro[4]	City of San Jose[5]	City of Los Angeles[6]	San Diego Region[7]	Notes
1	Improve or increase access to transit	CAPCOA TST-2: Not quantified alone, grouped strategy with TST-3 'Expand transit network' and TST-4 'Increase transit service frequency/speed'; CAPCOA LUT-5: 0.5% - 24.6%	Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST-2: Implement Transit Access Improvements (applicable in urban and suburban context, and appropriate for residential, retail, office, mixed use, and industrial projects); CAPCOA LUT-5: Increase Transit Accessibility [May be grouped with CAPCOA measures LUT-3 (mixed use development), SDT-2 (traffic calmed streets with good connectivity), and PPT-1 through PPT-7 (parking management strategies); measures are applicable in urban and suburban contexts; appropriate in rural context if development site is adjacent to a commuter rail station with convenient rail service to a major employment center; appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Increase transit accessibility to improve last-mile transit connections; Improve network connectivity/design to make destinations and low-carbon travel modes accessible; both applicable for both residential and employment uses]; City of LA [Existing transit mode share (as a percent of total daily trips) (%), Lines within project site improved (<50%, >=50%)]
2	Increase access to common goods and services, such as groceries, schools, and daycare	Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use)): 9% - 30% VMT reduction and CAPCOA LUT-4 (Increase Destination Accessibility): 6.7% - 20% VMT reduction	Y	Y	Y	Y	N	Y	Notes: Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use) - Applicable in urban and suburban context; negligible in rural context (unless the project is a master-planned community; appropriate for mixed-use projects) and CAPCOA LUT-4 (Applicable in urban and suburban context, negligible in rural context, appropriate for residential, retail, office, industrial, and mixed-use projects); City of San Jose [Access to Neighborhood Schools: Applicable for residential uses only]; City of San Jose [Very similar to measure 'Increase diversity of uses' - Applicable for residential and employment uses]
3	Incorporate affordable housing into the project	0.04% - 1.2%	Y	Y	Y	Y	N	Y	Notes: Similar measure is CAPCOA LUT-6 [Integrate Affordable and Below Market Rate Housing] - [Applicable in urban and suburban contexts; negligible impact in a rural context unless transit availability and proximity to jobs/services are existing characteristics; appropriate for residential and mixed-use projects]; City of San Jose [Similar to measure 'Integrate affordable and market rate housing] - Measure is applicable for residential uses only
4	Orient project towards transit, bicycle, and pedestrian facilities	1) 0.25% - 0.5% (0.25% reduction is attributed for a project oriented towards a planned corridor and 0.5% reduction is attributed for a project oriented towards an existing corridor) (as per the Sacramento Metropolitan Air Quality Management District (SMAQMD) *Recommended Guidance for Land Use Emission Reductions*), 2) 0.5% reduction in VMT per 1% increase in transit frequency and per 10% increase in transit ridership (as per the Center for Clean Air Policy (CCAP) *Transportation Emission Guidebook*)	Y	Y	Y	N	N	Y	Notes: CAPCOA LUT-7 [Orient project toward non-auto corridor]; Grouped strategy with LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use) ; there is no sufficient evidence that the measures results in non-negotiable trip reduction unless combined with other measures, including neighborhood design, density and diversity of development, transit accessibility and pedestrian and bicycle network improvements; the measure is applicable for urban or suburban context (may be applicable in a master-planned rural community) and is appropriate for residential, retail, office, industrial, and mixed use projects
5	Provide pedestrian network improvements	0% - 2%	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-1 [applicable in urban, suburban, and rural context; appropriate for residential, retail, office, industrial, and mixed-use projects; reduction benefit only occurs if the project has both pedestrian network improvements on site and connections to the larger off-site network]. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Provide pedestrian network improvements for active transportation: applicable for both residential and employment uses]; City of LA [Included (within project and connecting off-site/within project only)]
6	Incorporate bike lane street design (on-site)	1% increase in share of workers commuting by bicycle (for each additional mile of bike lanes per square mile) (*Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them – Another Look* by Dill and Carr (2003)); 0.075% increase in bicycle commuting with each mile of bikeway per 100,000 residents (*If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities* by Nelson and Allen (1997))	Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-5 [Grouped strategy, benefits of Bike Lane Street Design are small and should be grouped with the LUT-9 (Improve Design of Development) strategy to strengthen street network characteristics and enhance multi-modal environments], the measure is applicable in urban and suburban contexts and is appropriate for residential, retail, office, industrial, and mixed-use projects. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Expand the reach of bike access with investment in infrastructure: applicable for both residential and employment uses]; City of LA [Provide bicycle facility along site (Yes/No)]

7	Expand transit network		0.1% – 8.2%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST-3; Measure applicable in urban and suburban context, maybe applicable in rural context but no literature documentation available, appropriate for specific or general plans. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Increase transit accessibility to improve last-mile transit connections; Improve network connectivity/design to make destinations and low-carbon travel modes accessible; both applicable for both residential and employment uses]; City of LA [Existing transit mode share (as a percent of total daily trips) (%), Lines within project site improved (<50%, >=50%)]
8	Increase transit service frequency/speed		0.02% – 2.5%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TST-4, applicable in urban and suburban context, maybe applicable in rural context but no literature documentation available, appropriate for specific or general plans. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Similar to measure 'Subsidize public transit service upgrades']; City of LA [Reduction in headways (increase in frequency) (%)]
9	Provide a Bus Rapid Transit System		0.02% – 3.2%			Y	Y	Y	N	N	Y	Notes: CAPCOA TST-1 (Applicable in urban and suburban context; negligible in rural context; appropriate for specific or general plans). This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service.'
10	Required project contributions to transportation infrastructure improvement projects		Not Quantified: Grouped strategy (with RPT-2 and TST-1 through 7)			Y	Y	Y	Y	Y	Y	Notes: CAPCOA RPT-3 (Applicable in urban, suburban and rural context; appropriate for residential, retail, office, mixed use, and industrial projects); measure similar to some of the measures discussed above. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service.'
11	Increase destination accessibility		6.7% – 20%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA LUT-4 [Destination accessibility measured in terms of the number of jobs or other attractions reachable within a given travel time, which tends to be the highest at central locations and lowest at peripheral ones; the location of the project also increases the potential for pedestrians to walk and bike to these destinations and therefore reduces VMT; applicable for urban and suburban contexts, negligible impact in a rural context; appropriate for residential, retail, office, industrial, and mixed-use projects]. This can be considered under Technical Advisory Measure 'Improve pedestrian or bicycle networks, or transit service'; City of San Jose [Increase transit availability to improve last-mile transit connections; Improve network connectivity/design to make destinations and low-carbon travel modes accessible; both applicable for both residential and employment uses]; City of LA [Lines within project site improved (<50%, >=50%)]
12	Provide traffic calming measures		0.25% – 1%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-2 [applicable in urban, suburban, and rural contexts; appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Applicable for both residential and employment uses]; City of LA [Streets with traffic calming improvements (%), intersections with traffic calming improvements (%)]
13	Provide bike parking in non-residential projects		0.625% (as per the Center for Clean Air Policy (CCAP) *Transportation Emission Guidebook*)			Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-6 [Bike Parking in Non-Residential projects has minimal impacts as a standalone strategy and should be grouped with the LUT-9 (Improve Design of Development) strategy to encourage bicycling by providing strengthened street network characteristics and bicycle facilities]; the measure is applicable in urban, suburban, and rural contexts; appropriate for retail, office, industrial, and mixed-use projects; City of San Jose [Provide bike parking and end-of-trip facilities such as bike parking, bicycle lockers, showers, and personal lockers (Applicable for both residential and employment uses)]; City of LA [Include bike parking/lockers, showers, & repair station (Y/N)]
14	Provide bike parking with multi-unit residential projects		Not Quantified			Y	Y	Y	Y	Y	Y	Notes: CAPCOA SDT-7 [Grouped Strategy; the benefits of Bike Parking with Multi-Unit Residential Projects have no quantified impacts and should be grouped with the LUT-9 (Improve Design of Development) strategy to encourage bicycling by providing strengthened street network characteristics and bicycle facilities. The measure is applicable in urban, suburban, or rural contexts. It is appropriate for residential projects.]; City of San Jose [Provide bike parking and end-of-trip facilities such as bike parking, bicycle lockers, showers, and personal lockers (Applicable for both residential and employment uses)]; City of LA [Include bike parking/lockers, showers, & repair station (Y/N)]

15	Limit or eliminate parking supply where appropriate alternatives preserve mobility and do not result in impacts to existing land use		5% - 12.5%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA PDT-1 (applicable in urban and suburban context, negligible in rural context, appropriate for residential, retail, office, industrial, and mixed-use projects); reduction can be counted only if spillover parking is controlled (via residential permits and on-street market parking); follow multi-faceted strategy including 1) elimination/reduction of minimum parking requirements, 2) creation of maximum parking requirements, and 3) provision of shared parking; City of San Jose [Decrease project parking supply at the project site to rates lower than the standard parking minimums where allowable in the San Jose Municipal Code (applicable for employment uses)]; City of LA [City code parking provision (spaces), actual parking provision (spaces)]
16	Unbundle parking costs from property costs		2.6% - 13%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA PDT-2 (applicable in urban and suburban context, negligible in rural context, appropriate for residential, retail, office, industrial and mixed-use projects; complimentary strategies include workplace parking pricing); City of San Jose [Unbundle On-Site Parking Costs: Application for Residential Uses Only]; City of LA [Monthly cost for parking ($)]
17	Provide parking cash-out programs		0.6% – 7.7% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-15 [Implement employee parking "cash-out"; the term “cashout” is used to describe the employer providing employees with a choice of forgoing their current subsidized/free parking for a cash payment equivalent to the cost of the parking space to the employer. The measure is applicable in urban and suburban context; it is not applicable in rural context; it is appropriate for retail, office, industrial, and mixed-use projects. Restrictions are applied only if complementary strategies are in place: a) Residential parking permits and market rate public on-street parking to prevent spill over parking; b) Unbundled parking - is not required but provides a market signal to employers to forgo paying for parking spaces and “cash-out” the employee instead. In addition, unbundling parking provides a price with which employers can utilize as a means of establishing “cash-out” prices; City of San Jose [Parking cash-out: Employment uses only]; City of LA [Parking cash-out: Employees eligible (%)]
18	Implement or provide access to a commute reduction program - Voluntary		1.00% - 6.2% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-1: Commute Trip Reduction Program – Voluntary, is a multi-strategy program that encompasses a combination of individual measures described CAPCOA measures TRT-3 through TRT-9. It is presented as a means of preventing double-counting of reductions for individual measures that are included in this strategy. It does so by setting a maximum level of reductions that should be permitted for a combined set of strategies within a voluntary program. The main difference between a voluntary and a required program is: A) Monitoring and reporting is not required B) No established performance standards (i.e. no trip reduction requirements). The measure is applicable in urban and suburban contexts, negligible in a rural context, unless large employers exist and suite of strategies implemented are relevant in rural settings. The measure is appropriate for retail, office, industrial, and mixed-use projects; City of San Jose [Applicable for employment uses only]; City of LA [Employees and residents participating (%)]
19	Implement or provide access to Commute Trip Reduction Program – Required implementation/monitoring		4.2% – 21% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-2 (Commute Trip Reduction Program is a multi-strategy program that encompasses a combination of individual measures from TRT-3 through TRT-9. It is presented as a means of preventing double-counting of reductions for individual measures that are included in this strategy. It does so by setting a maximum level of reduction that should be permitted for a combined set of strategies within a program that is contractually required of the development sponsors and managers and accompanied by a regular performance monitoring and reporting program. Check examples of Tucson, Arizona and South San Francisco, CA from CAPCOA. The measure is applicable in urban and suburban contexts; it is negligible in rural context, unless large employees exist, and suite of strategies implemented are relevant in rural settings; jurisdiction level only); City of San Jose [Employment uses only]; City of LA [Employees participating (%)]
20	Provide ride-sharing program		1% – 15% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-3 [Provide Ride-Sharing Programs: applicable in urban and suburban context; Negligible impact in many rural contexts, but can be effective when a large employer in a rural area draws from a workforce in an urban or suburban area, such as when a major employer moves from an urban location to a rural location; appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Ride share for employment uses only]; City of LA [Measured in terms of employees eligible (%)]
21	Implement car-sharing program		0.4% – 0.7%			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-9 [urban and suburban context, negligible in rural context, and appropriate for residential, retail, office, industrial, and mixed-use projects]; City of San Jose [Applicable for both residential and employment uses]; City of LA [Car share project setting (urban, suburban, all other)]

22	Implement bike-sharing program		Taking evidence from the literature, a 135-300% increase in bicycling (of which roughly 7% are shifting from vehicle travel) results in a negligible impact (around 0.03% VMT reduction)			Y	Y	N	Y	Y	Y	Notes: CAPCOA TRT-12 [This measure has minimal impacts when implemented alone. The strategy's effectiveness is heavily dependent on the location and context. Bike-sharing programs have worked well in densely populated areas (examples in Barcelona, London, Lyon, and Paris) with existing infrastructure for bicycling. Bike sharing programs should be combined with Bike Lane Street Design (SDT-5) and Improve Design of Development (LUT-9). The measure is applicable in urban and suburban-center context only; it is negligible in a rural context; appropriate for residential, retail, office, industrial, and mixed-use projects; City of San Jose [Bike share for employment and residential uses]; City of LA [bike share - within 600 feet of existing bike share station - OR -implementing new bike share station (Y/N)]
23	Provide transit passes		Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; for TRT-4, commute VMT reduction is 0.3% - 20%			Y	Y	Y	Y	Y	Y	Notes: Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; City of San Jose [Implement Subsidized or Discounted Transit Program]; City of LA [Employees and residents eligible (%), amount of transit subsidy per daily passenger (daily equivalent) ($)]
24	Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ride-matching or shuttle services and preferential parking at workplaces		0.3% - 13.4% commute VMT reduction (for CAPCOA TRT-11: Provide Employer-Sponsored Vanpool/Shuttle); 7.2% - 15.8% school VMT reduction (for CAPCOA TRT-10: Implement a School Pool Program)			Y	Y	Y	Y	Y	Y	Notes: Similar to CAPCOA TRT-11 (Provide employer-sponsored vanpool/shuttle) - the measure is applicable for urban, suburban, and rural context, and is appropriate for office, industrial, and mixed-use projects; Similar measure is CAPCOA TRT-10 (Implement a School Pool Program: Applicable for urban, suburban, and rural context and appropriate for residential and mixed-use projects); City of San Jose [School carpool program - residential uses only)]; City of LA [School carpool program - level of implementation (low, medium, high); Employer sponsored vanpool or shuttle (Degree of implementation (low, medium, high), employees eligible (%), employer size (small, medium, large)]
25	Implement a school pool program		7.2% - 15.8% school VMT reduction			Y	Y	N	Y	Y	Y	Notes: CAPCOA TRT-10 [This project will create a ridesharing program for school children. Most school districts provide bussing services to public schools only. SchoolPool helps match parents to transport students to private schools, or to schools where students cannot walk or bike but do not meet the requirements for bussing. The measure is applicable in urban, suburban, and rural context and is appropriate for residential and mixed-use projects.]; City of San Jose [School carpool program - residential uses only)]. This measure can be considered under the Technical Advisory Measure 'Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ridematching services.'; City of LA [School carpool program - level of implementation (low, medium, high)
26	Operate free direct shuttle service		CAPCOA TST-6 (Provide Local Shuttles): Not Quantified; 0.3% - 13.4% commute VMT reduction (for CAPCOA TRT-11: Provide Employer-Sponsored Vanpool/Shuttle)			Y	Y	N	Y	Y	Y	Notes: CAPCOA TST-6 (Provide Local Shuttles - grouped strategy with TST-5 'Provide Bike Parking Near Transit' and TST-4 'Increase Transit Service Frequency/Speed') - Applicable in urban/suburban context; appropriate for large residential, retail, office, mixed use, and industrial projects; solves the "first mile/last mile" problem; CAPCOA TRT-11 (Provide employer-sponsored vanpool/shuttle) - the measure is applicable for urban, suburban, and rural context, and is appropriate for office, industrial, and mixed-use projects. This measure can be considered under the Technical Advisory Measure 'Shifting single occupancy vehicle trips to carpooling or vanpooling, for example providing ridematching services.'; City of San Jose [Employment uses only]; City of LA [Employer sponsored vanpool or shuttle (Degree of implementation (low, medium, high), employees eligible (%), employer size (small, medium, large)]
27	Provide teleworking options		0.07% - 5.5% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-6 [Applicable in urban, rural, and suburban contexts; appropriate for retail, office, industrial, and mixed-use projects]; City of San Jose [Alternative work schedules and telecommute (employment land uses only)]; City of LA [Alternative work schedules and telecommute (employees participating (%), type of program)]
28	Subsidize public transit service upgrades		Not Quantified			Y	Y	N	Y	N	Y	Notes: Similar to CAPCOA TST-2 through TST-4; City of San Jose [Subsidize transit service through contributions to the transit provider to improve transit service to the project (e.g. frequency and number of routes); applicable for both residential and employment uses]. The measure is included under the Technical Advisory Measure 'Provide incentives or subsidies that increase the use of modes other than single-occupancy vehicle.'
29	Implement subsidized or discounted transit program		0.3% – 20% commute VMT			Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-4 [Implement subsidized or discounted transit program (the measure is applicable in urban and suburban context, negligible in a rural context, appropriate for residential, retail, office, industrial, and mixed-use projects); The project will provide subsidized/discounted daily or monthly public transit passes. The project may also provide free transfers between all shuttles and transit to participants. These passes can be partially or wholly subsidized by the employer, school, or development. Many entities use revenue from parking to offset the cost of such a project. The measure is included under the Technical Advisory Measure 'Provide incentives or subsidies that increase the use of modes other than single-occupancy vehicle.'; City of San Jose [Implement Subsidized or Discounted Transit Program]; City of LA [Transit subsidies measured by employees and residents eligible (%), and amount of transit subsidy per passenger (daily equivalent) ($)]

30	Subsidize vanpool		0.3% - 13.4% commute VMT		Y	Y	N	Y	N	Y	Notes: Similar to CAPCOA TRT-11 (Provide Employer-Sponsored Vanpool/Shuttle: applicable in urban, suburban, and rural context; appropriate for office, industrial, and mixed-use projects). The measure is included under the Technical Advisory Measure 'Provide incentives or subsidies that increase the use of modes other than single-occupancy vehicle.'; City of San Jose [Applicable for employment uses only]
31	Providing on-site amenities at places of work, such as priority parking for carpools and vanpools, secure bike parking, and showers and locker rooms		22% increase in bicycle mode share (UK National Travel Survey)/2%-5% reduction in commute vehicle trips (*Transportation Demand Management Encyclopedia*)/0.625% reduction in VMT (*Center for Clean Air Policy (CCAP) Emission Guidebook*)		Y	Y	Y	Y	Y	Y	Notes: CAPCOA TRT-5 [Provide End of Trip Facilities]: End-of-trip facilities have minimal impacts when implemented alone. This strategy's effectiveness in reducing vehicle miles traveled (VMT) depends heavily on the suite of other transit, pedestrian/bicycle, and demand management measures offered. End-of trip facilities should be grouped with Commute Trip Reduction (CTR) Programs (TRT-1: Implement Commute Trip Reduction Program - Voluntary through TRT-2: Implement Commute Trip Reduction Program – Required Implementation/Monitoring) and TRT-3 (Provide Ride-Sharing Programs); City of San Jose [Similar measures include 'Provide bike parking/end of trip bike facilities', 'Implement car sharing programs']; City of LA [Include bike parking/lockers, showers, & repair station (Y/N)]
32	Provide employee transportation coordinators at employment sites		Not Quantified		Y	Y	Y	N	N	Y	Included as part of CAPCOA TRT-1 (Implement Commute Trip Reduction Program - Voluntary)
33	Provide a guaranteed ride home service to users of non-auto modes		Not Quantified		N	Y	Y	N	N	Y	
34	Locate project in an area of the region that already exhibits low VMT		10% - 65%		Y	Y	Y	N	N	Y	Notes: CAPCOA LUT-2 (Applicable in urban and suburban contexts; negligible in rural contexts; appropriate for residential, retail, office, industrial, and mixed-use projects)
35	Increase project/development density		1.5% - 30%		Y	Y	Y	Y	N	Y	Notes: CAPCOA LUT-1 (Applicable in urban and suburban contexts only; negligible in rural context; appropriate for residential, retail, office, industrial, and mixed-use projects); City of San Jose [Applicable for both residential and employment uses]
36	Increase the mix of uses within the project or within the project's surroundings		9% - 30%		Y	Y	Y	Y	N	Y	Notes: CAPCOA LUT-3: Increase Diversity of Urban and Suburban Developments (Mixed Use) [Applicable in urban and suburban context, negligible in rural context, and appropriate for mixed-use projects]; City of San Jose [Applicable for both residential and employment uses]
37	Deploy management strategies (e.g., pricing, vehicle occupancy requirements) on roadways or roadway lanes.		CAPCOA RPT-1: 7.9% - 22%		Y	Y	Y	N	N	N	Notes: Similar CAPCOA measure is RPT-1 (Road Pricing/Management: Implement Area or Cordon Pricing)
38	Price workplace parking		0.1% - 19.7% commute VMT		Y	N	N	Y	Y	N	Notes: CAPCOA TRT-14 [Urban and suburban context; Negligible impact in a rural context; Appropriate for retail, office, industrial, and mixed-use projects; Reductions applied only if complementary strategies are in place: o Residential parking permits and market rate public on-street parking - to prevent spill-over parking o Unbundled parking - is not required but provides a market signal to employers to transfer over the, now explicit, cost of parking to the employees. In addition, unbundling parking provides a price with which employers can utilize as a means of establishing workplace parking prices; City of San Jose [Price On-Site Workplace Parking (for employment uses only)]; City of LA [Daily parking charge ($), Employees subject to priced parking (%)]
39	Locate project near bike path/bike lane		0.625%		Y	N	Y	N	N	N	Notes: CAPCOA LUT-8 (Grouped strategy with 'Increase Destination Accessibility'; the measure is most effective when applied in combination of multiple design elements that encourage this use; strategy should be grouped with 'Increase Destination Accessibility' strategy to increase the opportunities for multi-modal travel; measure is applicable in urban or suburban context, may be applicable in a rural master planned community; appropriate for residential, retail, office, industrial, and mixed-use projects
40	Implement Commute Trip Reduction Marketing		0.8% - 4% commute VMT		Y	N	Y	Y	N	N	Notes: CAPCOA TRT-7 (applicable in urban and suburban context; negligible in rural context; appropriate for residential, retail, office, industrial, and mixed-use projects); City of San Jose [Employment uses only]
41	Education and encouragement - Voluntary travel behavior change program		1% - 6.2% commute VMT		Y	N	N	Y	Y	N	Notes: Similar to CAPCOA TRT-1 (Implement Commute Reduction Program - Voluntary); City of San Jose [For both residential and employment uses]; City of LA [Employees and residents participating (%)]
42	Education and encouragement - Promotions and marketing		0.8% - 4% commute VMT		Y	N	N	Y	Y	N	Notes: Similar to CAPCOA TRT-7 [Implement Commute Reduction Marketing]; City of San Jose [Similar measure might be 'Implement commute trip reduction marketing/educational campaign' (applicable for employment uses)]; City of LA [Employees and residents participating (%)]
43	Implement neighborhood shuttle		Not Quantified		Y	N	N	Y	Y	N	Notes: CAPCOA TST-6 (Provide Local Shuttles - grouped strategy with TST-5 'Provide Bike Parking Near Transit' and TST-4 'Increase Transit Service Frequency/Speed') - Applicable in urban/suburban context; appropriate for large residential, retail, office, mixed use, and industrial projects; solves the "first mile/last mile" problem; City of San Jose [Similar measure: 'Operate a free direct shuttle service' (applicable for employment uses only)]; City of LA [Degree of Implementation (low/medium/high), employees and residents eligible (%)]

44	Implement market price public parking (On-street)		2.8% – 5.5%		Y	N	Y	N	N	N	CAPCOA PDT-3 (applicable in urban and suburban context; negligible in rural context; appropriate for retail, office, and mixed-use projects; applicable in a specific or general plan context only, reduction can be counted only if spillover parking is controlled (via residential permits); studies conducted in downtown areas, and thus should be applied carefully if project is not in a central business/activity center
45	Implement area or cordon pricing		7.9%- 22%		Y	N	N	N	N	N	Notes: CAPCOA RPT-1; Applicable in Central Business District or urban center only
46	Create urban non-motorized zones		0.01% – 0.2% annual VMT reduction		Y	N	Y	N	N	N	Notes: CAPCOA SDT-4 [The project, if located in a CBD or major activity center, will convert a percentage of its roadway miles to transit malls, linear parks, or other nonmotorized zones. These features encourage non-motorized travel and thus a reduction in VMT. This measure is most effective when applied with multiple design elements that encourage this use. The benefits of Urban Non-Motorized Zones alone have not been shown to be significant. (considered grouped strategy with SDT-1 (provide pedestrian network improvements); this is applicable in urban context only and appropriate for residential, retail, office, industrial, and mixed-use projects]
47	Provide bike parking near transit		Not Quantified		Y	N	N	N	N	N	Notes: CAPCOA TST-5 (should be implemented with other two measures as mentioned to encourage multi-modal use in the area and provide ease of access to nearby transit for bicyclists (measure applicable in urban and suburban context; appropriate for residential, retail, office, mixed use, and industrial projects); Grouped strategy (with measures TST-3 'Expand transit network' and TST-4 'Increase transit service frequency/speed')
48	Dedicated land for bike trails		Not Quantified		Y	N	N	N	N	N	Notes: CAPCOA SDT-9 [Larger projects may be required to provide for, contribute to, or dedicate land for the provision of off-site bicycle trails linking the project to designated bicycle commuting routes in accordance with an adopted citywide or countywide bikeway plan. The benefits of Land Dedication for Bike Trails have not been quantified and should be grouped with the LUT-9 (Improve Design of Development) strategy to strengthen street network characteristics and improve connectivity to off-site bicycle networks. The measure is applicable in urban, suburban, or rural contexts and is appropriate for large residential, retail, office, mixed use, and industrial projects.]
49	Implement school bus program		38% - 63% school VMT reduction		Y	N	N	N	N	N	Notes: CAPCOA TRT-13 [Applicable in urban, suburban, and rural context; appropriate for residential and mixed-use projects]

Notes:

VMT = Vehicle Miles Traveled; CAPCOA = California Air Pollution Control Officers Association; OPR = Office of Planning and Research; TA = Technical Advisory; HOV = High Occupancy Vehicle; HOT = High Occupancy Toll; ITS = Intelligent Transportation System

CAPCOA Transportation Mitigation Categories (LU = Land Use/Location, SD = Neighborhood/Site Enhancements, PD = Parking Policy/Pricing, TR = Commute Trip Reduction Programs, TS = Transit System Improvements, RP = Road Pricing/Management; V = Vehicles)

[1] VMT reduction numbers obtained from *Quantifying Greenhouse Gas Mitigation Measures* published by the California Air Pollution Control Officers Association in August 2010.

[2] *Quantifying Greenhouse Gas Mitigation Measures* published by the California Air Pollution Control Officers Association in August 2010.

[3] *Technical Advisory on Evaluating Transportation Impacts in CEQA* published by the Governor's Office of Planning and Research State of California in December 2018.

[4] *Analysis of VMT Mitigation Measures Pursuant to SB 743* prepared by Iteris, Inc. in February 2018.

[5] *City of San Jose Transportation Analysis Handbook* (dated April 2018).

[6] *City of Los Angeles VMT Calculator Version 1.2*

[7] *Guidelines for Transportation Impact Studies in the San Diego Region* developed by San Diego Section of the Institute of Transportation Engineers (ITE) and the San Diego Traffic Engineers Council (SANTEC) in January 2019.

Links:

1) VMT Calculator (City of LA): https://ladot.lacity.org/what-we-do/planning-development-review/transportation-planning-policy/modernizing-transportation-analysis

Notes:

1) For City of Los Angeles, TDM strategies for VMT reduction are broadly classified into the following categories: 1) Parking, 2) Transit, 3) Education & Management, 4) Commute Trip Reductions, 5) Shared Mobility, 6) Bicycle Infrastructure, and 7) Neighborhood Enhancement

2) For City of San Jose, TDM strategies for VMT reduction are broadly classified into the following tiers: 1) Project Characteristics, 2) Multimodal Network Improvements, 3) Parking, and 4) Programmatic Transportation Demand Management

APPENDIX B

VEHICLE MILES TRAVELED MITIGATION MEASURES FOR LAND DEVELOPMENT PROJECTS FROM ACADEMIC RESEARCH

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#	Mitigation Measure[1]	VMT Reduction[2]	Notes
1	Improve or increase access to transit	1.3% - 5.8%	Variable: Various factors associated with proximity to transit stop (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
2	Land Use Mix	Elasticity: 0.02 - 0.10	Variable: Entropy - variety and balance of land-use types within a neighborhood
3	Regional Accessibility	Elasticity: 0.05 - 0.25	Variable: Various factors associated with job accessibility and distance to CBD (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
4	Job-Housing Balance	Elasticity: 0.06 - 0.31 for commute VMT	Variable: Various factors associated with job accessibility (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
5	Provide Pedestrian Network Improvements	Elasticity: 0.00 - 0.02 for sidewalk length, 0.19 for Pedestrian Environment Factor	
6	Provide Bicycling Network Improvements	No effect on VMT	
7	Implement Transit Improvements	No effect on VMT	
8	Voluntary Travel Behavior Change (VTBC) Program	5% - 12%	
9	Implement Employer-Based Trip Reduction (EBTR) Program	1.33% - 6% of commute VMT	
10	Provide telecommuting options	Home-based telecommuting: 48.1% for household VMT, 66.5% - 76.6% for all personal VMT, and 90.3% for commute VMT only; Center-based telecommuting: 53.7% - 64.8% for all personal VMT and 62% - 77.2% for commute VMT only	
11	Increase Project/Development Density	Elasticity: <=0.07 - 0.19	Variable: residential density
12	Improve network connectivity and/or increase intersection density on the project site	Elasticity: -0.46 - 0.59	Variable: Various factors associated with intersection or street density (please refer to *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
13	Implement Road Pricing	10% - 14.6%	Variable: Different road prices in various parts of the US (please refer to How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.)
14	Implement Parking Cash-out Programs or Workplace Parking Pricing	12% of commute VMT (parking cashout); 2.3% - 2.9% for $3 per day workplace parking price; 2.8% for price increase equivalent to 60% hourly value of commuter travel time cost	

Notes:

VMT = Vehicle Miles Traveled

[1] All mitigation measures have been obtained from *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.).

[2] All VMT reduction numbers have been obtained from *How do Local Actions Affect CMT? A Critical Review of the Empirical Evidence* (Salon, D., Boarnet, M.G., Handy, S., Spears, S., and Tal, G.).

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APPENDIX C

VEHICLE MILES TRAVELED MITIGATION MEASURES FOR COMMUNITY PLANS AND GENERAL PLANS

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#	Mitigation Measure[1]	VMT Reduction
1	Modify land use plan to increase development in areas with low VMT/capita characteristics and/or decrease development in areas with high VMT/capita characteristics	Not quantified in CAPCOA
2	Provide enhanced bicycle and/or pedestrian facilities	0% - 2% (for pedestrian network improvements); Multiple measures for bike facilities, refer to Table A for VMT reduction percentages
3	Add roadways to the street network if those roadways would provide shorter travel paths for existing and/or future trips	Not quantified in CAPCOA
4	Improve or increase access to transit	CAPCOA TST-2 (Implement transit access improvements): Not quantified alone, grouped strategy with TST-3 (Expand transit network) and TST-4 (Increase transit service frequency/speed); CAPCOA LUT-5 (Increase transit accessibility): 0.5% - 24.6%
5	Increase access to common goods and services, such as groceries, schools, and daycare	Similar to CAPCOA LUT-3 (Increase Diversity of Urban and Suburban Developments (Mixed Use)): 9% - 30% VMT reduction and CAPCOA LUT-4 (Increase Destination Accessibility): 6.7% - 20% VMT reduction
6	Incorporate a neighborhood electric vehicle network	#REF!
7	Provide traffic calming	0.25% – 1%
8	Limit or eliminate parking supply	5% - 12.5%
9	Unbundle parking costs	2.6% - 13%
10	Provide parking or roadway pricing or cash-out programs	0.10% - 19.70% commute VMT (for pricing workplace parking); 7.9% - 22% (for CAPCOA RPT-1 (Road Pricing/Management: Implement Area or Cordon Pricing)); 0.6% – 7.7% commute VMT (for cash-out programs)
11	Implement or provide access to a commute reduction program	4.2% – 21% commute VMT 0% – 3.2% VMT reduction (for commute reduction programs with required implementation/monitoring)
12	Provide car-sharing, bike sharing, and ride-sharing programs	0.4% - 0.7% VMT reduction (for car sharing); 1% - 15% commute VMT reduction (for ride-sharing); a 135% - 300% increase in biking (of which roughly 7% are shifting from vehicle travel) results in a negligible impact (around 0.03% VMT reduction)
13	Provide partially or fully subsidized transit passes	Similar to CAPCOA TRT-4 [Implement Subsidized or Discounted Transit Program]; for TRT-4, commute VMT reduction is 0.3% - 20%
14	Shift single occupancy vehicle trips to carpooling or vanpooling by providing ride-matching services or shuttle services	0.3% - 13.4% commute VMT reduction (for CAPCOA TRT-11: (Provide Employer-Sponsored Vanpool/Shuttle)); Grouped strategy (for CAPCOA TST-6 (Provide Local Shuttles))
15	Provide telework options	0.07% - 5.5% commute VMT
16	Provide incentives or subsidies that increase the use of modes other than a single-occupancy vehicle	0.3% - 13.4% commute VMT reduction (for CAPCOA TRT-11: (Provide Employer-Sponsored Vanpool/Shuttle)); Grouped strategy (for CAPCOA TST-6 (Provide Local Shuttles)); 0.3% - 20% commute VMT reduction (for CAPCOA TRT-4 (Implement Subsidized or Discounted Transit Program))
17	Provide employee transportation coordinators at employment sites	Not quantified in CAPCOA
18	Provide a guaranteed ride home service to users of non-auto modes	Not quantified in CAPCOA

Notes:

VMT = Vehicle Miles Traveled; CAPCOA = California Air Pollution Control Officers Association

CAPCOA Transportation Mitigation Categories (LU = Land Use/Location, SD = Neighborhood/Site Enhancements, PD = Parking Policy/Pricing, TR = Commute Trip Reduction Programs, TS = Transit System Improvements, RP = Road Pricing/Management; V = Vehicles)

[1] All mitigation measures have been obtained from the *Guidelines for Transportation Impact Studies in the San Diego Region* developed by San Diego Section of the Institute of Transportation Engineers (ITE) and the San Diego Traffic Engineers Council (SANTEC) in January 2019.

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