City of Long Beach

Traffic Impact Analysis Guidelines

June 2020

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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).

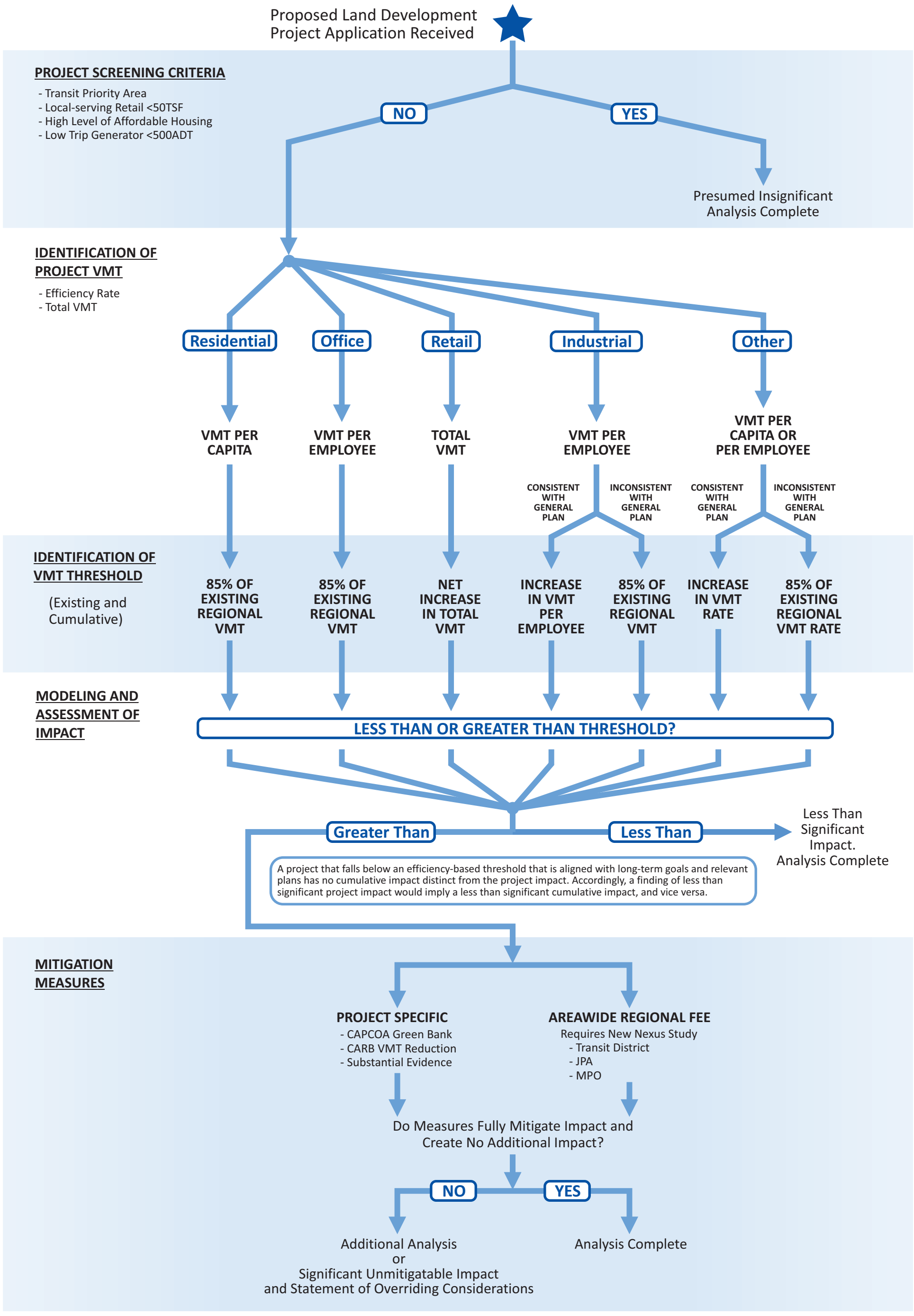

FIGURE 1

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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.

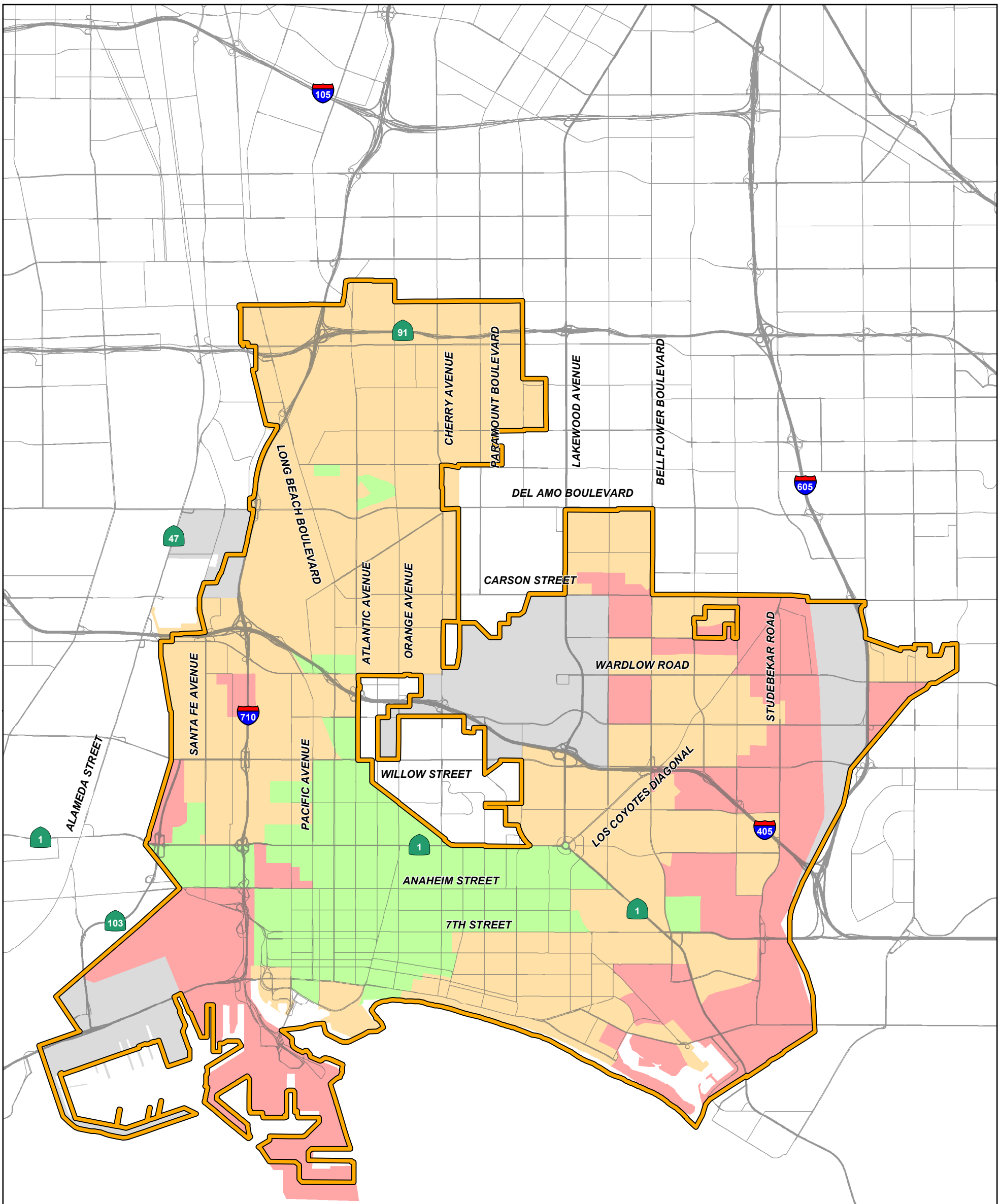

FIGURE 2

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

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

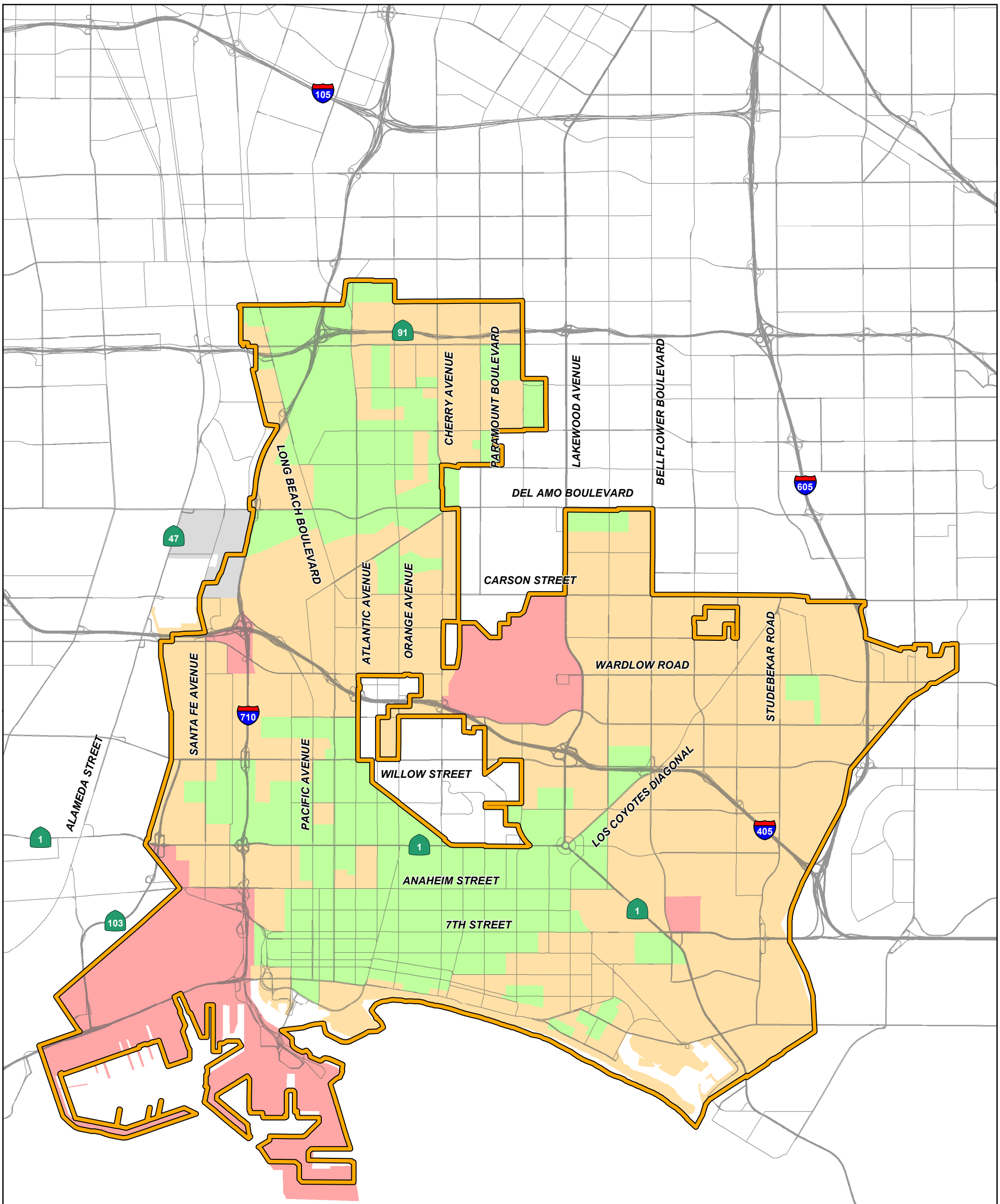

FIGURE 3

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

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

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Traffic Impact Analysis Guidelines

Existing VMT per Employee Compared to Regional Average

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

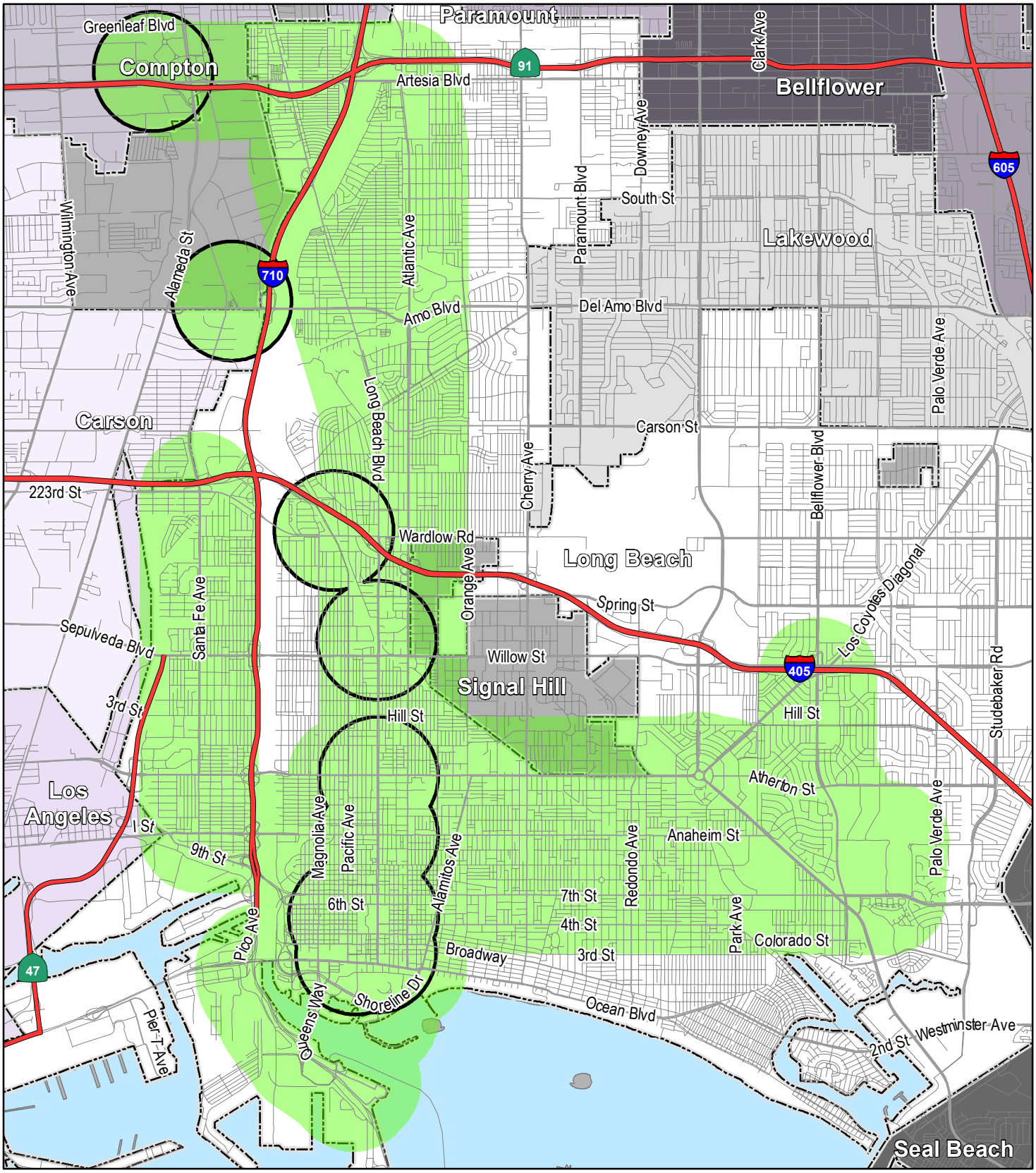
CEQA Guidelines Section 15064.3, Subsection (b), states that "generally, [land use] projects within one-half mile of either an existing major transit stop or an existing high quality transit corridor should be presumed to cause a less than significant transportation impact." The OPR *Technical Advisory 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

FIGURE 4

Half mile from High Quality Transit Corridor or Major Transit Stop

Half mile from Major Transit Stop

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