City of Temple City
Transportation Study Guidelines for Vehicle Miles Traveled and Level of Service Assessment

November 2024

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Introduction

These guidelines describe the transportation analysis requirements for land development, roadway projects, and specific plans in the City of Temple City. Guidelines are provided for evaluating a project's environmental transportation impacts and effects on the local transportation system.

The purpose of these guidelines is to provide guidance on how to prepare transportation studies in the City of Temple City in conformance with all applicable City and State regulations with more of a focus on localized traffic impacts.

Background Information

Senate Bill 743 (SB 743), signed by the Governor in 2013, has changed the way transportation impacts are identified. Specifically, the legislation directed the Office of Planning and Research (OPR) to look at different metrics for identifying transportation impacts under the California Environmental Quality Act (CEQA). The Final OPR guidelines were released in December 2018 and identified Vehicle Miles Traveled (VMT) as the preferred metric moving forward. The Natural Resources Agency completed the rule making process to modify the CEQA guidelines in December of 2018. The CEQA Guidelines identified that all lead agencies must use VMT as the new transportation metric for identifying transportation impacts for land use and transportation projects beginning in July 2020.

In anticipation of the change to VMT, the San Gabriel Valley Council of Governments (SGVCOG) undertook the SGVCOG SB 743 Implementation Study to assist with answering important implementation questions about the methodology, thresholds, and mitigation approaches for VMT impact analysis in its member agencies. The study included the following main components.

- *Analysis Methodologies Memorandum* – Identification of potential thresholds that can be considered when establishing thresholds of significance for VMT assessment and recommendations of analysis methodologies for VMT impact screening and analysis
- *Mitigation Memorandum* – Types of mitigation that can be considered for VMT impacts
- *VMT Assessment Tool* – A web-based tool that can be used for VMT screening and mitigation recommendations

The City of Temple City utilized the information produced through the Implementation Study to adopt a methodology and significance thresholds for use in CEQA compliance. As noted in CEQA Guidelines Section 15064.7(b) below, lead agencies are encouraged to formally adopt significance thresholds as a key part of the SB 743 implementation process.

> *(b) Each public agency is encouraged to develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects. Thresholds of significance to be adopted for general use as part of the lead agency's environmental review process must be adopted by ordinance, resolution, rule, or regulation, and developed through a public review process and be supported by substantial evidence. Lead agencies may also use thresholds on a case-by-case basis as provided in Section 15064(b)(2).*

The City adopted these guidelines in October 2020. Since that time, the Southern California Association of Governments (SCAG) has updated their regional travel demand model. In addition to updated socioeconomic data and transportation network assumptions, the model has changed formats from a "trip-based" to a "tour-based" (also known as an activity-based) model. As such, the City has reviewed these guidelines and updated its adopted thresholds of significance.

The City has produced these Transportation Study (TS) Guidelines to outline the specific steps for complying with the CEQA expectations for VMT analysis and the City's applicable non-CEQA c development standards and policies related to Level of Service (LOS).

It should be noted that CEQA requirements may change as the CEQA Guidelines are periodically updated and/or legal opinions are rendered that change how transportation impact analyses should be completed. As such, the City will continually review these guidelines for applicability and consultants should contact the City to ensure the most recent guidelines for project impact assessment are applied.

CEQA Changes

A key element of SB 743 is the elimination of auto delay, LOS, and other similar measures of vehicular capacity or traffic congestion as a basis for determining significant environmental impacts. This change is intended to assist in balancing the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of greenhouse gas emissions.

SB 743 includes amendments to current congestion management law that allows cities and counties to opt-out of the LOS standards that would otherwise apply in areas where Congestion Management Plans (CMPs) are still used. On July 16, 2019, the Los Angeles County Board of Supervisors voted to opt-out of the CMP.

In December 2018, OPR released their final recommended CEQA guidelines based on feedback from the public, public agencies, organizations, and individuals. OPR recommended VMT as the most appropriate measure of project transportation impacts for land use projects and land use plans. For transportation projects, lead agencies may select their own preferred metric but must support their decision with substantial evidence that complies with CEQA expectations. SB 743 does not prevent a city or county from continuing to analyze delay or LOS outside of CEQA review for other transportation planning or analysis purposes (i.e., general plans, impact fee programs, corridor studies, congestion mitigation, or ongoing network monitoring).

Level of Service Policy

While CEQA requirements have changed and LOS no longer constitutes CEQA impacts, LOS may still be used for planning and analysis purposes. The City retained vehicle LOS standards for the local roadway network. The LOS standards apply to discretionary approvals of new land use and transportation projects. Therefore, these TS guidelines also provide instructions for vehicle LOS analysis consistent with City requirements.

Transportation Study Guidelines

The following TS Guidelines provide requirements for preparing a TS for new development, land use or zoning amendments, new/updated general/specific plans or other land use plans, and transportation improvements pursuant to both State law and the local permitting process.

Prior to SB 743, the CEQA transportation impact analysis aligned with general plan mobility element policies, such as minimum level of service (LOS) requirements. Most cities relied on the CEQA transportation impact analysis to identify both CEQA mitigation measures and Project conditions of approval, including new roadways, intersection improvements, and/or signal improvements. The City, like most other SGVCOG cities, wishes to retain LOS analysis, but because LOS is no longer considered as an environmental affect, these guidelines have been structured to provide two distinct sections – CEQA and non-CEQA. LOS remains important for the safe and efficient movement of people and goods through the City, but this assessment should not be incorporated into CEQA documents because it can no longer be considered an environmental effect by decisionmakers, and could thereby cause confusion.

Accordingly, these guidelines are split into two distinct sections: CEQA and Non-CEQA.

The purpose of these TS guidelines is to provide general instructions for analyzing the potential transportation impacts of proposed development projects. These guidelines present the recommended format and methodology that should generally be utilized in the preparation of a TS.

Application of Guidelines

An applicant seeking project approval will submit the proposed project to the City with a planning and land use application. After a preliminary review of the project by City Staff, the applicant will be notified by the project planner if a TS is required. The TS should summarize the evaluation of project-related changes in both LOS and VMT.

A TS which includes LOS analysis shall be required for a proposed project that is anticipated to generate more than 100 total trips in the AM and/or PM peak hour, or the project is anticipated to add 50 trips to a single intersection during the AM and/or PM peak hour. Analysis of roadway segments around the project site may also be required. To determine if the findings of a project can be met, a *traffic study may be required for smaller projects based on the type, size and location of the proposed project.*

See Section "Non-CEQA Transportation Assessment" for details on when LOS analysis is required.

Furthermore, all TS's must include a VMT assessment that explains either why the project screens out or provides a full VMT impact analysis. A proposed project may screen out of full VMT analysis if it meets one or more of the following project screening criteria:

- Transit Priority Areas Screening
- Low VMT-generating Areas Screening
- Project Type Screening

See Section, "CEQA Assessment - VMT Analysis" for details on the screening criteria.

Projects may be screened from VMT analysis and require LOS analysis, or vice-versa. Where insufficient information is available to make a preliminary assessment of a project's effect on traffic, the City Engineer shall determine whether a TS will be required.

Guidelines Organization

The remainder of this document is organized to provide guidance on assessment for General Plan Consistency (e.g. Non-CEQA LOS analysis) and CEQA compliance (e.g. VMT analysis), as well as the format for the transportation study.

Transportation Study	
General Plan Transportation Assessment LOS Analysis	**CEQA Transportation Assessment** VMT Analysis Active Transportation and Public Transit Analysis

Non-CEQA Transportation Assessment

Level of Service Analysis Procedure

Traffic analysis should be prepared by, or under the direction of, a registered traffic engineer, registered civil engineer, or qualified transportation planner. To establish a mutually agreeable scope of work for the traffic analysis, the analyst and project applicant shall meet with staff from the Community Development department to identify study area, assumptions, and methodologies of the traffic analysis. All assumptions and methodologies of the LOS analysis are subject to review and approval of the City Traffic Engineer.

A transportation study which includes LOS analysis shall be required for a proposed project that meets any of the following criteria:

- When either the AM or PM peak hour trip generation is expected to exceed 100 vehicle trips from the proposed development
- Projects that will add more than 50 trips during the AM or PM peak hours to any intersection
- Any project where variations from the standards and guidelines provided in this manual are being proposed
- When determined by the City Traffic Engineer that existing or proposed traffic conditions in the project vicinity or a unique project feature or operational aspect warrant evaluation

Traffic Counts

The traffic analysis should not use traffic counts that are more than two years old without approval of the City Traffic Engineer. If traffic counts taken within the last two years are not available, then new traffic counts shall be collected by a qualified data collection firm. Turning movement data at the study intersections should be collected in 15-minute intervals during the hours of 7:00 AM to 9:00 AM. and 4:00 PM to 6:00 PM, unless the City Traffic Engineer specifies other hours (e.g., for a signal warrant determination or weekend analysis). Unless otherwise required, all traffic counts should generally be conducted when local schools or colleges are in session, in typical weather conditions, on Tuesdays, Wednesdays, or Thursdays during non-summer months, and should avoid being taken on weeks with a holiday.

Trip Generation

Trip generation rates from the latest edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE) shall be utilized. Analysis for a proposed project with trip generation rates not provided in the ITE Trip Generation Manual may use rates from other agencies or locally approved studies for specific or unique land uses. Documentation supporting the use of these trip generation rates will be required.

The traffic analysis should include justification for trip generation credits such as existing uses, transit, and internal capture. The pass-by traffic credit should be calculated based upon ITE data or special studies approved by the City.

Trip Distribution and Assignment

Description of trip distribution and assignment for vehicle trips to and from the site along specific roadways that will be utilized by project generated traffic is required. The basic methodology and assumptions used to develop trip distribution and assignments must be clearly stated and approved by the City Traffic Engineer. The basis for trip distribution should be linked to the demographic or market data in the area and should consider the project's location relative to the regional roadway system.

The trip assignment for the project should be based on existing and projected travel patterns and the future roadway network and its travel time characteristics. The trip assignment should incorporate the trip generation of the project minus the appropriate credits.

Traffic Forecasts

The traffic analysis should include the total traffic which is expected to occur at buildout of the proposed project. This means that the analyst preparing the traffic study should include all the cumulative effects of the proposed project. The latest version of the Southern California Association of Governments (SCAG) Travel Demand Model or appropriate sub-area travel demand model should be used to generate future year forecasts. Projects which have been approved, planned, or are under construction in the vicinity of the proposed project should be verified as included in the latest version of the SCAG model or appropriate sub-area model approved by the City Traffic Engineer.

Study Area

In consultation with City staff, intersections and roadway segments within the study area shall be analyzed for effects to intersection operations and roadway capacity. At a minimum, the transportation study should evaluate the following:

- Site access driveways
- Roadways adjacent to the project site
- Intersections in the immediate vicinity of the project site and where the proposed project will add 50 or more peak hour trips
- Selected roadway segments in the vicinity of the project

Analysis Methodologies

The City will use the Intersection Capacity Utilization (ICU) methodology to evaluate the AM and PM peak hour LOS at signalized intersections. The latest version of the Highway Capacity Manual

(HCM) methodology will be used to evaluate the AM and PM peak hour LOS at unsignalized intersections. The peak hour will be identified as the highest one-hour period in both AM and PM counted periods, as determined by four consecutive 15-minute count intervals. The following parameters should be used in determining the LOS at the intersections within the City.

ICU Methodology (signalized intersections)

- A minimum clearance interval of 0.10 of green time
- Lane capacities of 1,800 per hour per lane for through and turn lanes
- Lane capacities of 2,880 per hour for dual turn lanes

HCM Methodology (unsignalized intersections)

- A peak hour factor (PHF) based on observed conditions will be used for the under existing conditions
- A PHF of 0.95 will be used for future conditions

Pedestrian activity should be considered on a case-by-case basis using reductions in saturation flow rates for affected lanes as determined by sound engineering judgement. The HCM is the best source of guidance for assessment of pedestrian influences on flow rates.

Table 1 summarizes the range of values and LOS designations.

Table 1: Level of Service Criteria

LOS	LOS Criteria		Description
	Signalized Intersection (v/c)	Unsignalized Intersection (delay)	
A	≤0.600	≤10.0	EXCELLENT. Operations with very low delay and most vehicles do not stop.
B	>0.600 and ≤0.700	>10.0 and ≤15.0	VERY GOOD. Operations with good progression but with some restricted movements.
C	>0.700 and ≤0.800	>15.0 and ≤25.0	GOOD. Operations where a significant number of vehicles are stopping with some backup and light congestion.
D	>0.800 and ≤0.900	>25.0 and ≤35.0	FAIR. Operations where congestion is noticeable, longer delays occur, and many vehicles stop. The proportion of vehicles not stopping declines.
E	>0.900 and ≤1.000	>35.0 and ≤50.0	POOR. Operations where there is high delay, extensive queueing, and poor progression.
F	>1.000	>50.0	FAILURE. Operations that are unacceptable to most drivers, when the arrival rates exceed the capacity of the intersection.

Source: 2000 Highway Capacity Manual

Roadway Segment Analysis

A roadway segment analysis compares the daily traffic volume along a study roadway segment to the roadway classification and associated design capacity. The results are reflected in a volume to capacity or v/c ratio. The City of Temple City has established daily vehicle capacity thresholds for each functional roadway classification. Daily capacity thresholds represent a v/c of 1.00. Table 2 summarizes the roadway segment vehicle capacity thresholds. Within the City of Temple City, the threshold for acceptable roadway segment conditions is LOS C or better.

Table 2: Roadway Classification Vehicle Capacity Thresholds

Roadway Classification	Roadway Capacity (Average Daily Traffic)
Primary	9,000
Secondary	8,000
Collector	7,500
Local	6,000

Analysis Scenarios

The following identifies the analysis scenarios that should be evaluated for LOS analysis (at the discretion of the City Traffic Engineer).

- **Existing Conditions:**

  Existing traffic conditions: data must have been collected within the past two-years, otherwise new traffic counts shall be conducted.

- **Opening Year:**

  Existing traffic conditions plus ambient growth and traffic from all the development within the study area for which an application has been submitted ("pending projects"), or that have been approved but not yet constructed. There may be multiple opening years if the project is proposed in phases.

- **Opening Year plus Project:**

  Traffic conditions of Opening Year (existing plus ambient growth and approved and pending developments) plus traffic generated by the proposed project.

- **Horizon Year:**

  Horizon (future buildout) traffic analysis is only required for proposed projects that require CEQA impact analyses related to air quality, noise, or energy impacts. If required, this analysis will use City General Plan buildout combined with buildout of the circulation system based on City and SCAG projections. Build-out of City General Plan combined with build-out of circulation system. SCAG Build-out projections should be used for this

purpose. A General Plan build out analysis is generally required for any project that contributes traffic to an intersection projected to have unacceptable LOS, any project that requires a General Plan Amendment or otherwise proposes development that exceeds the land use intensity assumed for the General Plan, and/or at the discretion of the City Engineer.

- **Horizon Year plus Project:**

As stated above, the horizon (future buildout) traffic analysis is only required for proposed projects that require CEQA impact analyses related to air quality, noise, or energy impacts. If required, this analysis would compare the Horizon Year to the Horizon Year plus proposed project.

Projects that are to be constructed in more than one phase will require interim year future analysis to address each phase of the development and its associated traffic effects. The year(s) to be analyzed will coincide with the scheduled phasing and will be approved by the City Engineer or designee.

A table shall be included to show the forecast LOS for each intersection within the defined study area. This summary table shall present LOS for all scenarios evaluated, including improvements.

Transportation Effects

Level of service standards for roadways and intersections in Temple City are classified into three categories to provide a more context-sensitive approach to transportation planning. The objective minimum LOS thresholds are shown in Table 3 and 4. Category C roadway segments and intersections are auto centric and serve single family areas. Therefore, it is expected that they should not experience a great deal of change and should have a minimum acceptable LOS D at intersections and LOS C for roadway segments. Category A streets are areas that the General Plan expects to see a great deal of change, including pedestrian, bicycle, and automobile facility improvements; a vibrant economy; and more people travelling from the region to visit. Since the street will be serving multiple users, the areas are expected to see more economic activity, and the street will be designed in a sustainable manner, these intersections and roadway segments permit LOS F operations.

Table 3: Level of Service Thresholds by Category

Category	Intersections	Roadway Segments
Category A	F	F
Category B	E	D
Category C	D	C

Roadway and intersection facility categories within the City are illustrated in Figure 1.

Figure 1: Intersection Facility Categories

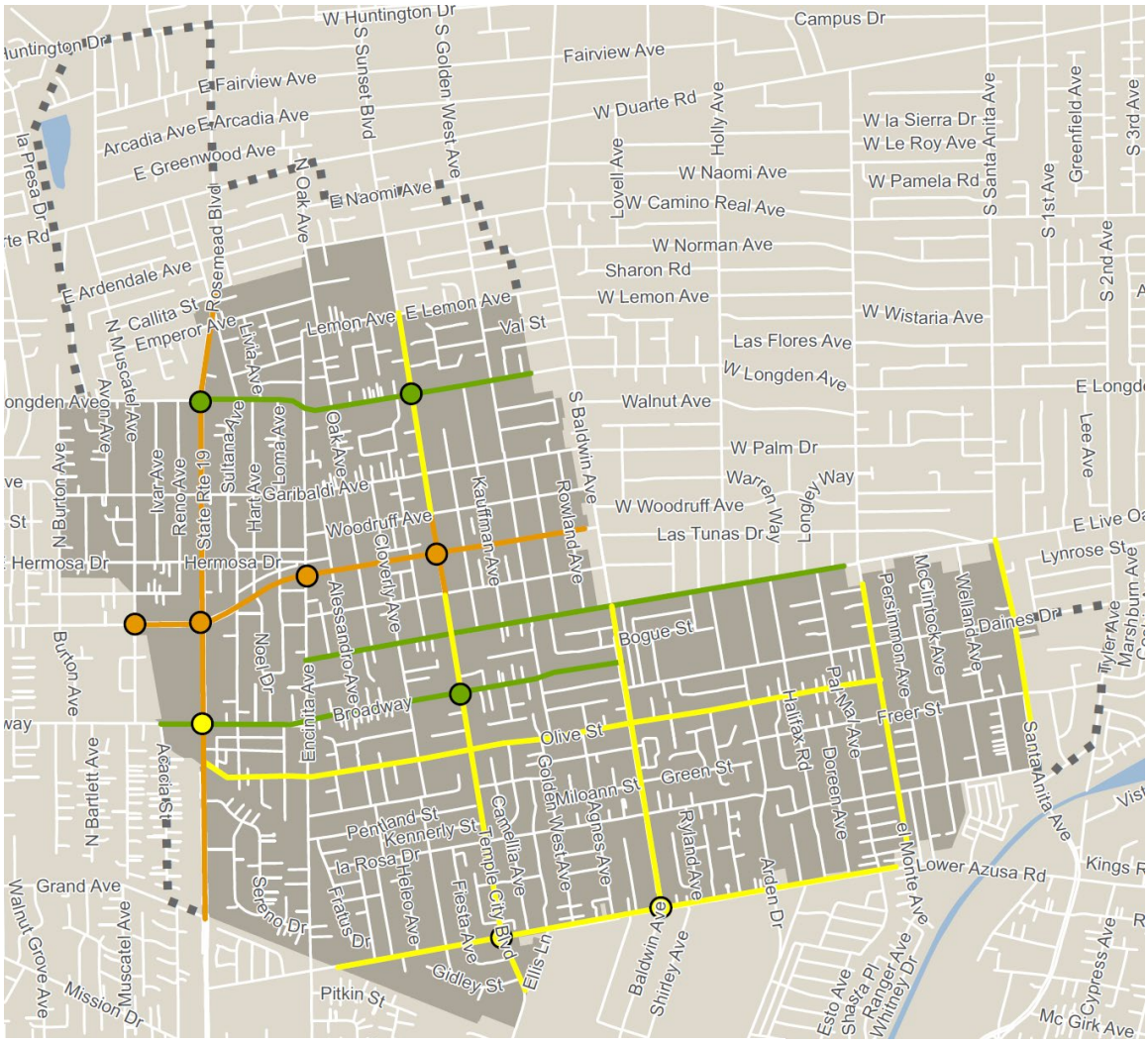


Table 4: Transportation Effect Thresholds by Category

Category	Intersections
Category A	None
Category B	Moderate: LOS degrades to F, or V/C increases by 0.02 or more if already LOS F
Category C	Minimal: LOS degrades to E/F, or V/C increases by 0.02 or more if already E/F

The fair share cost for the proposed improvements in the cumulative condition should also be calculated.

On-Site Parking Analysis

The analysis should address the on-site parking supply versus parking required per City code. If the proposed development is of mixed-use type, a table shall be included presenting each land use, its size and the code parking requirement. This table should clearly indicate how the code parking was calculated and include the proposed on-site parking supply together with the resultant surplus or deficit from code requirements.

Should the on-site parking supply be less than required by the City code, a detailed explanation justifying a reduction to the code requirement must be included. Note that this does not eliminate the need for any zoning code variance. Shared parking evaluations will be considered when appropriate.

Access and Circulation Analysis

The project's effect on access points and on-site circulation shall be analyzed. As appropriate, the analysis shall include the following:

- Number of access points proposed for the project site
- Spacing between driveways and intersections
- Potential signalization of driveways
- On-site stacking distance (Including uses with a drive thru)
- Shared access
- Turn conflicts/restrictions
- Adequate sight distance
- Driveway improvements
- Pedestrian connections
- Any other operational characteristics as identified by City staff

If the proposed project is a residential or commercial use with privacy gates, the applicant shall provide a stacking analysis for review and approval. The adequacy of the interface with the arterial

network will need to be demonstrated and necessary improvements to adjacent intersections may be required.

CEQA Transportation Assessment - VMT Analysis

VMT Analysis Methodology

For purposes of SB 743 compliance, a VMT analysis should be conducted for land use projects as deemed necessary by the City Traffic Engineer and would apply to projects that have the potential to increase the baseline VMT per service population (e.g. population plus employment) for the City. Normalizing VMT per service population (e.g. creating a rate by dividing VMT by service population) provides a transportation efficiency metric that the analysis is based on. All assumptions and methodologies of the VMT analysis are subject to review and approval by the City Traffic Engineer.

A flowchart of the VMT analysis process is attached to these guidelines (see Attachment A, "VMT Analysis Flowchart"). A web-based tool has been prepared to assist with VMT assessment screening and mitigation recommendations. A user guide for use of the web-based tool is attached (see Attachment B, "SGVCOG VMT Assessment Tool Users Guide").

Project Screening

There are three types of screening that may be applied to effectively screen projects from a detailed, project-level assessment. These screening steps are summarized below:

Step 1: Transit Priority Area (TPA) Screening

Projects located within a TPA[1] may be presumed to have a less than significant impact absent substantial evidence to the contrary. This presumption may ***NOT*** be appropriate if the project:

1. Has a Floor Area Ratio (FAR) of less than 0.75;

[1] A TPA is defined as a half mile area around an existing major transit stop or an existing stop along a high-quality transit corridor per the definitions below. Public Resources Code § 21099(a)(7)

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

Pub. Resources Code, § 21155 - For purposes of this section, a 'high-quality transit corridor' means a corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours.

Includes more parking for use by residents, customers, or employees of the project than required by the City. If a project has more parking than is required by code that is intended for design feasibility (such as completing a full floor in an above- or below-grade parking structure), this exception would not apply;

2. Is inconsistent with the applicable Sustainable Communities Strategy (as determined by the lead agency, with input from the Southern California Association of Governments [SCAG]); or
3. Replaces affordable residential units with a smaller number of moderate- or high-income residential units.

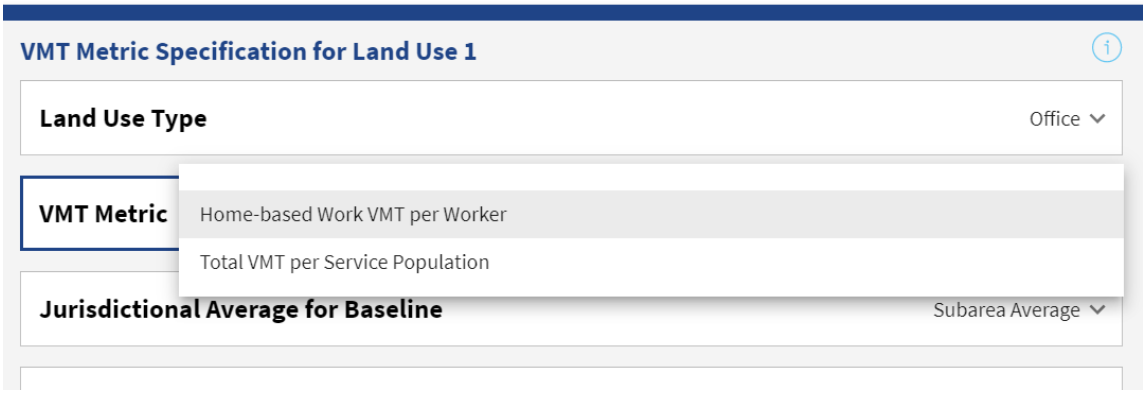
To identify if the project is in a TPA, the analyst may review the TPA map included in the SGVCOG VMT assessment tool. Additionally, the analyst should confirm with all local transit providers that no recent changes in transit service have occurred in the project area (e.g. addition or removal of transit lines, addition or removal of transit stops, or changes to service frequency).

Step 2: Low VMT Area Screening

Residential and office projects located within a low VMT-generating area may be presumed to have a less than significant impact absent substantial evidence to the contrary. In addition, other employment-related and mixed-use land use projects may qualify for the use of screening if the project can reasonably be expected to generate VMT per resident, per worker, or per service population that is similar to the existing land uses in the low VMT area.

For this screening, the SCAG travel forecasting model was used to measure VMT performance for individual traffic analysis zones (TAZs). TAZs are geographic polygons similar to Census block groups used to represent areas of homogenous travel behavior. Total daily VMT per service population was estimated for each TAZ. This presumption may not be appropriate if the project land uses would alter the existing built environment in such a way as to increase the rate or length of vehicle trips. The project applicant should document whether or not any increase to the trip generation rate or length of vehicle trips is expected.

To identify if the project is in a low VMT-generating area, the analyst should use the SGVCOG VMT Evaluation Tool at: https://apps.fehrandpeers.com/SGVCOGVMT/. There are two VMT Metrics for each Land Use Type built into the tool as shown in the figure below that may be used to screen out a project:



To use the tool for a proposed project, the land use type must be either an existing or future land use within the Tier 1 Traffic Analysis Zone (TAZ) for Total VMT per Service Population, or within the Tier 2 TAZ for Home-based VMT per capita or Home-based Work VMT per employee. Additionally, if using the Total VMT per Service Population metric, the analyst must verify that the project is consistent with the existing land use (i.e. if the project is proposing single-family housing, there should be existing single-family housing of approximately the same density) within that TAZ and use professional judgment that there is nothing unique about the project that would otherwise misrepresent utilizing the data from the travel demand model.

Step 3: Project Type Screening

Some project types have been identified as having the presumption of a less than significant impact. The following uses can be presumed to have a less than significant impact absent substantial evidence to the contrary as their uses are local serving in nature:

- Local-serving K-12 schools
- Local parks
- Day care centers
- Local-serving retail uses less than 50,000 square feet, including:
    - Gas stations
    - Banks
    - Restaurants
    - Shopping Center
- Local-serving hotels (e.g. non-destination hotels)
- Local-serving assembly uses (places of worship, community organizations)
- Community institutions (public libraries, fire stations, local government)
- Affordable, supportive, or transitional housing
- Assisted living facilities
- Senior housing (as defined by HUD)

- Local serving community colleges that are consistent with the assumptions noted in the RTP/SCS
- Student housing projects on or adjacent to a college campus
- Other local-serving uses as approved by the City Traffic Engineer
- Projects generating less than 110 daily vehicle trips[2,3]
    - This generally corresponds to the following "typical" development potentials:
        - 11 single family housing units
        - 16 multi-family, condominiums, or townhouse housing units
        - 10,000 sq. ft. of office
        - 15,000 sq. ft. of light industrial[4]
        - 63,000 sq. ft. of warehousing[5]
        - 79,000 sq. ft. of high cube transload and short-term storage warehouse[5]

Local serving retail projects with a total square footage less than 50,000 square feet may be presumed to have a less than significant impact absent substantial evidence to the contrary. Local serving retail generally improves the convenience of shopping close to home and has the effect of reducing vehicle travel. Any project that uses the designation of "local-serving" should be able to demonstrate that its users (employees, customers, visitors) would be existing within the community. The project would not generate new "demand" for the project land uses but would meet the existing demand that would shorten the distance existing residents, employees, customers, or visitors would need to travel.

[2] Note that a redevelopment project replacing an existing use would estimate the net increase in trips above trips that already exists.

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

[4] This number was estimated using rates from ITE's Trip Generation Manual. Some industrial and warehousing tenants may generate traffic differently than what is documented in ITE. In these cases, documentation of the project generating less than 110 daily trips will be required for review and approval by the City Traffic Engineer.

[5] This number was estimated using rates from ITE's Trip Generation Manual. Some industrial and warehousing tenants may generate traffic differently than what is documented in ITE. In these cases, documentation of the project generating less than 110 daily trips will be required for review and approval by the City Traffic Engineer.

Public Parking Lots

Parking provided for public use does not automatically qualify for VMT screening given the potential to change the length and volume of vehicle trips. The intent of this requirement is to avoid the oversupply of parking and induced vehicle travel.

Public parking projects that seek VMT screening should provide substantial evidence that the project does not attract additional vehicle trips or VMT. Substantial evidence for screening public parking projects from VMT analysis should be scoped in consultation with City staff. Applicable parking districts, shared use parking agreements, and the requirements within the City municipal code may be compared to the actual supply of parking spaces as a component of the supporting evidence.

VMT Assessment for Non-Screened Development

Projects not screened through the steps above should complete VMT analysis and forecasting through the SCAG model or appropriate sub-area model to determine if the project has a significant VMT impact. This analysis should include 'project generated VMT' for the project TAZ (or TAZs) and 'project effect on VMT' estimates under the scenarios below. Project generated VMT shall include the VMT generated by the site compared to the CEQA threshold of significance. The project effect on VMT is the link based VMT for a geographic region which is more appropriate to review to evaluate how developments may change travel behavior in the region.

- **Baseline conditions:**

  This data is available from the SCAG model or appropriate sub-area model approved by the City Traffic Engineer. This data is also available in the SGVCOG VMT Assessment Tool. Baseline conditions typically represent the year of the Notice of Preparation (NOP). Interpolation between the base and future year model will be required to identify the VMT representative of the baseline year.

- **Baseline plus Project:**

  The project land use would be added to the project TAZ or a separate TAZ would be created to contain the project land uses. A full base year model run would be performed and VMT changes would be isolated for the project TAZ and across the full model network. The model output must include reasonableness checks of the production and attraction balancing to ensure the project effect is accurately captured. These reasonableness checks are subject to City Traffic Engineer's review. If this scenario results in a less-than-significant impact, then additional cumulative scenario analysis may not be required (more information about this outcome can be found in the Thresholds Evaluation discussion later in this chapter). The SGVCOG VMT assessment tool provides an estimate of the Baseline plus project conditions. This data could be presented in lieu of

results from the full model run. However, it is recommended that a base year plus project run always be performed as a check for reasonableness and consistency with the cumulative year results.

- **Cumulative no Project:**

This data is available from the SCAG model or appropriate sub-area model approved by the City Traffic Engineer.

- **Cumulative plus project:**

The project land use would either be added to the project TAZ or a separate TAZ would be created to contain the project land uses. The addition of project land uses should be accompanied by a reallocation of a similar amount of land use from other TAZs; especially if the proposed project is significant in size such that it would change other future developments. Land use projects are often represented in the assumed growth of the cumulative year population and employment. It may be appropriate to remove land use growth that represents a project from the cumulative year model to represent the cumulative no project scenario. If project land uses are simply added to the cumulative no project scenario, then the analysis should reflect this limitation in the methodology and acknowledge that the analysis may overestimate the project's effect on VMT.

The model output should include total VMT, which includes all vehicle trips and trip purposes, and VMT per service population. Total VMT (by speed bin) is needed as an input for air quality, greenhouse gas (GHG), and energy impact analysis while total VMT per service population is recommended for transportation impact analysis[6].

The baseline and cumulative "plus project" scenarios noted above will summarize project generated VMT per service population and comparing it back to the appropriate benchmark noted in the thresholds of significance. The cumulative "plus project" scenario noted above will summarize the project effect on VMT, comparing how the project changes VMT on the network looking at citywide VMT per service population comparing it to the no project condition.

Project-generated VMT shall be extracted from the travel demand forecasting model using the origin-destination trip matrix and shall multiply that matrix by the final assignment skims. The project-effect on VMT shall be estimated using an appropriate boundary as approved by the City Traffic Engineer and extracting the total link-level VMT for both the no project and with project condition. The TAZ identification numbers within the study area shall be included in the report.

[6] The City has selected VMT per service population for its impact threshold. However, the City will allow for use of VMT to be isolated by trip purpose with review and approval of the City Traffic Engineer.

A detailed description of this process is attached to these guidelines. See Attachment C, "Detailed VMT Forecasting Information".

CEQA VMT Impact Thresholds

VMT Impacts

VMT thresholds provided below are to be applied to determine potential project generated VMT impacts and a project's effect on VMT impacts.

A project would result in a significant project generated VMT impact if either of the following conditions are satisfied:

1. The baseline project generated VMT per employee or per capita exceeds 15% below the applicable baseline VMT (pursuant to the adopted resolution contained in Attachment E), or
2. The cumulative project generated VMT exceeds 15% below the applicable baseline VMT (pursuant to the adopted resolution contained in Attachment E).

The project's effect on VMT would be considered significant if it resulted in the following condition being satisfied:

1. The cumulative link-level boundary Citywide VMT per service population increases under the plus project condition compared to the no project condition.

Please note that the cumulative no project shall reflect the adopted RTP/SCS; as such, if a project is consistent with the SCAG RTP/SCS, then the cumulative impacts (project effect on VMT) shall be considered less than significant subject to consideration of other substantial evidence.

VMT Mitigation Measures

The following mitigation measures are available to reduce VMT impacts:

1. Modify the project's-built environment characteristics to reduce VMT generated by the project.
2. Implement transportation Demand Management (TDM) measures to reduce VMT generated by the project.
3. Participate in a VMT fee program and/or VMT mitigation exchange/banking program (if available) to reduce VMT from the project or other land uses to achieve acceptable levels.

As part of the Implementation Study, key TDM measures that are appropriate to the region were identified. Following the City's implementation of VMT thresholds, CAPCOA released updated technical guidance which changed the effectiveness and calculation methods for TDM measures.

Measures appropriate for most of the City and changes to the CAPCOA guidance are provided in Attachment E, "VMT Reduction Strategies and CAPCOA Updates".

VMT reductions should be evaluated as part of the VMT impact analysis using state-of-the-practice methodologies recognizing that many of the TDM strategies are dependent on building tenant performance over time. As such, actual VMT reduction cannot be reliably predicted and monitoring may be necessary to gauge performance related to mitigation expectations.

When a Project is found to have a significant impact under CEQA, the City requires developers and the business community to assist in reducing peak hour and total vehicular trips by implementing Transportation Demand Management Plans (TDMs). The potential of a proposed project to reduce VMT through the use of a TDM plan should be addressed in the traffic study.

If a TDM plan is proposed as a mitigation measure for a project, and the traffic study attributes a reduction in peak and total traffic to the TDM plan, the following information must be provided:

1. A detailed description of the major components of the TDM plan and how it would be implemented and maintained on a continuing basis.
2. Case studies or empirical data that supports the anticipated reduction of traffic attributed to the TDM plan.
3. Additional Volume/Capacity ratio calculations that illustrate the circulation benefits of the TDM plan.
4. Enforcement Measures – how it will be monitored and enforced.
5. How it complies with the South Coast Air Quality Management District Regulations.

CEQA Assessment – Active Transportation and Public Transit Analysis

Potential impacts to public transit, pedestrian facilities and travel, and bicycle facilities and travel can be evaluated using the following criteria:

- A significant impact occurs if the project conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decreases the performance or safety of such facilities.

Therefore, the TS should evaluate whether a project is consistent with adopted policies, plans, or programs regarding active transportation or public transit facilities, or otherwise increases or decreases the performance or safety of such facilities and make a determination as to whether it has the potential to conflict with existing or proposed facilities supporting these travel modes.

Transportation Study Format

Each transportation study submitted to the City shall contain each of the following elements unless the topic is not applicable. However, items omitted as "not applicable" shall first be approved by the City.

1. Executive Summary

This portion of the report shall present factual and concise information relative to the major issues in the report. The Executive Summary shall include a brief overview of the project, the project's traffic generation potential, the expected VMT impacts of the project, and a summary of mitigation measures. It should also summarize any deficiencies in LOS and the corresponding proposed improvements.

2. Introduction

The introduction of the report shall include a detailed description of study procedures, a general overview of the proposed project site and study area boundaries, existing and proposed site uses, and existing and proposed roadways and intersections within the defined study area (defined study area to be determined by the City). Exhibits required for this section shall include a regional map showing the project vicinity and a site layout map.

3. Project Description and Location

This section shall expand on information presented in the introduction and shall provide a detailed development scenario and specific project location. Exhibits in this section shall include, at a minimum, a clear illustration of the project in terms of a site plan, its density, adjacent roadways, on-site parking supply, proposed traffic circulation within the project, gross square footage, number of rooms/units, and other descriptors as appropriate.

4. Methodology and Thresholds

Identify the methodology used to calculate LOS and VMT. Include the criteria used for screening projects from project-level VMT analysis, if applicable. Identify the impact threshold for VMT, and the City's LOS standards for roadways and intersections.

5. LOS Analysis

This should include the Traffic Generation Forecast, Traffic Distribution and Assignment, Traffic Analysis, and identify required improvements described in the "Level of Service Analysis Procedure".

6. On-site Parking, Access, and Circulation Analysis

Refer to On-Site Parking Analysis section and Access and Circulation Analysis section.

7. Active Transportation and Public Transit Analysis

Refer to Active Transportation and Public Transit Analysis section.

8. Vehicle Miles Traveled (VMT) Analysis

Present the Project VMT per service population for all analysis scenarios and the Project effect on VMT for all analysis scenarios. Data should be presented in tabular format. If the project meets the City's VMT screening criteria, this should be documented. All VMT impacts should be identified in accordance with the VMT Impact Thresholds described above. Proposed VMT mitigation measures should be identified.

9. Appendix

Detailed appendix material shall be supplied as part of the report. If the main report is too large to include an appendix, such material shall be provided under a separate and identifiable cover. Typical material in this regard includes VMT and TDM calculations, traffic counts, LOS calculation sheets, completed signal warrants, accident diagrams at high accident locations, sketches of proposed roadway improvements, and other information necessary for the City's review of the report.

Attachments

Attachment A: VMT Analysis Flowchart

SGVCOG VMT Assessment Flowchart

FEHR & PEERS

Steps	Project Questions	Procedural Flowchart

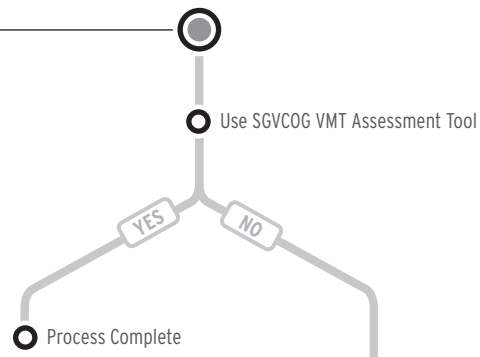
Decision — Analytical process or procedural outcome

Step 1 Screening

Type A TPA Screening

1. Is the project in a Transit Priority Area?

2. Are the following requirements met?
   - Must have a total FAR greater than or equal to 0.75
   - Cannot provide more parking than the City Municipal Code Requirement
   - Must be consistent with SCAG RTP/SCS
   - Cannot replace affordable units with a smaller number of moderate- or high-income residential units

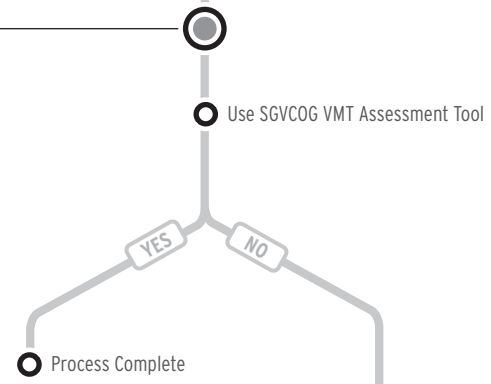


Type B Low VMT Area Screening

1. Is the project located in a low VMT area?

2. Are the following requirements met?
   - The project is composed of similar land use types and of a similar density to the land uses within the project TAZ
   - The project is assumed to generate VMT per person similar to those existing uses

Note: Review jurisdiction's thresholds of significance for definition of low VMT area.



Type C Project Type Screening

Is the project a local-serving project as noted in the Project Type Screening project list in the TIA Guidelines?

These projects include but are not limited to:
- Local serving K-12 schools
- Local-serving retail uses less than 50,000 square feet
- Community and Religious Assembly Uses
- Public Services
- Affordable or supportive housing
- Projects generating less than 110 daily vehicle trips
- Other projects as approved by the City Traffic Engineer

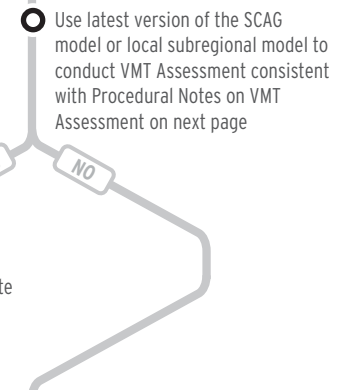
Note: If the project fulfills Type A, B or C screening, the project is presumed to result in a less-than-significant transportation impact.

Step 2 VMT Assessment

What is the project-level VMT and its effect on VMT assessment? Does the project have a less than significant impact?

Details for VMT Assessment are provided in Transportation Study guidelines.

Note: If the project is not screened from assessment in Step 1, the project will require a full VMT assessment to disclose potential significant impacts.

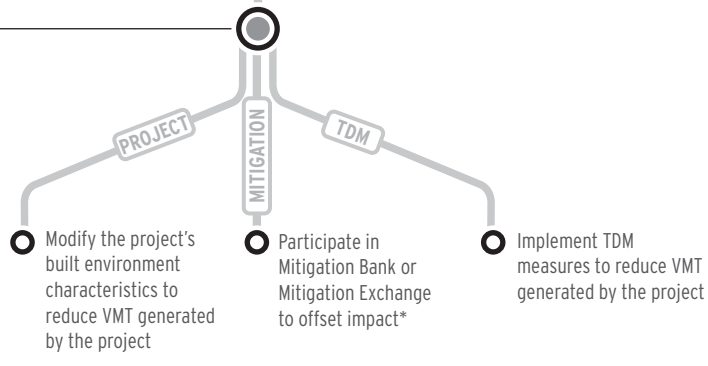


Step 3 Developing Mitigation Measures

What are the options to mitigate VMT impacts?

Note: VMT reductions associated with proposed TDM mitigation measures can be estimated with:
- CAPCOA reduction equations
- Use of SCAG model
- The SGVCOG VMT Assessment Tool TDM module can be utilized to estimate VMT reduction potential associated with TDM measures

*Please note that a Mitigation Bank or Mitigation Exchange program may not be readily available. Check with your local agency.



Abbreviations

CAPCOA = California Air Pollution Control Officers Association
FAR = Floor Area Ratio
PA = Production-Attraction
RTP = Regional Transportation Plan
SCAG = Southern California Association of Governments
SCS = Sustainable Communities Strategy
SGVCOG = San Gabriel Valley Council of Governments
TDM = Transportation Demand Management
TIA = Traffic Impact Analysis
TPA = Transit Priority Area
VMT = Vehicle Miles Traveled

Attachment B: SGVCOG VMT Assessment Tool User Guide

these comparisons can be easily calculated by aggregating the row or column totals for all zones that are within the desired geography.

SGVCOG VMT Tool:
Quick Start Guide & Documentation

(August 28, 2024)

Led by the San Gabriel Valley Council of Governments (SGVCOG) at the direction of 27 of the 31 member cities that constitute SGVCOG, this tool is an outcome of the VMT implementation process whereby the participating cities adopted new significance thresholds for analyzing transportation impacts pursuant to Senate Bill 743 (SB 743). The tool covers the following SGVCOG cities:

Alhambra	Industry	Rosemead
Arcadia	Irwindale	San Dimas
Azusa	La Canada Flintridge	San Gabriel
Baldwin Park	La Puente	San Marino
Claremont	La Verne	Sierra Madre
Covina	Monterey Park	South El Monte
Diamond Bar	Montebello	Temple City
Duarte	Monrovia	Walnut
El Monte	Pomona	West Covina

The tool can be accessed at https://apps.fehrandpeers.com/SGVCOGVMT/. Each of the cities has unique thresholds of significance, and the methodologies for VMT screening may vary slightly due to the different development patterns and geographic location of each community. Please coordinate with the respective city when using this tool for development purposes.

WHAT DOES THIS TOOL DO?

The SGVCOG VMT Tool is designed to assist you in screening and estimating project-generated VMT for certain types of land use projects in the San Gabriel Valley and calculating VMT reductions associated with certain VMT-reducing measures. The tool is intended for use on four primary land uses:

- Residential
- Office
- Industrial
- Commercial (e.g. retail, restaurant, and recreational uses)

The tool evaluates projects with one or a combination of these uses.

LIMITATIONS OF THE VMT EVALUATION TOOL

The VMT Evaluation Tool only covers some of the possible screening criteria that a city may establish for land use project VMT analysis per California Senate Bill 743. The Tool is limited to providing estimates based on data provided in the model, whereby if a proposed project is of a land use type that is not reflected in the Traffic Analysis Zone (TAZ) either now or in the future, the Tool is not capable of

estimating the VMT efficiency rate for that land use type. Other land uses types, large, complex and/or mixed-use projects, or long-range land use plans should be analyzed by performing custom modeling using the SCAG RTP Model or other appropriate tool determined in consultation with the agency. Before making any decisions based on the information provided by the VMT Evaluation Tool, it is recommended that you contact the city in which the proposed development is located.

RUNNING THE VMT EVALUATION TOOL – 4 BASIC STEPS

The following are the four basic steps involved in running the VMT Evaluation Tool:

Page 1: Select Project Area

Step 1: Jurisdiction

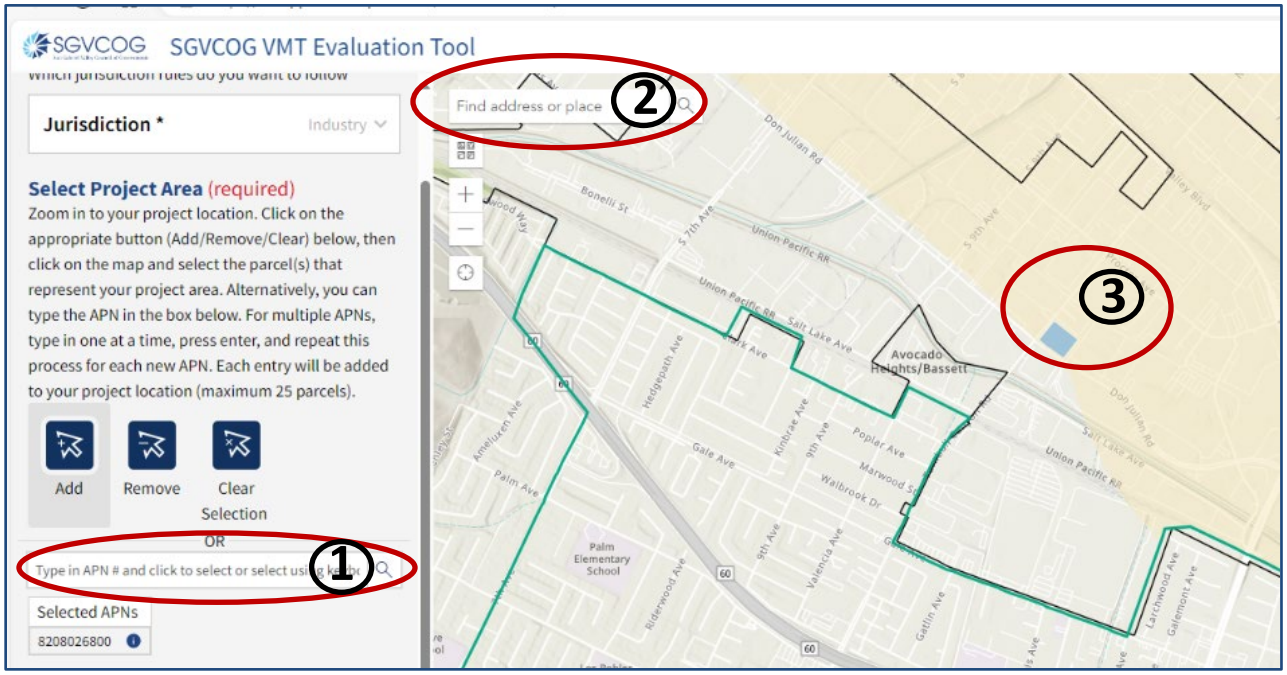
Using the drop-down box, select the city where the project is located. This is required.

Step 2: Select Parcel(s)

There are three ways to locate the parcels associated with a proposed project:

1. Type in the Assessor Parcel Number(s) (APN). The APN requires exclusion of the dash between each grouping of numbers (XXXXXXXXXX).
2. Type in the Project Address; or,
3. Zoom into the map

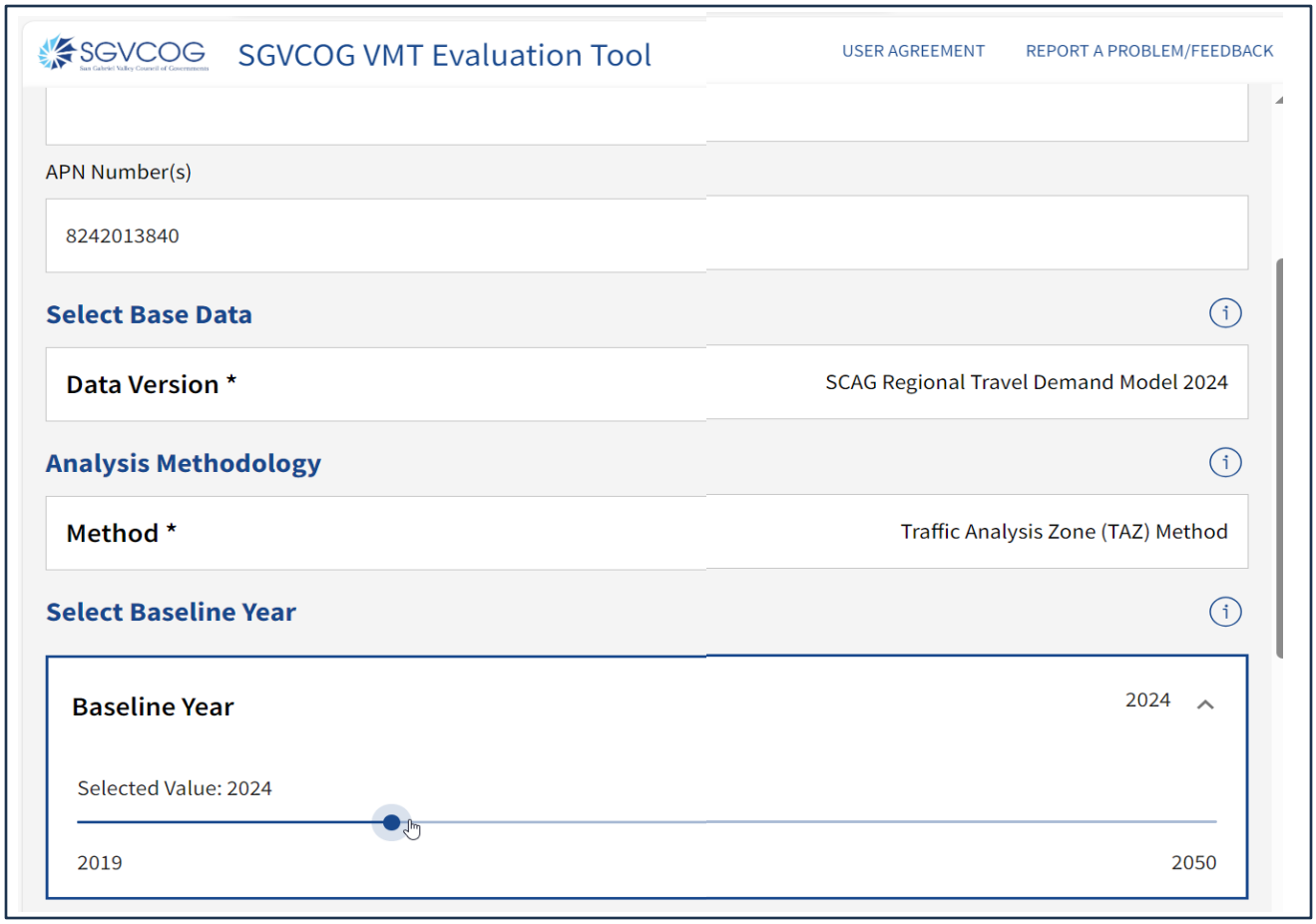
To select the parcel, click on "Add". If you are selecting by zooming into the map, click the "Add" button first and then select the parcel from the map. You will see the selected APNs display under the "Selected APN" field.



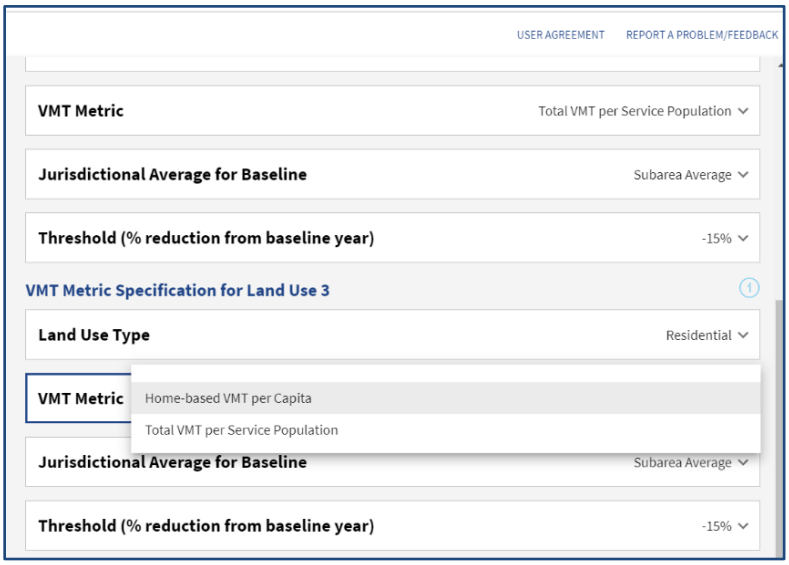
Page 2: Determine Screening Inputs

- **Project Information**
  - **Project Name:** Must type in a project name (required field) – max 250 characters

- **Project Description:** Required field – max 250 characters
- **APNs:** Auto-populated from Page 1



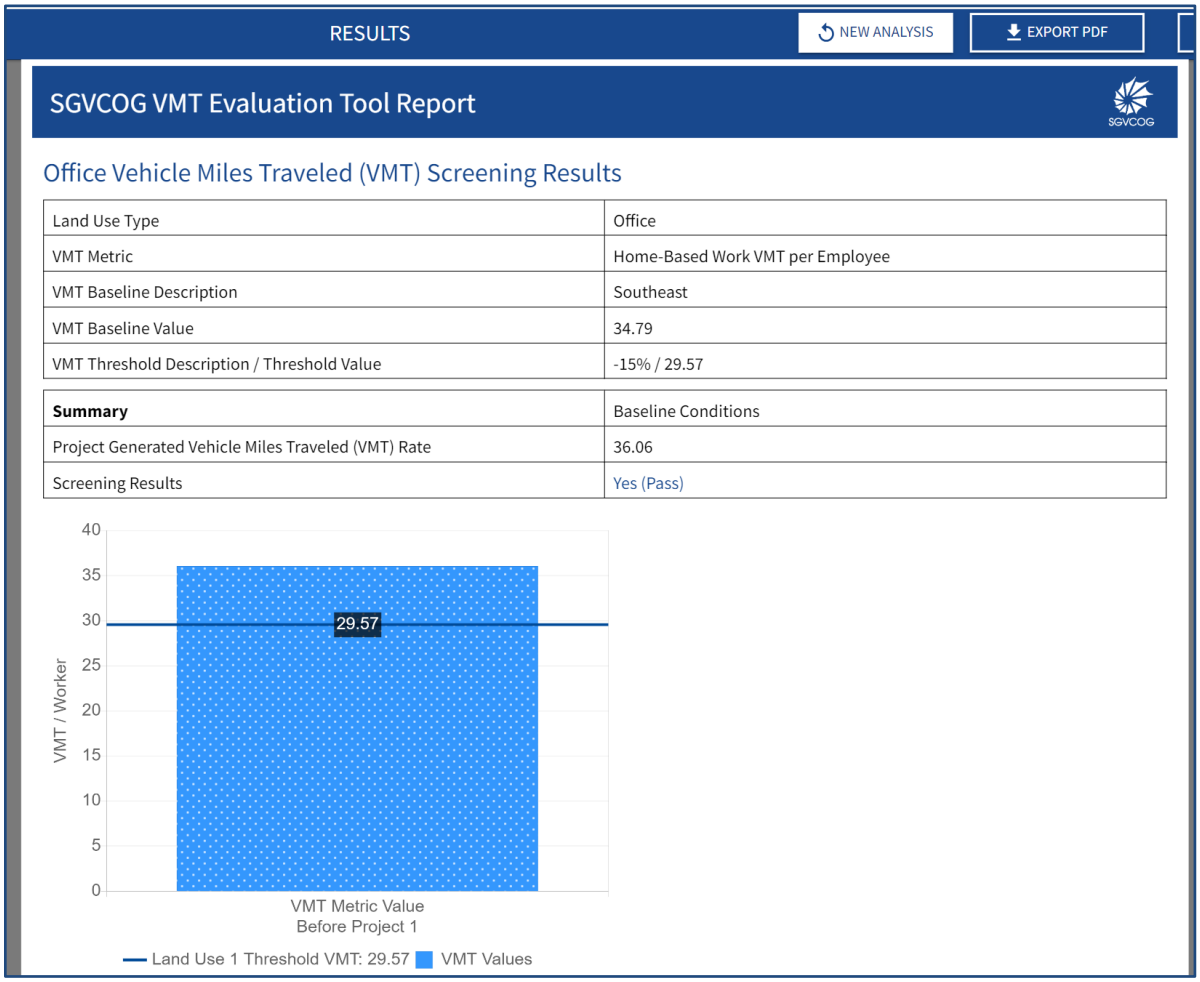
- **Select Base Data:** Auto-populated
- **Analysis Methodology:** Auto-populated
- **Select Baseline Year:** The tool has the capability of providing baseline VMT between 2019 and 2050 pursuant to the 2024 SCAG RTP Model. To select a baseline year, click on the timeline and slide the point to the preferred baseline year.**VMT Metric Specification for Land Use 1-3:** The tool is capable of evaluating up to three land use types per project. The tool is also capable of evaluating the difference in VMT Metrics for one land use type. For the latter, select the same land use type for Land Use 1 and Land Use 2 and select different VMT Metrics.



- **Land Use Type:** Select 1)

Residential, 2) Office, 3) Industrial, or 4) Commercial.

- **VMT Metric:** Select VMT per Capita, VMT per Worker, or Total VMT per Service Population
- **Jurisdictional Average for Baseline:** Pre-set (based on City preferences)
- **Threshold:** Pre-set (based on City preferences)
- **Project Screening Only (go to Page 3 - RESULTS)** versus **Continue to VMT Reduction Factors (go to Page 4):** Option to screen first without VMT reductions. The tool provides a mechanism to return to this page and select reductions. Note that if you select "Project Screening Only" the tool will perform the analysis, this step may take several seconds – you will see a spinning icon reflecting that the tool is working on the analysis.

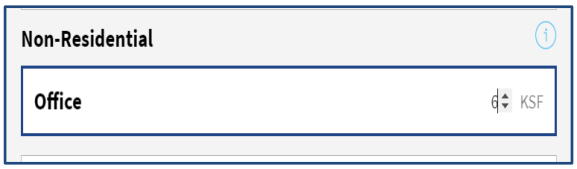


Page 3 (VMT Screening Results): From this page with Project Screening Results, there is an option at the top left of the page to "Edit Inputs". Click this to return to Page 2.

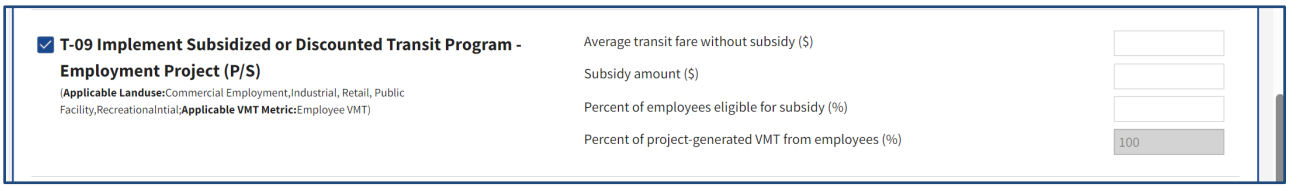
Page 4 (Land Use Info and VMT Reduction Strategies): Click on **Continue to VMT Reduction Strategies on Page 2** to test VMT reduction strategies. Details about the VMT Reduction Strategies are provided in Appendix D of the Transportation Assessment Guidelines.

On this page, populate the project details. Note that all Project Land Use Information fields must be populated with a value. Enter "0" for all categories that are not relevant.

- **Project Land Use Information**
    - The left-hand entry boxes contain up/down arrows for increasing/decreasing values, but by clicking to the left of the up/down arrows, you may also type in a value, as shown below. Please note that all square-footage values are calculated in the tool in terms of one thousand square feet (KSF) so for a 6,000 square-foot office, the field would be populated with a "6", as shown below.



- **VMT Reduction Strategies**
    - Select the desired VMT Reduction Strategies by first clicking the box next to the strategy. In some cases, additional inputs will be required, such as the example below for **T-09 Implement Subsidized or Discounted Transit Program - Employment Project (P/S).**



- **A number of reduction strategies overlap with each other**. For instance, a strategy may consist of a basket of measures which may overlap with some of the measures in another strategy. The SGVCOG VMT Evaluation Tool has been coded to reflect one of these dependencies for T-05 and T-06, but other dependencies should be closely evaluated to ensure that VMT reductions are accurately calculated pursuant to **Appendix A** of this User's Guide.

Once all land use information fields have been completed and at least one strategy selected, the "Continue to VMT Results" button at the bottom of the page will be available. Clicking on the button will take you to "Page 3 - RESULTS" and the results will include the VMT screening results and the VMT results with the VMT reduction strategies applied. The results will also display if the VMT impact is significant or less than significant. You can return to the inputs page by clicking the "Return" button at the left-top of the page.

- Note that when you select "Continue to VMT Results" the tool will perform the analysis, this step may take several seconds – you will see a spinning icon reflecting that the tool is working on the analysis.

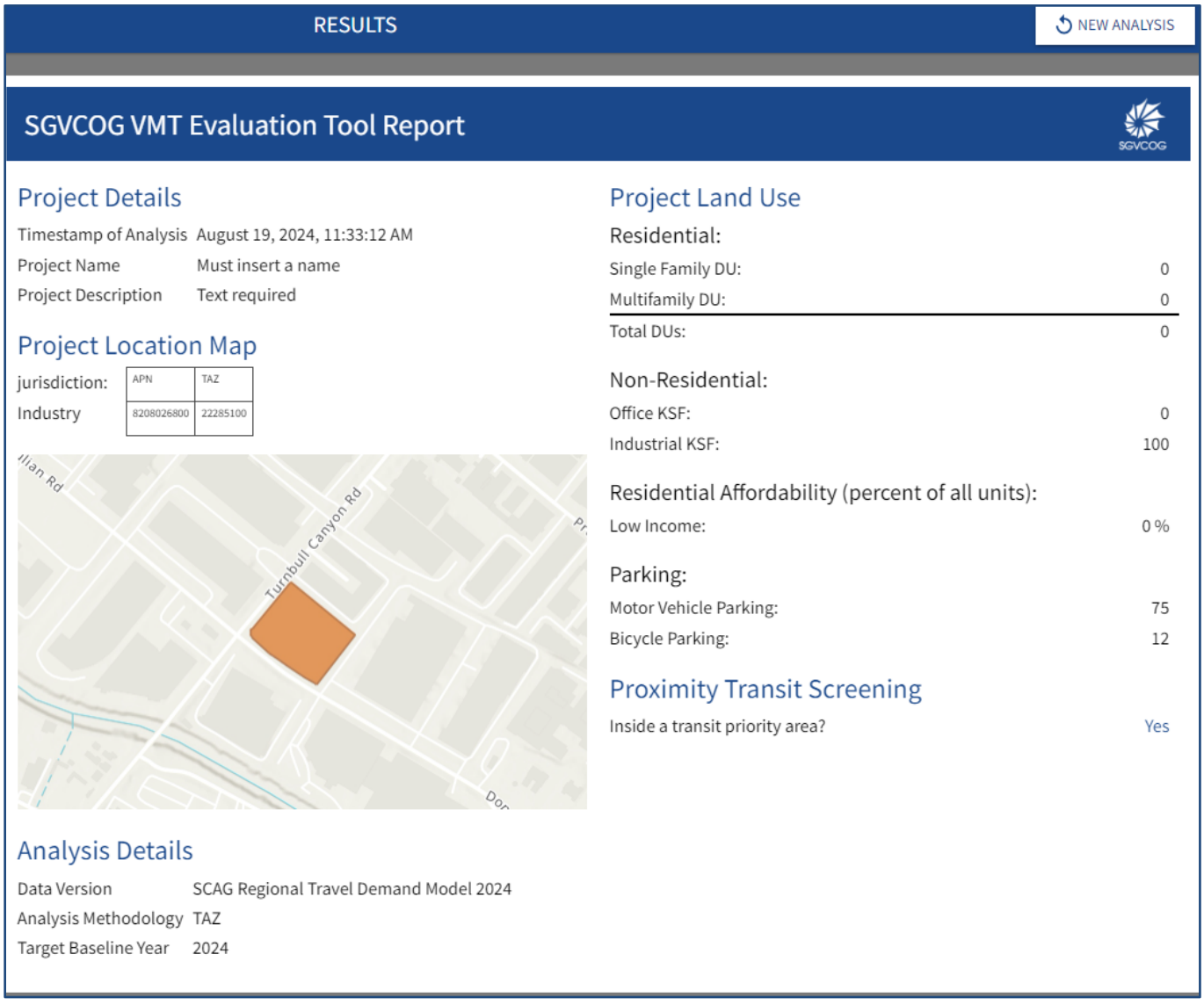
CONTENTS of "Page 3 – RESULTS"

The Results Report provides a summary of the screening results, VMT analysis, and VMT reduction. The following sections are provided in the Results Report:

- Project Details: This section provides the date/time that the report was generated, the project name and the project description.
- Project Location Map: This section provides the jurisdiction, APN, TAZ number and a project map.
- Proximity Transit Screening: This section identifies if the project is in a transit priority area.
- Analysis Details: This section provides the SCAG data version, methodology, and baseline year

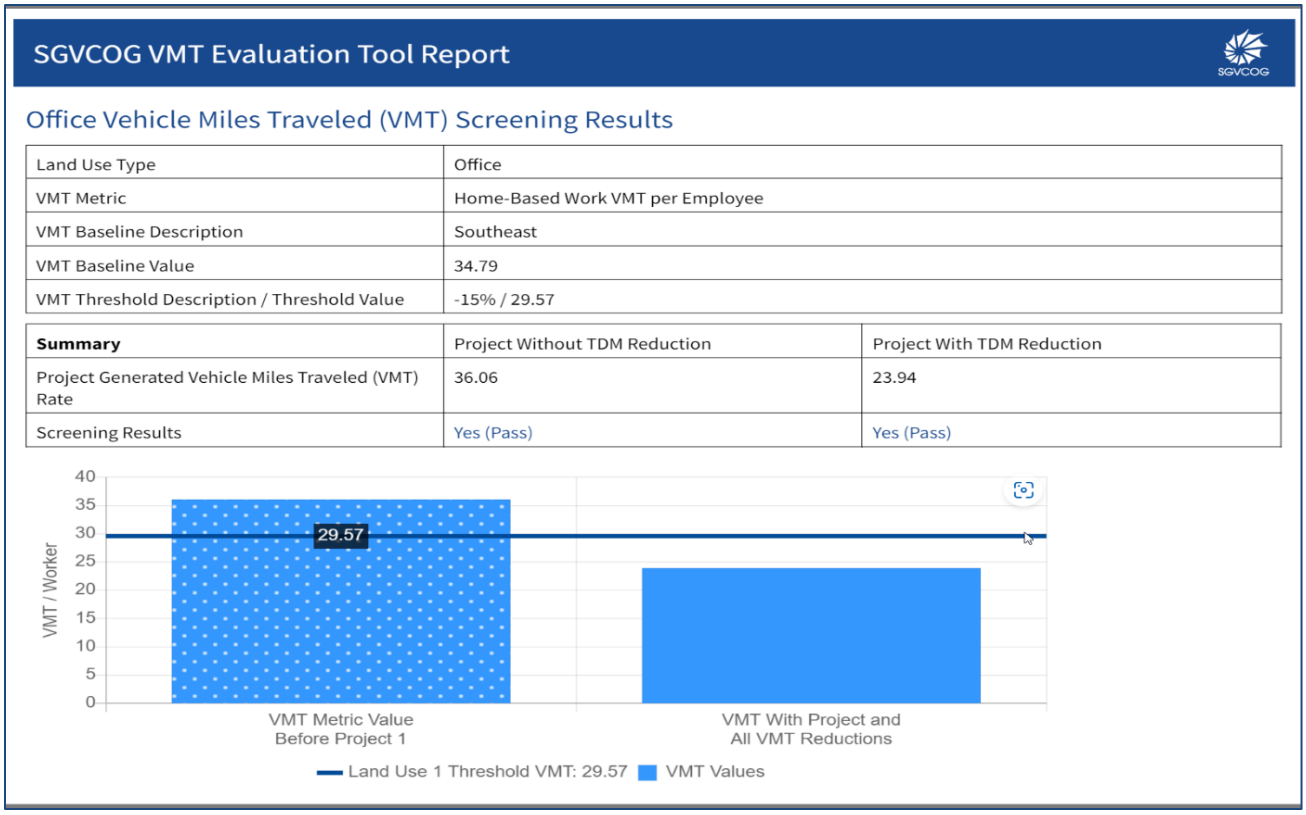
- VMT Screening Results: This section summarizes the land use type and VMT metric and methodology, and if the project is in a Low VMT area (and is screened). See below for an example. This Tool screens projects based on their location within a TPA and/or a Low VMT Area. The Screening Results provides the following information about these two screening criteria.
- If VMT reduction strategies are selected, the report includes the VMT results before and after applying the VMT reduction strategies and provides a list of all strategies with the selected strategies highlighted.
- **NOTE:** The Tool does not screen based on 110-daily trips. Screening for this factor must be completed outside of the tool using the ITE Trip Generation Manual.

A screenshot of a sample report is provided below.



Page 1 of the SGVCOG VMT Evaluation Tool Report provides project information inputs.

Page 2 of the SGVCOG VMT Evaluation Tool Report provides details about the VMT generation in the area of the proposed project. The table in the figure below indicates the VMT per Employee Baseline (34.79), and the dark blue line indicated in the bar chart (29.57) indicates the threshold of 15 percent below the Baseline.



SGVCOG VMT Evaluation Tool Report

Office Vehicle Miles Traveled (VMT) Screening Results

Land Use Type	Office
VMT Metric	Home-Based Work VMT per Employee
VMT Baseline Description	Southeast
VMT Baseline Value	34.79
VMT Threshold Description / Threshold Value	-15% / 29.57

Summary	Project Without TDM Reduction	Project With TDM Reduction
Project Generated Vehicle Miles Traveled (VMT) Rate	36.06	23.94
Screening Results	Yes (Pass)	Yes (Pass)

READING THE REPORT & EXPORT FILES

The VMT Evaluation Tool produces two types of outputs: a formatted report, which shows up on the Results screen and can be downloaded as a PDF file, and data tables including all the user-provided inputs and the back-end data which can be downloaded as CSV files (use the buttons at the upper right of the screen).

Key things to look for in the report / PDF:

- **Whether the project falls in proximity to transit** (within ½ mile of a Major Transit Stop, or ½ mile of a stop along a High-Quality Transit Corridor as defined in state law): Look for the 'Inside TPA?' question on Page 1 of the report.

- **Whether the project falls in a low-VMT area** (i.e., below the VMT threshold specified by the city/town/county): Look for the 'Low VMT Screening Analysis' row on the Screening Results page(s) of the report, starting on page 2. There will be Low-VMT Screening results for each land use you select.

	Without Project	With Project and Tier 1-3 VMT Reductions	With Project and All VMT Reductions
Project Generated Vehicle Miles Traveled (VMT) Rate	14.69	14.53	11.75
Low VMT Screening Analysis	No (Fail)	No (Fail)	Yes (Pass)

TIPS FOR SUCCESS

- Look for the "tool-tips"  across the tool to help understand fields where inputs are required.
- The tool may take up to a minute to run a report; if it takes much longer, refresh and try again.
- If you are running variations on the same site and project, use the back arrows in the upper-left of the screen (such as 

) to go back, vary some inputs, and run the report again.
- To start a completely new analysis while staying in the tool, use the button in the upper-right of the Results screen. 

- The tool is optimized for Chrome, Firefox, Edge or Safari on a Windows or Mac computer, although you may also access it from a tablet or another browser. If you encounter unexpected issues, try clearing your browser cache and cookies and running again.
- Please fill out the short feedback form by clicking on the link 

in the upper-right of the tool. You may report errors, rate the tool, and offer suggestions for future improvements.

FOR MORE INFORMATION

If you have questions about the VMT Evaluation Tool, you may email j.hayes@fehrandpeers.com.
For any inquiries about how the tool may be applied in a land use review and approval process, please contact city staff in which the project is located.

Appendix A: VMT Reduction Strategies

Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity

California Air Pollution Control Officers Association (CAPCOA)
December 2021

List of All VMT Reduction Strategies	**Notes:** **Refer to the CAPCOA *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* (GHG Handbook, December 2021) for additional information on evaluating strategy effectiveness at reducing VMT.**
T-01 Increase Residential Density	**Applicable Land Use: Residential** **Should be applied to larger developments and/or developments where the density is somewhat similar to the surrounding neighborhood.**
T-02 Increase Job Density	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational** **Should be applied to larger developments and/or developments where the density is somewhat similar to the surrounding neighborhood.**
T-03 Provide Transit Oriented Development	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational** **To qualify as a TOD, the development must be within a 10-minute walk (0.5 mile) of a high frequency transit station.**
T-04 Integrate Affordable and Below Market Rate Housing	**Applicable Land Use: Residential** **Multifamily residential units must be permanently dedicated as affordable for lower income families. See definition in the GHG Handbook.**
T-17 Improve Street Connectivity	**Applicable Land Use: Large Community of Citywide Plan**
T-05 Implement Commute Trip Reduction Program – voluntary	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-06 Implement Commute Trip Reduction Program – mandatory	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-07 Implement Commute Trip Reduction Marketing – Employment Project	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-08 Provide Ride-Sharing Program – Employment Project	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-09 Implement Subsidized or Discounted Transit Program – Employment Project	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-10 Provide End-of-Trip Bicycle Facilities	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-11 Provide Employer-Sponsored Vanpool	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-12 Price Workplace Parking	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-13 Implement Employee Parking Cashout	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**

T-23 Provide Community-Based Travel Planning - Employment Project	**Applicable Land Use: Commercial Employment, Industrial, Retail, Public Facility, Recreational**
T-07 Implement Commute Trip Reduction Marketing - Residential Project	**Applicable Land Use: Residential**
T-09 Implement Subsidized or Discounted Transit Program - Residential Project	**Applicable Land Use: Residential**
T-23 Provide Community-Based Travel Planning - Residential Project	**Applicable Land Use: Residential**
T-15 Limit Residential Parking Supply	**Applicable Land Use: Residential**
T-16 Unbundle Residential Parking Costs from Property Cost	**Applicable Land Use: Residential**
T-24 Implement Market Price Public Parking - On-Street	**Applicable Land Use: Large Community of Citywide Plan**
T-18 Provide Pedestrian Network Improvement	**Applicable Land Use: Large Community of Citywide Plan**
T-19A Construct or Improve Bike Facility	**Applicable Land Use: Large Community of Citywide Plan**
T-19B Construct or Improve Bike Boulevard	**Applicable Land Use: Large Community of Citywide Plan**
T-20 Expand Bikeway Network	**Applicable Land Use: Large Community of Citywide Plan**
T-21A Implement Conventional Carshare Program	**Applicable Land Use: Large Community of Citywide Plan**
T-21B Implement Electric Carshare Program	**Applicable Land Use: Large Community of Citywide Plan**
T-22A Implement Pedal (Non-electric) Bikeshare Program	**Applicable Land Use: Large Community of Citywide Plan**
T-22B Implement (Electric) Bikeshare Program	**Applicable Land Use: Large Community of Citywide Plan**
T-22C Implement Scootershare Program	**Applicable Land Use: Large Community of Citywide Plan**
T-25 Extend Transit Network Coverage or Hours	**Applicable Land Use: Large Community of Citywide Plan**
T-26 Increase Transit Service Frequency	**Applicable Land Use: Large Community of Citywide Plan**

T-27 Implement Transit-Supportive Roadway Treatment	**Applicable Land Use: Large Community of Citywide Plan**
T-28 Provide Bus Rapid Transit	**Applicable Land Use: Large Community of Citywide Plan**
T-29 Reduce Transit Fare	**Applicable Land Use: Large Community of Citywide Plan**

Strategies selected MUST be applicable to the land use being evaluated. Each strategy indicates the applicable land use and applicable VMT metric listed under the measure title.	
If this strategy is chosen…	**Additional VMT Reduction is NOT possible from…**
T-05 Implement Commute Trip Reduction Program – voluntary **Voluntary CTR programs must include the following elements to apply the VMT reductions reported in literature.** • **Employer-provided services, infrastructure, and incentives for alternative modes such as ridesharing (Measure T-8), discounted transit (Measure T-9), bicycling (Measure T-10), vanpool (Measure T-11), and guaranteed ride home.** • **Information, coordination, and marketing for said services, infrastructure, and incentives (Measure T-7).**	**T-06 Implement Commute Trip Reduction Program – mandatory** **T-07 Implement Commute Trip Reduction Marketing – Employment Project** **T-08 Provide Ride-Sharing Program** **T-09 Implement Subsidized or Discounted Transit Program – Employment Project** **T-10 Provide End-of-Trip Bicycle Facilities** **T-11 Provide Employer-Sponsored Vanpool**
T-06 Implement Commute Trip Reduction Program – mandatory **The mandatory CTR program must include all other elements (i.e., Measures T-7 through T-11) described for the voluntary program (Measure T-5) plus include mandatory trip reduction requirements (including penalties for non-compliance) and regular monitoring and reporting to ensure the calculated VMT reduction matches the observed VMT reduction.**	**T-05 Implement Commute Trip Reduction Program – voluntary** **T-07 Implement Commute Trip Reduction Marketing – Employment Project** **T-08 Provide Ride-Sharing Program** **T-09 Implement Subsidized or Discounted Transit Program – Employment Project** **T-10 Provide End-of-Trip Bicycle Facilities** **T-11 Provide Employer-Sponsored Vanpool**

T-07 Implement Commute Trip Reduction Marketing – Employment Project	**T-05 Implement Commute Trip Reduction Program – voluntary** **T-06 Implement Commute Trip Reduction Program – mandatory**
T-08 Provide Ride-Sharing Program – Employment Project	**T-05 Implement Commute Trip Reduction Program – voluntary** **T-06 Implement Commute Trip Reduction Program – mandatory**
T-09 Implement Subsidized or Discounted Transit Program – Employment Project	**T-05 Implement Commute Trip Reduction Program – voluntary** **T-06 Implement Commute Trip Reduction Program – mandatory**
T-10 Provide End-of-Trip Bicycle Facilities	**T-05 Implement Commute Trip Reduction Program – voluntary** **T-06 Implement Commute Trip Reduction Program – mandatory**
T-11 Provide Employer-Sponsored Vanpool	**T-05 Implement Commute Trip Reduction Program – voluntary** **T-06 Implement Commute Trip Reduction Program – mandatory**

Attachment C: Detailed VMT Forecasting Information

This section provides detailed VMT forecasting instructions for use with the Southern California Association of Governments (SCAG) Travel Demand Model. Please note that SCAG updates the travel demand model every four years and the latest version available should be utilized for VMT assessment in the City.

The SCAG 2024 RTP Model, released in April 2024, is an Activity-Based Travel Demand Model (ABM), which simulates daily activities of each resident and household in the region and generate travel to link those activities in time and space. Compared to the SCAG 2016 RTP model, a trip-based model used in the last SGVCOG VMT Tool, the 2024 RTP model generates a complete travel profile or trajectory for a typical weekday for each resident, which could be traced to home or work TAZs.

Please note that a trip-based model generates trips by purpose and by TAZ, without any linkage between those trips and to trip-makers, due to its aggrege nature, therefore the VMT metrics used with a trip-based model only covers partial VMT information. This shortcoming has been overcome by an ABM, which the SCAG 2024 RTP Model follows. We could develop new VMT metrics to provide a complete VMT profile using the newly released SCAG model.

Given the SCAG ABM takes socio-economic variables, such as population, household, and employment., as the inputs to estimate travel, this may create challenges for complying with the VMT guidance because trip generation is not directly tied to specific land use categories. The following methodology addresses this particular challenge among others.

Based on the complete travel profiles generated by SCAG ABM, all the tours/trips made by resident can be traced back to their home TAZs, where residential land uses are located; while work-related tours/trips made by workers can be traced to their work location, where non-residential land uses are located. Focusing on residential and employment land uses, the first step to forecasting VMT requires translating the land use into model terms, the closest approximations are:

- Resident VMT: VMT of all tours made by residents, summarized by home TAZ.

  Given the detailed travel profile that the SCAG Model provides, additional VMT metrices can be developed as alternatives to be used in projects based on the discretion of the city, as listed below.

  - Alternative #1: Home-based VMT: VMT of the home-based tours only, made by residents. This VMT metric is a subset of the total resident VMT.
  - Alternative #2: Home-based direct VMT: VMT for home-based trips only. This is equivalent to the home-based VMT in a trip-based model and is a subset of the home-based VMT.

- Employee VMT: VMT for all work-related including work or work-related business tours, made by employed residents and summarized by work location TAZ.

  Similarly, additional VMT metrices can be developed as alternatives to be used in projects based on the discretion of cities, as listed below.

  - Alternative #1: VMT for work tours (commuting only). This VMT metric is a subset of VMT for all work-related tours.
  - Alternative #2: HBW direct VMT: VMT for home-based work trips with both trip-ends being home and work respectively, a subset of the VMT for work tours.

The VMT metrices listed above are calculated based on the simulated trip list, which only includes travel of the residents within the modeling region, instead of using the final trip tables used in the standard vehicle assignment since they are not stratified by tour or trip purpose. In order to provide the most complete VMT estimates including external trips, the recommended approach to estimating VMT is outlined below. Deviating from this approach will require justification and approval from the City Traffic Engineer.

VMT Forecasting Instructions

This approach will calculate total Origin/Destination (OD) VMT using standard SCAG model output files. The OD method for calculating total VMT includes all vehicle trips that start in a specific traffic analysis zone, and all vehicle trips that end in a specific traffic analysis zone. The major steps of this approach are listed as follows:

- Re-skim final loaded congested networks and adjust the external skim for each mode and time period to account for truncated trips
- Multiply appropriate distance skim matrices by OD trip matrices to estimate VMT by time period
- Sum matrices by time period and mode to calculate daily automobile VMT
- Calculate automobile VMT for individual TAZs

Appropriateness Checks

The number of vehicle trips from the total VMT estimation should match as closely as possible with the results from the traditional model process. The estimated results should be checked against the results from a full model run to understand the degree of accuracy. Note that these custom processes may or may not include full lengths of IX/XI trips (trips with origins or destinations outside of the model roadway network) or special generator trips (airport, seaport, stadium, etc.).

When calculating VMT for comparison at the study area, citywide, or regional geography, the same methodology that was used to estimate project specific VMT should be used. The VMT for

Attachment D: VMT Reduction Strategies (CAPCOA 2021)

FEHR PEERS

Memorandum

Date: January 11, 2024

To: Roy Choi, SGVCOG
Steph Wong, SGVCOG
Turner Lott, SGVCOG

From: Jolene Hayes and Katy Cole, Fehr & Peers

Subject: SGVCOG VMT Evaluation Tool CAPCOA Updates Final Technical Memorandum (Deliverable 2.4.2)

OC20-0715.02

Introduction

This draft technical memorandum documents the differences between the 2010 *Quantifying Greenhouse Gas Mitigation Measures* and 2021 *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity* (Handbook) published by the California Air Pollution Control Officials Association (CAPCOA). The 2021 Handbook updated the 2010 document with new data and research.

Information contained in the Handbook is a critical input to the SGVCOG VMT Evaluation Tool. The SGVCOG VMT Evaluation Tool (Tool) provides participating cities with the ability to screen out projects located within Low VMT areas. In addition, the Tool contains VMT reduction measures that could be applied to reduce the estimated project-generated VMT to a level below the adopted significance threshold. The current version of the Tool was developed in 2020, one year before CAPCOA published the 2021 Handbook. This technical memorandum describes changes to the Handbook and how the changes impact the update to the Tool.

CAPCOA Changes

The current Tool provides VMT mitigation options based on the 2010 CAPCOA Handbook, research on travel behavior by census tract, and additional documentation.[1] In December 2021, CAPCOA updated this handbook to reflect new data and measures to quantify greenhouse gas (GHG) reductions across categories and subcategories. For the purpose of the Tool, the GHG reduction strategies focus on only the Transportation category and its associated subcategories contained in the Handbook. Changes to the

[1] Neighborhood types from Salon, Deborah. February 2014. Quantifying the effect of local government actions on VMT. California Air Resources Board and the California Environmental Protection Agency

transportation subcategories, place type, VMT reduction strategies, and the quantification of VMT reduction strategies are described herein.

Subcategories

The 2010 CAPCOA Handbook identified four (4) subcategories appropriate for including in the Tool and provided the maximum VMT reduction associated with various strategies within each subcategory. The 2021 CAPCOA Handbook retained the same number of subcategories; however, the number of quantified strategies under each subcategory have been reduced or the strategies have been modified due to refinement of empirical data, analysis, reevaluation of VMT reduction potential, and consideration of the research meeting the rigor required for CEQA analysis.

The four (4) subcategories are:

- Land Use
    - 2010 Handbook: 9 quantified strategies
    - 2021 Handbook: 5 quantified strategies
- Trip Reduction Programs
    - 2010 Handbook: 15 quantified strategies
    - 2021 Handbook: 10 quantified strategies
- Parking or Road Pricing/Management
    - 2010 Handbook: 4 quantified strategies
    - 2021 Handbook: 4 quantified strategies
- Neighborhood Design
    - 2010 Handbook: 9 quantified strategies
    - 2021 Handbook: 9 quantified strategies

The 2021 Handbook also identified a scale of application at the Project/Site versus within the Plan/Community. Only strategies that have a scale of application at the Project/Site are appropriate for individual land development projects, or as stated in the 2010 Handbook, "Project/Site refers to measures that reduce emissions at the scale of a parcel, employer, or development project" (2021 Handbook, Page 37). Strategies that are identified as Plan/Community are "measures that reduce emissions at the scale of a neighborhood, corridor, or entire municipality" (2021 Handbook, Page 37). Since the 2021 Handbook

specifies scale of application, only strategies that are appropriate for Project/Site scale of application are included in the updated Tool. This results in fewer strategies that are applicable than in the current Tool.

The "Neighborhood Place Types" were also altered. Instead of the seven place types, as described in Table 1, the 2021 Handbook aggregated the Locational Context into three place types: 1) Urban, 2) Suburban, and 3) Rural.

Table 1. CAPCOA Handbook Neighborhood Place Types Comparison

2010 Neighborhood Place Types	Description	2021 Neighborhood Place Types
Central City Urban	Very high density, excellent accessibility, high public transit access, low single-family homes, older high-value housing stock	Urban
Urban High Transit Use	High density, good accessibility, high public transit access, low single-family homes, middle-aged and older housing stock	
Urban Low Transit Use	Good accessibility, low vacancy, middle-aged housing stock	
Suburb with Multifamily Housing	Average on most indicators, low single-family homes, and relatively lower housing values	Suburban
Suburb with Single-Family Homes	Low density and accessibility, low vacancy, high newer single-family homes, and relatively higher housing values	
Rural in Urbanized Area	Slightly better accessibility than the truly "rural" tracts, more likely to have multifamily housing	Rural
Rural	Very low access, high vacancy, high newer single-family homes with lower housing values (mainly outside population centers of any kind)	

Notes: Neighborhood place type coding used in script: 1) Urban Low Transit Use, 2) Suburb with Multifamily Housing, 3) Central City Urban, 4) Rural, 5) Suburb with Single Family Homes, 6) Urban High Transit Use, and 7) Rural in Urbanized Area. Categories 1, 3, and 6 are now sorted into the "Urban" place type, categories 2 and 5 are sorted into the "Suburban" place type, and Categories 4 and 7 are sorted into the "Rural" place type.

VMT Reduction Strategies

In the 2010 Handbook, VMT reduction strategies applicable for use in the Tool were categorized into four VMT mitigation categories. The 2021 Handbook added an additional category and altered the descriptions of the others. The VMT reduction strategies included in the Tool are supported by evidence from a previous literature review prepared by Fehr & Peers, and from our work in VMT reduction strategies. This documentation also specifies the efficacy of the measure in Urbanized Area and Rural

neighborhood place types.[2] Differences in the mitigation categories (or tiers) applicable to the SGVCOG Tool are provided as follows:

Table 2: Changes to CAPCOA Categories

Tool Category	2010 CAPCOA Category	2021 CAPCOA Categories
Tier 1: Project Characteristics	Land Use/Location	Land Use
Tier 2: Multimodal Infrastructure	Neighborhood/Site Enhancements	Neighborhood Design
Tier 3: Parking	Parking Policy/Pricing	Parking or Road Pricing / Management
Tier 4: Transportation Demand Management (TDM)	Commute Trip Reduction Programs	Trip Reduction Programs

Strategies in each of the 2021 Categories described in Table 2 and their corresponding evidence and calculations will be updated in the Tool. (Shortened versions of these descriptions will be provided in the tooltips (information buttons) within the tool itself.) As part of this effort, we have developed scripts for the purpose of reflecting the 2021 CAPCOA strategies and VMT reduction associated with each one. The following tables provide a summary of changes that informed the development of the scripts. These changes will be incorporated into the Tool as part of Task 2.4.2.

Table 3: Comparison of CAPCOA 2010 and 2021 VMT Reduction Strategies

2010 Strategy (by Sub-Sector)	Included in 2021 Handbook?	If in New 2021 Handbook - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Land Use				
Increase Density LUT-1	Modified (see T-1)	NA	NA	Project/Site: 65% Neighborhood/ City: 30%
Increase Location Efficiency LUT-2	Modified (see T-2)	NA	NA	
Increase Density of Urban and Suburban	Modified (see T-2)	NA	NA	

[2] These neighborhood place types were added for completeness and allows reductions similar to suburban with single family neighborhood place type to provide flexibility in testing VMT reductions in rural settings. Many VMT reduction measures are not as effective in rural settings and the analyst should consider available research and supplement that research with local data on VMT reductions in rural settings when evaluating VMT reductions in a rural setting.

2010 Strategy (by Sub-Sector)	Included in 2021 Handbook?	If in New 2021 Handbook - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Land Use				
Development (Mixed Use) LUT-3				
Increase Destination Accessibility	T-29A and T-29B	T-29A: P/S T-29B: N/C	Not Quantified	
Increase Transit Accessibility	Modified	NA	NA	
Integrate Affordable and Below Market Rate Housing	T-30	P/S	Not Quantified	
Orient Project Toward Non-Auto Corridor	T-31	P/S	Not Quantified	
Locate Project near Bike Path/Bike Lane	T-32	P/S	Not Quantified	
Improve Design of Development	Modified	NA	NA	
Increase Residential Density	T-1	P/S	30%	
Increase Job Density	T-2	P/S	30%	
Provide Transit-Oriented Development	T-3	P/S	31%	
Improve Street Connectivity	T-16	N/C	30%	

Measure (by Sub-Sector)	Included in New 2021 Admin Draft?	If in New 2021 Admin Draft - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Trip Reduction Programs (VMT in this section is "commute" VMT)				
Implement Commute Trip Reduction Program Voluntary	T-4	P/S	4%	Project/Site: 45% Neighborhood/City: 2.3%

Measure (by Sub-Sector)	Included in New 2021 Admin Draft?	If in New 2021 Admin Draft - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Trip Reduction Programs (VMT in this section is "commute" VMT)				
Implement Commute Trip Reduction Program Mandatory Implementation and Monitoring	T-5	P/S	26%	
Provide Ridesharing Program	T-7	P/S	8%	
Implement Subsidized or Discounted Transit Program	T-8	P/S	5.5%	
Provide End-of-Trip Bicycle Facilities	T-9	P/S	4.4%	
Telecommuting and Alternative Work Schedules	NO	NA	NA	
Implement Commute Trip Reduction Marketing	T-6	P/S	4%	
Implement Preferential Parking Permit Program (Carpoolers)	T-39	P/S	Not Quantified	
Implement Car-Sharing Program	NO	NA	NA	
Implement School Pool Program	T-40	P/S	Not Quantified	
Provide Employer Sponsored Vanpool	T-10	P/S	20.4%	
Implement Bike Sharing Program	NO	NA	NA	
Implement School Bus Program	T-41	P/S	Not Quantified	
Price Workplace Parking	T-11	P/S	20%	
Implement Employee Parking Cash-Out	T-12	P/S	12%	
Community-Based Travel Planning	T-22	N/C	2.3%	
Provide First and Last Mile TNC Incentives	T-38	N/C	Not Quantified	

Measure (by Sub-Sector)	Included in New 2021 Admin Draft?	If in New 2021 Admin Draft - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Parking Management				
Limit Parking Supply	Modified	NA	NA	Project/Site: 30% Neighborhood/ City:30%
Unbundle Residential Parking Costs from Property Cost	T-15	P/S	15.7%	
Implement Market Price Public Parking (On-Street)	T-23	N/C	30%	
Require Residential Area Parking Permits	NO	NA	NA	
Limit Residential Parking Supply	T-14	P/S	13.7%	
Provide Electric Vehicle Charging Infrastructure	T-13	P/S	0%	

Measure (by Sub-Sector)	Included in New 2021 Admin Draft?	If in New 2021 Admin Draft - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Neighborhood Design				
Provide Pedestrian Network Improvements	T-17	N/C	6.4%	Project/Site: NA Neighborhood/ City: 8%
Traffic Calming Measures	T-34	N/C	Not Quantified	
Implement a Neighborhood Electric Vehicle (NEV) Network	NO	NA	NA	
Urban Non-Motorized Zones	T-35	N/C	Not Quantified	
Incorporate Bike Lane Street Design (on-site)	NO	NA	NA	

Measure (by Sub-Sector)	Included in New 2021 Admin Draft?	If in New 2021 Admin Draft - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Neighborhood Design				
Provide Bike Parking in Non-Residential Projects	T-33	All	Not Quantified	
Provide Bike Parking In Multi-Unit Residential Projects	T-33	All	Not Quantified	
Provide EV Parking	NO	NA	NA	
Dedicate Land for Bike Trails	NO	NA	NA	
Construct or Improve a Bike Facility	T-18-A	N/C (corridor)	0.8% of adjacent roadway VMT	
Construct of Improve Bike Boulevard	T-18-B	N/C (corridor)	0.2% of corridor VMT	
Expand Bikeway Network	T-19	N/C	0.50%	
Implement Conventional Carshare Program	T-20-A	N/C	0.15%	
Implement Electric Carshare Program	T-20-B	N/C	0.15%	
Implement Pedal (non-Electric) Bikeshare Program	T-21-A	N/C	0.02%	
Implement Electric Bikeshare Program	T-21-B	N/C	0.06%	
Implement Scootershare Program	T-21-C	N/C	0.07%	

Measure (by Sub-Sector)	Included in New 2021 Admin Draft?	If in New 2021 Admin Draft - Scale of Applicability (Project/Site(P/S), Neighborhood/City (N/C), All)	2021 VMT Reduction Max	2021 Sub-Sector Maximum
Transit				
Provide a Bus Rapid Transit System	NO	NA	NA	Project/Site: NA Neighborhood/ City: 15%
Implement Transit Access Improvements	NO	NA	NA	
Expand Transit Network Coverage or Hours	T-24	N/C	4.6%	
Expand Transit Service Frequency/Speed	T-25	N/C	11.3%	
Provide Bike Parking Near Transit	T-45	N/C	Not Quantified	
Provide Local Shuttles	NO	NA	NA	
Implement Transit-Supportive Roadway Treatments	T-26	N/C	0.6%	
Reduce Transit Fares	T-27	N/C	1.2%	
Provide Real-Time Transit Information	T-42	N/C	Not Quantified	
Provide Electric Shuttles	T-43	P/S	Not Quantified	
Improve Transit Access, Safety, and Comfort	T-44	N/C	Not Quantified	

The 2021 CAPCOA strategies are presented in **Figure 1** and further defined following the figure. **Figure 1** includes information about the appropriate context and scale for strategy application and potential VMT reduction. Note that the VMT reduction potential is specific to an affected population and may only apply to select types of VMT such as commute trips.

2021 CAPCOA VMT Reduction Strategies

The following 27 strategies have sufficient supporting evidence to quantify potential VMT reduction from their implementation.

T-1: Increase Residential Density

This measure accounts for the VMT reduction achieved by a project that is designed with a higher density of dwelling units (du) compared to the average residential density in the U.S. Increased densities affect the

distance people travel and provide greater options for the mode of travel they choose. Increasing residential density results in shorter and fewer trips by single-occupancy vehicles and thus a reduction in GHG emissions. This measure is best quantified when applied to larger developments and developments where the density is somewhat similar to the surrounding area due to the underlying research being founded in data from the neighborhood level.

T-2: Increase Job Density

This measure accounts for the VMT reduction achieved by a project that is designed with a higher density of jobs compared to the average job density in the U.S. Increased densities affect the distance people travel and provide greater options for the mode of travel they choose. Increasing job density results in shorter and fewer trips by single-occupancy vehicles and thus a reduction in GHG emissions.

T-3: Provide Transit-Oriented Development

This measure would reduce project VMT in the study area relative to the same project sited in a non-transit-oriented development (TOD) location. TOD refers to projects built in compact, walkable areas that have easy access to public transit, ideally in a location with a mix of uses, including housing, retail offices, and community facilities. Project site residents, employees, and visitors would have easy access to high-quality public transit, thereby encouraging transit ridership and reducing the number of single occupancy vehicle trips and associated GHG emissions.

T-4: Integrate Affordable and Below Market Rate Housing

This measure requires below market rate (BMR) housing. BMR housing provides greater opportunity for lower income families to live closer to job centers and achieve a jobs/housing match near transit. It is also an important strategy to address the limited availability of affordable housing that might force residents to live far away from jobs or school, requiring longer commutes. The quantification method for this measure accounts for VMT reductions achieved for multifamily residential projects that are deed restricted or otherwise permanently dedicated as affordable housing.

T-5: Implement Commute Trip Reduction Program (Voluntary)

This measure will implement a voluntary commute trip reduction (CTR) program with employers. CTR programs discourage single occupancy vehicle trips and encourage alternative modes of transportation such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions.

T-6: Implement Commute Trip Reduction Program (Mandatory Implementation and Monitoring)

This measure will implement a mandatory CTR program with employers. CTR programs discourage single-occupancy vehicle trips and encourage alternative modes of transportation such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions.

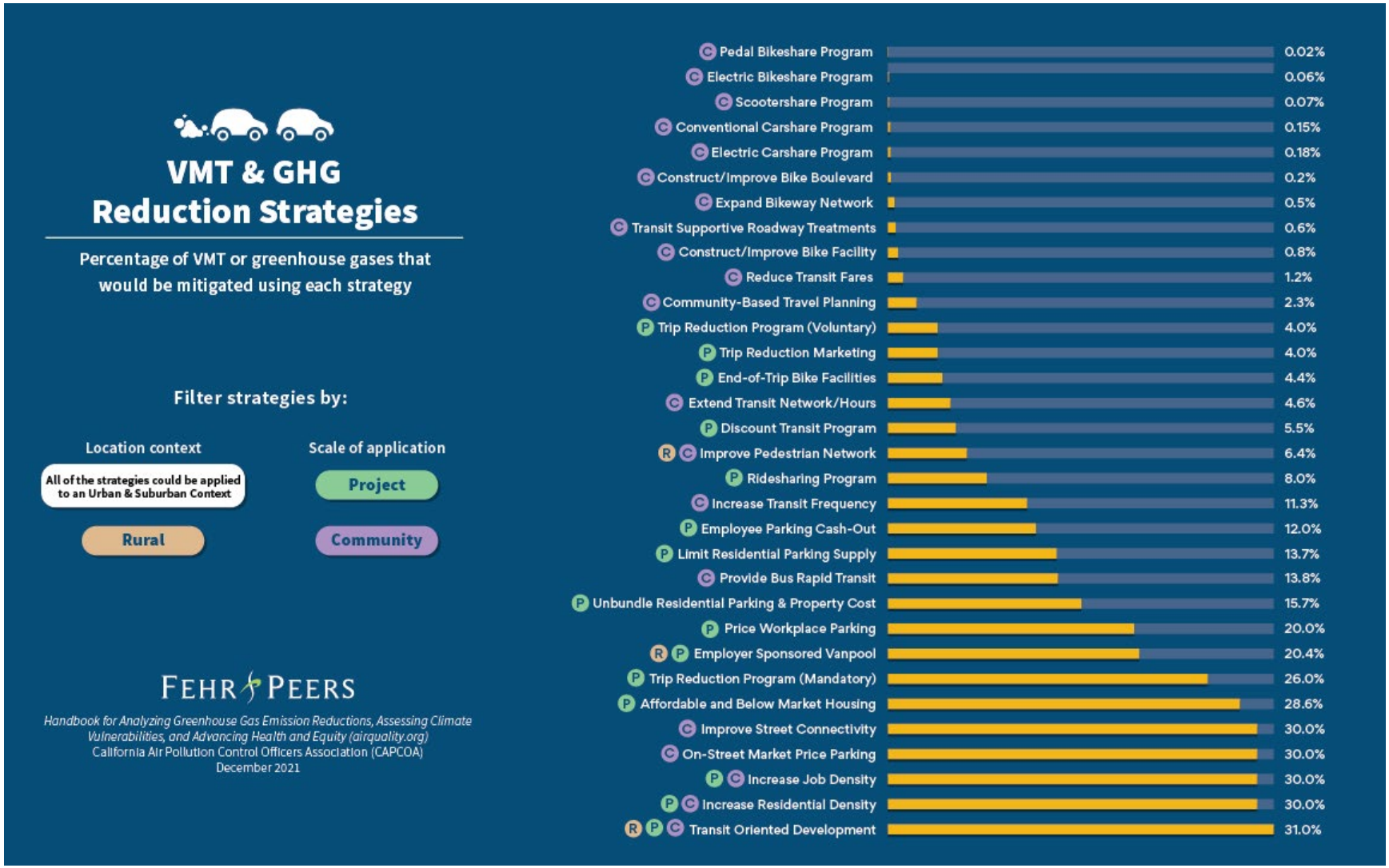


Figure 1 – CAPCOA Handbook VMT Reduction Strategies Summary

T-7: Implement Commute Trip Reduction Marketing

This measure will implement a marketing strategy to promote the project site employer's CTR program. Information sharing and marketing promote and educate employees about their travel choices to the employment location beyond driving such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions.

T-8: Provide Ridesharing Program

This measure will implement a ridesharing program and establish a permanent transportation management association with funding requirements for employers. Ridesharing encourages carpooled vehicle trips in place of single-occupied vehicle trips, thereby reducing the number of trips, VMT, and GHG emissions.

T-9: Implement Subsidized or Discounted Transit Program

This measure will provide subsidized or discounted, or free transit passes for employees and/or residents. Reducing the out-of-pocket cost for choosing transit improves the competitiveness of transit against driving, increasing the total number of transit trips and decreasing vehicle trips. This decrease in vehicle trips results in reduced VMT and thus a reduction in GHG emissions.

T-10: Provide End-of-Trip Bicycle Facilities

This measure will install and maintain end-of-trip facilities for employee use. End-of-trip facilities include bike parking, bike lockers, showers, and personal lockers. The provision and maintenance of secure bike parking and related facilities encourages commuting by bicycle, thereby reducing VMT and GHG emissions.

T-11: Provide Employer-Sponsored Vanpool

This measure will implement an employer-sponsored vanpool service. Vanpooling is a flexible form of public transportation that provides groups of 5 to 15 people with a cost-effective and convenient rideshare option for commuting. The mode shift from long-distance, single-occupied vehicles to shared vehicles reduces overall commute VMT, thereby reducing GHG emissions.

T-12: Price Workplace Parking

This measure will price onsite parking at workplaces. Because free employee parking is a common benefit, charging employees to park onsite increases the cost of choosing to drive to work. This is expected to reduce single-occupancy vehicle commute trips, resulting in decreased VMT, thereby reducing associated GHG emissions.

T-13: Implement Employee Parking Cash-Out

This measure will require project employers to offer employee parking cash-out. Cash-out is when employers provide employees with a choice of forgoing their current subsidized/free parking for a cash payment equivalent to or greater than the cost of the parking space. This encourages employees to use other modes of travel instead of single occupancy vehicles. This mode shift results in people driving less and thereby reduces VMT and GHG emissions.

T-14: Provide Electric Vehicle Charging Infrastructure

Install onsite electric vehicle chargers in an amount beyond what is required by the 2019 California Green Building Standards (CALGreen) at buildings with designated parking areas (e.g., commercial, educational, retail, multifamily). This will enable drivers of PHEVs to drive a larger share of miles in electric mode (eVMT), as opposed to gasoline-powered mode, thereby displacing GHG emissions from gasoline consumption with a lesser amount of indirect emissions from electricity. Most PHEVs owners charge their vehicles at home overnight. When making trips during the day, the vehicle will switch to gasoline mode if/when it reaches its maximum all-electric range.

T-15: Limit Residential Parking Supply

This measure will reduce the total parking supply available at a residential project or site. Limiting the amount of parking available creates scarcity and adds additional time and inconvenience to trips made by private auto, thus disincentivizing driving as a mode of travel. Reducing the convenience of driving results in a shift to other modes and decreased VMT and thus a reduction in GHG emissions. Evidence of the effects of reduced parking supply is strongest for residential developments.

T-16: Unbundle Residential Parking Costs from Property Cost

This measure will unbundle, or separate, a residential project's parking costs from property costs, requiring those who wish to purchase parking spaces to do so at an additional cost. On the assumption that parking costs are passed through to the vehicle owners/drivers utilizing the parking spaces, this measure results in decreased vehicle ownership and, therefore, a reduction in VMT and GHG emissions. Unbundling may not be available to all residential developments, depending on funding sources.

T-17: Improve Street Connectivity

This measure accounts for the VMT reduction achieved by a project that is designed with a higher density of vehicle intersections compared to the average intersection density in the U.S. Increased vehicle intersection density is a proxy for street connectivity improvements, which help to facilitate a greater number of shorter trips and thus a reduction in GHG emissions.

T-18: Provide Pedestrian Network Improvement

This measure will increase the sidewalk coverage to improve pedestrian access. Providing sidewalks and an enhanced pedestrian network encourages people to walk instead of drive. This mode shift results in a reduction in VMT and GHG emissions.

T-19-A: Construct or Improve Bike Facility

This measure will construct or improve a single bicycle lane facility (only Class I, II, or IV) that connects to a larger existing bikeway network. Providing bicycle infrastructure helps to improve biking conditions within an area. This encourages a mode shift on the roadway parallel to the bicycle facility from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. When constructing or improving a bicycle facility, a best practice is to consider local or state bike lane width standards. A variation of this measure is provided as T-19-B, Construct or Improve Bike Boulevard.

T-19-B: Construct or Improve Bike Boulevard

Construct or improve a single bicycle boulevard that connects to a larger existing bikeway network. Bicycle boulevards are a designation within Class III Bikeway that create safe, low-stress connections for people biking and walking on streets. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. A variation of this measure is provided as T-19-A, Construct or Improve Bike Facility, which is for Class I, II, or IV bicycle infrastructure.

T-20: Expand Bikeway Network

This measure will increase the length of a city or community bikeway network. A bicycle network is an interconnected system of bike lanes, bike paths, bike routes, and cycle tracks. Providing bicycle infrastructure with markings and signage on appropriately sized roads with vehicle traffic traveling at safe speeds helps to improve biking conditions (e.g., safety and convenience). In addition, expanded bikeway networks can increase access to and from transit hubs, thereby expanding the "catchment area" of the transit stop or station and increasing ridership. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. When expanding a bicycle network, a best practice is to consider bike lane width standards from local agencies, state agencies, or the National Association of City Transportation Officials' Urban Bikeway Design Guide.

T-21-A: Implement Conventional Carshare Program

This measure will increase carshare access in the user's community by deploying conventional carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions. A variation of this measure, electric carsharing, is described in Measure T-21-B, Implement Electric Carshare Program.

T-21-B: Implement Electric Carshare Program

This measure will increase carshare access in the user's community by deploying electric carshare vehicles. Carsharing offers people convenient access to a vehicle for personal or commuting purposes. This helps encourage transportation alternatives and reduces vehicle ownership, thereby avoiding VMT and associated GHG emissions. This also encourages a mode shift from internal combustion engine vehicles to electric vehicles, displacing the emissions-intensive fossil fuel energy with less emissions-intensive electricity. Electric carshare vehicles require more staffing support compared to conventional carshare programs for shuttling electric vehicles to and from charging points. A variation of this measure, conventional carsharing, is described in Measure T-21-A, Implement Conventional Carshare Program.

T-22-A: Implement Pedal (Non-Electric) Bikeshare Program

This measure will establish a bikeshare program. Bikeshare programs provide users with on-demand access to bikes for short term rentals. This encourages a mode shift from vehicles to bicycles, displacing VMT and thus reducing GHG emissions. Variations of this measure are described in Measure T-22-B, Implement Electric Bikeshare Program, and Measure T-22-C, Implement Scootershare Program.

T-22-B: Implement Electric Bikeshare Program

This measure will establish an electric bikeshare program. Electric bikeshare programs provide users with on-demand access to electric pedal assist bikes for short-term rentals. This encourages a mode shift from vehicles to electric bicycles, displacing VMT and reducing GHG emissions. Variations of this measure are described in Measure T-22-A, Implement Pedal (Non-Electric) Bikeshare Program, and Measure T-22-C, Implement Scootershare Program.

T-22-C: Implement Scootershare Program

This measure will establish a scootershare program. Scootershare programs provide users with on-demand access to electric scooters for short-term rentals. This encourages a mode shift from vehicles to scooters, displacing VMT and thus reducing GHG emissions. Variations of this measure are described in Measure T-22-A, Implement Pedal (Non-Electric) Bikeshare Program, and Measure T-22-B, Implement Electric Bikeshare Program.

T-23: Provide Community-Based Travel Planning

This measure will target residences in the plan/community with community-based travel planning (CBTP). CBTP is a residential based approach to outreach that provides households with customized information, incentives, and support to encourage the use of transportation alternatives in place of single occupancy vehicles, thereby reducing household VMT and associated GHG emissions.

T-24: Implement Market Price Public Parking (On-Street)

This measure will price all on-street parking in a given community, with a focus on parking near central business districts, employment centers, and retail centers. Increasing the cost of parking increases the total cost of driving to a location, incentivizing shifts to other modes and thus decreasing total VMT to and from the priced areas. This VMT reduction results in a corresponding reduction in GHG emissions.

T-25: Extend Transit Network Coverage or Hours

This measure will expand the local transit network by either adding or modifying existing transit service or extending the operation hours to enhance the service near the project site. Starting services earlier in the morning and/or extending services to late-night hours can accommodate the commuting times of alternative-shift workers. This will encourage the use of transit and therefore reduce VMT and associated GHG emissions.

T-26: Increase Transit Service Frequency

This measure will increase transit frequency on one or more transit lines serving the plan/community. Increased transit frequency reduces waiting and overall travel times, which improves the user experience and increases the attractiveness of transit service. This results in a mode shift from single occupancy vehicles to transit, which reduces VMT and associated GHG emissions.

T-27: Implement Transit-Supportive Roadway Treatments

This measure will implement transit-supportive treatments on the transit routes serving the plan/community. Transit-supportive treatments incorporate a mix of roadway infrastructure improvements and/or traffic signal modifications to improve transit travel times and reliability. This results in a mode shift from single occupancy vehicles to transit, which reduces VMT and the associated GHG emissions.

T-28: Provide Bus Rapid Transit

This measure will convert an existing bus route to a bus rapid transit (BRT) system. BRT includes the following additional components, compared to traditional bus service: exclusive right-of-way (e.g., busways, queue jumping lanes) at congested intersections, increased limited-stop service (e.g., express service), intelligent transportation technology (e.g., transit signal priority, automatic vehicle location systems), advanced technology vehicles (e.g., articulated buses, low-floor buses), enhanced station design, efficient fare-payment smart cards or smartphone apps, branding of the system, and use of vehicle guidance systems. BRT can increase the transit mode share in a community due to improved travel times, service frequencies, and the unique components of the BRT system. This mode shift reduces VMT and the associated GHG emissions.

T-29: Reduce Transit Fares

This measure will reduce transit fares on the transit lines serving the plan/community. A reduction in transit fares creates incentives to shift travel to transit from single-occupancy vehicles and other traveling modes, which reduces VMT and associated GHG emissions. This measure differs from Measure T-8, Implement Subsidized or Discounted Transit Program, which can be offered through employer-based benefits programs in which the employer fully or partially pays the employee's cost of transit.

VMT Mitigation Measure Effectiveness and Feasibility

The determination of VMT mitigation effectiveness and feasibility is largely determined based on the CAPCOA Handbook evidence. The maximum VMT reduction associated with each mitigation project was then determined from the CAPCOA Handbook or alternative data source with a similar level of supporting evidence. Before actual quantification of any reduction in the project's induced VMT can be performed, additional information, data, and modeling is required as outlined below.

VMT Mitigation Measure Quantification

The reductions presented in the CAPCOA Handbook are all expressed as percentages – this allows for a high level of flexibility in analyzing VMT on an average daily, or on an annual basis. However, each measure may apply to only a subset of VMT (such as commute or home-based work VMT) – so it is imperative to understand what sort of VMT inputs are needed when mitigating induced automobile VMT. A VMT lexicon shown in **Figure 2** provides additional insights about various VMT types.

Most of the strategies in **Table 3** focus on reducing VMT within physical areas such as communities. The mitigation actions do not involve directly modifying the project alternatives. In these instances, the specific community area must be defined and the types of trips that will be influenced must also be determined. It is also possible that mitigation could include a specific land use project that would be subject to new VMT reduction strategies. In either case, the analysis needs to account for the fact that the strategy will be reducing the VMT being generated by the project site or community area. The VMT reduction associated with that strategy then needs to be applied against the project's VMT to determine the amount of VMT reduction that has been achieved.

Metric	Definition	Example
Total VMT	All vehicle-trips (i.e., passenger and commercial vehicles) assigned on the network within a specific geographic boundary (i.e., model-wide, region-wide, city-wide). Vehicle volume on each link is multiplied by link distance. For use in VMT mitigation analysis, commercial vehicle trips/VMT should be excluded.	
Total VMT generated by a project	All vehicle-trips generated by the site/zone are traced to the zone or zones of study. May use final assignment origin-destination (OD) trip tables or production (P) and attraction (A) estimates multiplied by distance skims. When the model has multiple assignment periods, OD trip tables and congested skims from each period should be used.	
Household VMT per resident	All automobile (i.e., passenger cars and light-duty trucks) vehicle-trips are traced back to the residence of the trip-maker, even non-home-based trips.	
Home-Based VMT per resident	All home-based automobile vehicle trips are traced back to the residence of the trip-maker; non-home-based trips are excluded.	
Home-Based Work (HBW) VMT per employee	All automobile trips between home and work are counted.	

Attachment E: Adopted VMT Resolution