Transportation Assessment Guidelines

Prepared for:
City of Rolling Hills Estates

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FEHR PEERS

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Introduction

The City of Rolling Hills Estates (City) Departments of Community Development and Public Works requires Applicants to analyze the traffic and circulation elements of proposed development projects, General Plan Amendments (GPAs), Specific Plans (SPs), and other planned development to comply with the California Environmental Quality Act (CEQA) and City regulations. These requirements shall be satisfied through the preparation of a Transportation Assessment (TA) document prepared in conformance with the Departments of Community Development and Public Works requirements as described in this Transportation Assessment Guidelines (TAG) document.

The TAG provides direction for this review consistent with the General Plan Mobility Element vision that "*provides a safe, multimodal, efficient transportation system that meets the current and future needs of Rolling Hills Estates*." The TAG outlines the format and methodology that is required to be utilized in the study preparation. The purpose of these guidelines is to establish procedures to ensure consistency of analysis and the adequacy of information presented regarding the proposed development project or plan. In many cases, coordination with City staff will be required to provide further specific guidance regarding the scope and content of the TA.

Background

Senate Bill (SB) 743, signed in 2013, changes the way transportation studies are conducted in California Environmental Quality Act (CEQA) documents. In January 2019, the Natural Resources Agency and the Governor's Office of Planning and Research (OPR) codified SB 743 into the Public Resources Code (PRC) and the *State CEQA Guidelines*. Vehicle miles traveled (VMT) replaces motorist delay and level of service (LOS) as the metric for impact determination (Id. at subd. (b)(2)). For land development projects, VMT is

defined as the product of the daily trips generated by a new development and the distance those trips travel to their destinations.

Transportation Assessment Process

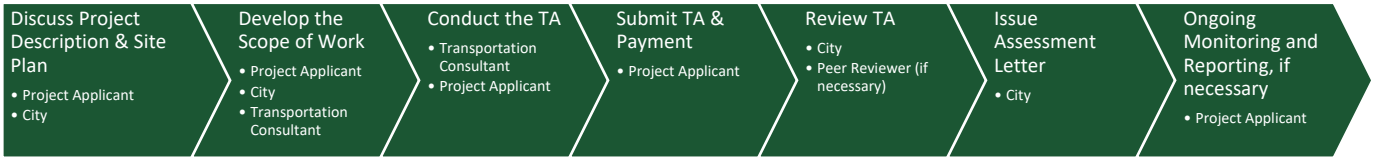
This section provides an overview of the City's transportation assessment process, including roles of participants (project applicant, transportation consultant, peer reviewer, and the City) and their responsibilities. A Traffic Engineer consultant or a Civil Engineer registered in the State of California, qualified to practice traffic engineering shall be selected at the sole discretion of the City and shall be compensated for all fees, costs and expenses by the applicant for preparation of the TA. **Table 1** below provides a description of the responsibilities and tasks of each participant in the City's transportation assessment process.

Table 1: Roles and Responsibilities

Role	Responsibility
City	The Departments of Community Development and/or Public Works will review and approve the proposed scope of work, CEQA document/transportation study, and mitigation measures/conditions of approval.
Project Applicant	Provide the project description and contract with a qualified, primary transportation consultant approved by the City to perform the transportation review, as well as pay the cost of a peer review transportation consultant as deemed necessary by the City. Applicant will also pay for any supplemental, Non-CEQA study. For example, a parking study.
Transportation Consultant	Conduct an unbiased review of the effects of the project on the transportation network by completing the scope of work developed and agreed upon with the City.
Peer Reviewer	Conduct an unbiased peer review of the CEQA/supplemental transportation assessment. The City staff will peer review the supplemental, Non-CEQA studies, such as parking or site circulation. Only in the cases where there are conflicting CEQA studies, such as discrepancies, will the City staff conduct a peer review.

Figure 1 below provides a flow chart of the City's transportation assessment review process, beginning with the initial discussion of the proposed project description and site plan, followed by initiating the transportation assessment study, and ending with ongoing monitoring. Each step in the flow chart includes a sub bullet of the participating individual(s).

Figure 1: City of Rolling Hills Estates Transportation Assessment Process



Developing the Scope of Work

At the outset of the project development process, the Applicant should seek a meeting with City staff to discuss the project description and location, the TA study content, and the analysis methodology. Key elements to address include a description of the project in sufficient detail to determine project trip generation, study area, and to identify the appropriate level of analysis based on the City's screening criteria. In addition, discuss the methodology to estimate project VMT, along with project design features and transportation demand management (TDM) strategies per the City's TDM ordinance for non-residential[1] that may reduce the VMT from the project development. As a result of the meeting, the Applicant or its consultant shall prepare a TA scope of work for review and approval by the City.

Table 2 below provides a comprehensive list of the potential scoping elements for a typical TA study in the City of Rolling Hills Estates. The final scoping list will be confirmed by the City on a project-by-project basis during this stage of the TA process.

[1] https://library.municode.com/ca/rolling_hills_estates/codes/code_of_ordinances?nodeId=TIT10VETR_CH10.56TRDEMATRRE

Table 2: Transportation Assessment Scoping Elements

Topic	Sub-Topic	Description
Project Summary	Project Description	Provide an overview of the proposed land uses and site plan
	Study Area Description	Identify the extents of the study area, including study intersections and freeway ramps, as well as existing environmental setting
	Trip Generation/Distribution	Provide trip generation and distribution estimates based on the project description
CEQA Analysis	Consistency with Plans	Conduct a review of the project description's consistency with plans, policies, and programs
	Detailed VMT Analysis	If the project does not screen out of CEQA review, conduct a detailed VMT analysis compliant with CEQA Guidelines section 15064.3.
	Hazards Evaluation & Emergency Access	Conduct a review of the site plan to ensure no hazardous geometries are proposed, and that emergency access is maintained
	Mitigation Identification	If necessary, develop a list of actions to mitigate transportation-related impacts identified through the plan review, VMT analysis, and emergency access and hazards assessment
Supplemental Transportation Assessment	Auto level of service analysis	Analyze peak-hour level of service at identified study intersections using the Highway Capacity Manual (HCM) methodology, including queuing analysis for turning bays.
	Site Plan Review	Conduct a thorough review of the project site plan to ensure adequate circulation and consistency with design guidance
	Project Construction Plan	Identify the haul routes, any required street/lane closures, parking plan for the construction workers, and hours of operation
	Pedestrian, Bicycle, and Transit Access Assessment	Analyze the effects of the project on pedestrian, bicycle, and transit facilities in the study area
Transportation Demand Management	TDM Plan	Develop a transportation demand management plan for the project, and in accordance with the City's TDM ordinance for non-residential projects
	TDM Compliance	Monitor compliance with the TDM Plan on an ongoing basis, as determined in the COA below

Conditions of Approval (COA)

The City will establish the Conditions of Approval (COA) for the project following the final review of TA, which could include mitigation actions identified through the CEQA process as well as other conditions determined by the City required for approval of the project – such as the Project Construction Plan, or a supplemental Parking study.

Table 3 below provides the screening checklist of the required scoping elements for the project TA.

Table 3: Screening Checklist of TA Scoping Elements

Topic	Sub-Topic	**Project Generates <25** Vehicle Trips During Peak Hour	**Project Generates >25** Vehicle Trips During Peak Hour	**Does Not Pass CEQA VMT Screen**
Project Summary	Project Description	✓	✓	✓
	Study Area Description	✓	✓	✓
	Trip Generation/Distribution	✓	✓	✓
CEQA Analysis	Consistency with Plans	✓	✓	✓
	Detailed VMT Analysis	Not required if passes VMT screen	Not required if passes VMT screen	✓
	Emergency Access & Hazards Assessment	✓	✓	✓
	Mitigation Identification			✓
Transportation Assessment	Auto level of service analysis		✓	✓
	Site Plan Review		✓	✓
	Pedestrian, Bicycle, and Transit Access Assessment		✓	✓
Transportation Demand Management	TDM Plan		✓	✓
	TDM Compliance		✓	✓
Conditions of Approval	Conditions of Approval	✓	✓	✓

Project Summary

The TA will include a **Project Summary**, which contains (1) the project description, (2) the defined study area, and (3) project trip generation and trip distribution. **Table 4** below provides a description of each of the three sub-topics and the information that should be provided in the TA.

Table 4: Description of the Project Summary Section of the TA

Topic	Sub-Topic	Description
Project Summary	Project Description	Describe the project, including the proposed size and land use type(s), location, parcel number, whether it is replacing an existing land use, number of parking spaces, and an overview of the proposed site plan.
	Study Area Description	The criteria for defining the study area balances the need to have a robust understanding of the effects of the project with the level of effort required both to conduct (consultant/project applicant) and review (City) the analysis. The number and location of the intersections will be determined in coordination with City staff but may include: • Intersections at the block ends of the project • Signalized intersections • All way/side-street stop-controlled intersections
	Trip Generation/Distribution	**Utilize trip generation rates from the latest version of the Institute of Transportation Engineers (ITE) Trip Generation Manual.** This City will consider modified rates if the project applicant has specific trip generation data supporting other rates. The project applicant must provide the City with supporting documentation justifying the modified rates.

CEQA Analysis

The CEQA section of the TA will include the required CEQA checklist questions for transportation impact determination, including (1) project consistency with City plans/policies, (2) VMT assessment (3) hazards evaluation, and (4) emergency vehicle access. Additionally, freeway analysis may be required. **Table 5** below provides a description of each of the five sub-topics and the information that should be provided in the TA -including the appropriate methodologies.

Table 5: Description of the CEQA Analysis Section of the TA

Topic	Sub-Topic	Description
CEQA Analysis	Consistency with Plans	**The project should be reviewed against the following list of programs, plans, and policies to determine project consistency:** • Rolling Hills Estates General Plan • Rolling Hills Estates Municipal Code Title 10 – Vehicles and Traffic • Rolling Hills Estates Municipal Code Title 11 – Streets, Sidewalks, and Public Places • Rolling Hills Estates Municipal Code Chapter 17.40 – Off-Street Parking • Rolling Hills Estates Local Roadway Safety Plan • Rancho Palos Verdes and Rolling Hills Estates Hazard Mitigation Plan • LA Metro Active Transportation Strategic Plan • SCAG Regional Transportation Plan (RTP)
	VMT Analysis	**The following screening criteria shall be used to determine if the project may be screened from further VMT analysis:** • Would the project generate a net increase of 110 or more daily vehicle trips? If yes, further VMT analysis may be required. • Is the project located in a Transit Priority Area (TPA) or on a High-Quality Transit Corridor (HQTC). If no, further VMT analysis may be required. • Does the retail portion (if any) of the project exceed 50,000 square feet or is not local serving in nature? If yes, further VMT analysis required. • If the project does not satisfy the small project screening criteria (<110 daily trips), the retail screening criteria or is not located in a TPA or on a HQTC corridor then map based screening can be used. If the project is in a high-VMT generating area (using data from the current SCAG travel model) with respect to the Citywide average baseline VMT then further VMT analysis is required.

Topic	Sub-Topic	Description
	Hazards Evaluation & Emergency Access	Conduct a review of the site plan to ensure no hazardous geometries are proposed, and that emergency access is maintained
	Mitigation Identification	If the project/plan results in a significant impact for any one of the above CEQA sub-topics, feasible mitigation measures must be identified. A list of transportation demand management (TDM) strategies to reduce VMT is provided is the subsequent chapters. Additionally, the project applicant may be required to pay a transportation impact fee -with the funds allocated to VMT-related mitigation actions.

Project/Plan VMT Analysis Methodology

For projects/plans that do not meet any of the screening criteria described in **Table 5**, a VMT analysis would be required to determine if the project/plan or plan exceeds the City's VMT thresholds. The VMT analysis would rely on the best available data to inform trip generation and trip length estimates for the project uses. For land use plans (e.g., specific plans or community plans) and projects consisting of typical land use types, such as residential, office, and retail land uses, the VMT analysis may be conducted using the most recent version of the SCAG model. For other unique project types, such as a conference center, hotel or performing arts center, the VMT analysis should be customized to determine the unique trip generation and trip length characteristics of the proposed uses.

As required under current practice, the VMT analysis should consider the potential impacts of the project under both existing and future/cumulative conditions as follows:

- **Existing/Baseline Conditions**: Project-generated VMT should be estimated for the proposed land uses under existing/baseline conditions. VMT can be estimated using the SCAG regional travel demand model and should be reported as VMT per capita (residential projects), VMT per employee (office projects), or VMT per service population (other land uses).
- **Cumulative Conditions**: A project that is below the City's thresholds based on VMT per capita (residential projects), VMT per employee (office projects), or VMT per service population (other land uses) and does not have a VMT impact compared to baseline conditions would also not have a cumulative impact as long as it is aligned with long-term environmental goals and relevant plans.

Project effects on VMT can also be considered under cumulative conditions to determine if community plans or Citywide VMT would be higher/lower in the future with the project in place. To evaluate the project's effects on VMT, the future year travel demand model can be updated by the transportation planner/engineer completing the VMT analysis to reflect the project and determine if VMT increases or

not with the project. A redistribution of land use can be completed to ensure that the "no project" assessment and the "with project" assessment contain the same land use control totals, especially if the project is large enough that it would affect land use absorption elsewhere.

City VMT Thresholds of Significance

The VMT thresholds for all projects and plans in the City of Rolling Hills Estates are summarized below in **Table 6**.

Table 6: City Of Rolling Hills Estates VMT Thresholds

Project Type	Threshold for Determination of Significant VMT Impact
Residential Project	Project exceeds 15% below the Citywide Baseline VMT for home-based VMT per capita
Employment (Commercial or Industrial) Project	Project exceeds 15% below the Citywide Baseline VMT for home-based work VMT per employee
Regional Retail Project	Project results in a net increase in total VMT per service population in comparison to the Citywide Baseline VMT
Mixed-Use Projects	Evaluate each respective project VMT metric using the criteria above, based on the land use mix. For example, if the project is a mixed-use residential and office, then VMT per capita and VMT per employee metrics should be calculated for the entire project.
Land Use Plans (Community Plan, Specific Plan)	Total VMT per service population generated by the Plan exceeds 15% below the Citywide Baseline VMT
Other land use types	Project exceeds 15% below the Citywide Baseline VMT. For land use types not listed above, the County can determine the appropriate VMT metric depending on the project characteristics. For projects that are generally producing job-related travel, the employment generating VMT (home-based work VMT per employee) can be compared to the citywide baseline. For other projects, the total VMT per service population can be compared to the Citywide baseline, or the net change in VMT can be compared within the study area.
Transportation Projects or Plans	Project results in an increase in VMT in comparison to the baseline VMT in the study area

Supplemental Transportation Assessment

This section describes the analysis requirements for the supplemental transportation assessment portion of the TA. As a reminder, these analyses are not required by CEQA and are instead requested by the City for additional detail and operational context for the effects of the project/plan on the surrounding transportation system. **Table 7** below provides the outline of sub-topics that are to be included in the supplemental transportation assessment, including a description of the criteria and/or methodology that should be applied for each sub-topic.

Table 7: Description of the Supplemental Analysis Section of the TA

Topic	Sub-Topic	Description
Data Collection		Applicants/Consultants should collect traffic counts for the identified study locations, unless the City has counts available in their archive that are within the past 2 years. Suitability of the traffic counts will be determined by City staff prior to use in the analysis.. As part of the initial data collection, the traffic counts should also collect biking and walking count information, in addition to vehicular counts.
Supplemental Transportation Assessment	Auto level of service analysis (LOS)	The City requires a level of service (LOS) analysis for the identified study intersections to determine any potential operation deficiencies as a result of the proposed project/plan in the City. The criteria for selecting the study intersections were previously noted. **LOS Analysis Methodology** The LOS analysis methodology will utilize the Highway Capacity Manual (HCM) to estimate average driver delay. This can be done using a software program such as Synchro. **Analysis Scenarios** The project/plan shall analyze the following scenarios: • Existing Baseline Conditions – based on the year of notice of preparation (NOP) of the proposed project/plan. • Opening Year without Project – This is the opening year of the project (or buildout year of the plan) without the project/plan. In other words, the cumulative baseline. • Opening Year with Project – This assesses the opening year with the project/plan conditions. **Growth Factor & Cumulative Projects** For the opening year analysis scenarios, the study shall apply an annual growth rate factor as determined by City Staff along with the growth associated with cumulative development projects in the City.

Topic	Sub-Topic	Description
		Evaluation Metrics and Deficiencies Criteria The project/plan evaluation metric is level of service (LOS) and delay at the study intersections (using the HCM methodology). An intersection will be shown to have an LOS deficiency if one of the following criteria is met: • An intersection operating at LOS E experiences an added delay of **4.0 seconds or more** with the addition of the proposed project/plan. If this occurs, corrective measures are necessary to bring the intersection back to its existing LOS E (i.e., net zero delay). • An intersection operating at LOS F experiences an added delay of **2.0 seconds or more** with the addition of the proposed project/plan. If this occurs, corrective measures are necessary to bring the intersection back to its existing LOS F (i.e., net zero delay).
	Site Plan Review	Conduct a thorough review of the project site plan to ensure adequate circulation and consistency with design guidance
	Project Construction Plan	Identify the haul routes, any required street/lane closures, parking plan for the construction workers, and hours of operation
	Pedestrian, Bicycle, and Transit Access Assessment	This type of assessment creates a more cohesive understanding of the full transportation network in the study area and aligns with the General Plan update goals and policies. This sub-topic involves analyzing the effects of the project/plan on pedestrian, bicycle, and transit facilities in the study area. The study area radii will be 1/4-mile for pedestrian and transit facilities (5-minute walk) and ½-mile for bike facilities (5-minute bike ride).

Transportation Demand Management Mitigation

This section outlines the City expectations for establishing a transportation demand management (TDM) mitigation plan for the project/plan. **Table 8** below outlines the process.

Table 8: Description of the Transportation Demand Management Mitigation Section of the TA

Topic	Sub-Topic	Description
Transportation Demand Management Mitigation	TDM Mitigation Plan	Developing a TDM mitigation plan will be a first step in mitigating any identified VMT project impacts. A menu of TDM options applicable to the City is provided Appendix A. However, for projects that don't have VMT impacts to mitigate, the City may still require the development of a TDM plan to ensure that multimodal goals included in the General Plan update are reinforced through development projects in the City.
	TDM Mitigation Compliance	The City may require reporting on an annual or bi-annual basis through resident/commuter surveys, parking studies, and/or driveway counts. This would allow the City to collect regular data on the efficacy of TDM strategies in Rolling Hills Estates.

The land use context of Rolling Hills Estates presents a challenge to the effectiveness of common TDM strategies for VMT reduction at individual project sites in the more suburban areas of the City. Despite this challenge, identifying mitigations that reduce the number of single-occupant vehicle trips and miles traveled generated by proposed projects is still relevant. Land use and transportation plans, such as Community Plans or Active Transportation Plans, provide an opportunity to reduce VMT through defining land uses mixes and densities and providing a circulation network that minimizes longer distance trips and promotes travel through active modes of transportation. This chapter summarizes the near-term TDM strategies suited to the City's transportation and land use context and identifies potential longer-term mitigation programs that may be worthy of further evaluation.

VMT Mitigation through TDM

Projects with VMT impacts should have mitigation options available for implementation. The types of mitigation that affect VMT are those that reduce the number of single-occupant vehicles generated by the site. This can be accomplished by changing the proposed land uses, modifying the project design features, or by implementing TDM strategies. TDM strategies have been determined to be among the most effective VMT mitigators. TDM strategies are reductions made through project site modifications, programming, and operational changes.

The scale of a TDM strategy is an important consideration for mitigation effectiveness. The biggest effects of TDM strategies on VMT (and resultant emissions) derive from regional policies related to land use

location efficiency and infrastructure investments that support taking transit, walking, and bicycling. While there are many measures that can influence VMT and emissions related to site design and building operations, those measures have smaller effects that are often dependent on final building tenants.

TDM Strategies: Near-Term

Specific mitigation strategies need to be tailored to the project characteristics and their effectiveness needs to be analyzed and documented as part of the environmental review process to determine if impacts could be mitigated or if they would remain significant and unavoidable. Given that research on the effectiveness of TDM strategies is continuing to evolve, feasible mitigation measures should be considered based on the best data available at the time a project is being considered by the City.

The research provided by the CAPCOA[2] estimates the effectiveness of VMT reductions by land use type, such as residential or office, and place type, such as urban or suburban. The TDM strategies illustrated in **Appendix A** can be considered for VMT mitigation measures in Rolling Hills Estates. This appendix provides a table describing each strategy in detail with the maximum amount of VMT reduction based on CAPCOA research. To ensure that mitigation measures are implemented and effective, mitigation monitoring may be required once the project is in operation.

[2] Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity. CAPCOA (2021). https://www.airquality.org/ClimateChange/Documents/Final%20Handbook_AB434.pdf

Appendix A:
TDM Mitigation Strategies

CAPCOA 2021 ID[1]	Measure	Sector	Applicable Context	Scale of application	Type of VMT affected	Measure Description	Maximum Reduction[2]
T-1	Increase Residential Density	Land Use	Urban, Suburban	Project / Site	Project-generated trips	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.	30.0%
T-2	Increase Job Density	Land Use	Urban, Suburban	Project / Site	Project-generated trips	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.	30.0%
T-3	Provide Transit-Oriented Development	Land Use	Urban, Suburban, Rural	Project / Site	Project-generated trips	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 singleoccupancy vehicle trips and associated GHG emissions.	31.0%
T-4	Integrate Affordable and Below Market Rate Housing	Land Use	Urban, Suburban	Project / Site	Project-generated trips	This measure accounts for VMT reduction achieved for multi-family residential projects that are deed restricted or otherwise permanently dedicated as affordable housing.	28.6%
T-5	Implement Commute Trip Reduction Program (Voluntary)	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	This measure will implement a voluntary commute trip reduction (CTR) program with employers. CTR programs discourage singleoccupancy vehicle trips and encourage alternative modes of transportation such as carpooling, taking transit, walking, and biking, thereby reducing VMT and GHG emissions.	4.0%
T-6	Implement Commute Trip Reduction Program (Mandatory Implementation and Monitoring)	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	26.0%
T-7	Implement Commute Trip Reduction Marketing	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	4.0%

CAPCOA 2021 ID[1]	Measure	Sector	Applicable Context	Scale of application	Type of VMT affected	Measure Description	Maximum Reduction[2]
T-8	Provide Ridesharing Program	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	8.0%
T-9	Implement Subsidized or Discounted Transit Program - Employees Only	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	5.5%
T-9-A	Implement Subsidized or Discounted Transit Program - Employees and Residents	Trip Reduction Programs	Urban, Suburban	Project / Site	Project-generated trips	This measure will provide subsidized or discounted, or free transit passes for employees and 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.	5.5%
T-10	Provide End-of-Trip Bicycle Facilities	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	4.4%
T-11	Provide Employer-Sponsored Van pool	Trip Reduction Programs	Urban, Suburban, Rural	Project / Site	Employee commute trips	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.	8.1%
T-12	Price Workplace Parking	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	20.0%
T-13	Implement Employee Parking Cash-Out	Trip Reduction Programs	Urban, Suburban	Project / Site	Employee commute trips	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.	12.0%

CAPCOA 2021 ID[1]	Measure	Sector	Applicable Context	Scale of application	Type of VMT affected	Measure Description	Maximum Reduction[2]
T-14	Provide Electric Vehicle Charging Infrastructure	Parking or Road Pricing/Management	Urban, Suburban, Rural	Project / Site	N/A	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, multi-family). 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.	11.9% (GHG only; no effect on VMT)
T-15	Limit Residential Parking Supply	Parking or Road Pricing/Management	Urban, Suburban	Project / Site	Project-generated trips	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.	13.7%
T-16	Unbundle Residential Parking Costs from Property Cost	Parking or Road Pricing/Management	Urban, Suburban	Project / Site	Project-generated trips	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.	15.7%
T-17	Improve Street Connectivity	Land Use	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	30.0%
T-18	Provide Pedestrian Network Improvements	Neighborhood Design	Urban, Suburban, Rural	Community-wide / Large Plan Area	Household trips	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.	6.4%
T-19-A	Construct or Improve Bike Facility	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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-18-B, Construct or Improve Bike Boulevard.	0.8%

CAPCOA 2021 ID[1]	Measure	Sector	Applicable Context	Scale of application	Type of VMT affected	Measure Description	Maximum Reduction[2]
T-19-B	Construct or Improve Bike Boulevard	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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-18-A, Construct or Improve Bike Facility, which is for Class I, II, or IV bicycle infrastructure.	0.2%
T-20	Expand Bikeway Network	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	Employee commute trips	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.	0.5%
T-21-A	Implement Conventional Carshare Program	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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-20-B, Implement Electric Carshare Program.	0.15%
T-21-B	Implement Electric Carshare Program	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	N/A	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-20-A, Implement Conventional Carshare Program.	0.18%

CAPCOA 2021 ID[1]	Measure	Sector	Applicable Context	Scale of application	Type of VMT affected	Measure Description	Maximum Reduction[2]
T-22-A	Implement Pedal (Non-Electric) Bikeshare Program	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	This measure will establish a bikeshare program. Bikeshare programs provide users with on-demand access to bikes for shortterm 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-21-B, Implement Electric Bikeshare Program, and Measure T-21-C, Implement Scootershare Program.	0.02%
T-22-B	Implement Electric Bikeshare Programs	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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-21-A, Implement Pedal (Non-Electric) Bikeshare Program, and Measure T-21-C, Implement Scootershare Program.	0.06%
T-22-C	Implement Scootershare Program	Neighborhood Design	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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-21-A, Implement Pedal (Non-Electric) Bikeshare Program, and Measure T-21-B, Implement Electric Bikeshare Program.	0.07%
T-23	Community-Based Travel Planning	Trip Reduction Programs	Urban, Suburban	Community-wide / Large Plan Area	Household trips	This measure will target residences in the plan/community with community-based travel planning (CBTP). CBTP is a residentialbased 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 VMT and associated GHG emissions.	2.3%
T-24	Implement Market Price Public Parking (On-Street)	Parking or Road Pricing/Management	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	30.0%
T-25	Extend Transit Network Coverage or Hours	Transit	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	4.6%

CAPCOA 2021 ID[1]	Measure	Sector	Applicable Context	Scale of application	Type of VMT affected	Measure Description	Maximum Reduction[2]
T-26	Increase Transit Service Frequency	Transit	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	11.3%
T-27	Implement Transit-Supportive Roadway Treatments	Transit	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	0.6%
T-28	Provide Bus Rapid Transit	Transit	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	13.8%
T-29	Reduce Transit Fares	Transit	Urban, Suburban	Community-wide / Large Plan Area	All neighborhood/ city trips	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.	1.2%

Source: Fehr & Peers, 2022.

1. Refer to updated information contained in the 2021 GHG Handbook. CAPCOA (2021) Each measure is numbered alphanumerically with the first letter of the emissions sector serving as the letter code (e.g., T=Transportation).

2. Maximum reduction is based on the 2021 GHG Handbook unless otherwise specified.