Draft Transportation Impacts Analysis under CEQA for Projects on the State Highway System

Environmental Management Office, Caltrans

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1. Introduction/Background

The intent of this guidance is to provide information to support Caltrans' California Environmental Quality Act (CEQA) practitioners in making CEQA significance determinations for transportation impacts on the State Highway System (SHS).

With the passage of Senate Bill (SB) 743 (Steinberg, 2013) codified at Public Resources Code (PRC) section 21099, California embarked on a new approach for analyzing transportation impacts under CEQA. These changes require updates to both the Caltrans Local Development-Intergovernmental Review (LD-IGR) function and project delivery for projects on the SHS.

In SB 743, the legislature found and declared the following:

> *(1) With the adoption of Chapter 728 of the Statutes of 2008, popularly known as the Sustainable Communities and Climate Protection Act of 2008, the Legislature signaled its commitment to encouraging land use and transportation planning decisions and investments that reduce vehicle miles traveled and contribute to the reductions in greenhouse gas emissions required in the California Global Warming Solutions Act of 2006 (Division 25.5 (commencing with Section 38500) of the Health and Safety Code). Similarly, the California Complete Streets Act of 2008 (Chapter 657 of the Statutes of 2008) requires local governments to plan for a balanced, multimodal transportation network that meets the needs of all users of streets, roads, and highways for safe and convenient travel.*
>
> *(2) Transportation analyses under the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) typically study changes in automobile delay. New methodologies under the California Environmental Quality Act are needed for evaluating transportation impacts that are better able to promote the state's goals of reducing greenhouse gas emissions and traffic-related air pollution, promoting the development of a multimodal transportation system, and providing clean, efficient access to destinations.*

The legislative intent of SB 743 is to do both of the following:

1) Ensure that the environmental impacts of traffic, such as noise, air pollution, and safety concerns, continue to be properly addressed and mitigated through the California Environmental Quality Act.
2) More appropriately balance 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.

In December 2018, the Office of Administrative Law approved updates to the formal CEQA regulations prepared by the Governor's Office of Planning and Research (OPR).

The formal regulations are generally referred to as the CEQA "Guidelines." The update contained, among other things, a new section 15064.3 addressing transportation impacts. OPR also released their [Technical Advisory on Evaluating Transportation Impacts in CEQA] (Technical Advisory) which contains recommendations on assessing vehicle miles traveled (VMT), significance, and mitigation measures.[1]

Section 15064.3 segregates the analysis of transportation impacts arising from land use projects and those arising from transportation projects. For Caltrans, SB 743 means major changes in two activities:

1. Review of a proposed land use project's or of a proposed plan's potential impact to the SHS, which are generally addressed through the Caltrans Local Development-Intergovernmental Review Program; and
2. CEQA analysis of capacity-increasing transportation projects on the SHS.

These changes are consistent with both the CEQA Guidelines and OPR's Technical Advisory. Caltrans supports these changes, which aim to reduce automobile use while increasing use of more sustainable modes that are essential to supporting our growing population and economy, while also meeting climate goals. Reducing VMT corresponds with the goals detailed in Caltrans' Strategic Management Plan for Stewardship and Efficiency, as well as Sustainability, Livability, and Economy. It is also consistent with and will aid Caltrans in continuing to meet its policy aims for the Environment (DP-004); Freeway System Management (DP-08); Energy Efficiency, Conservation, and Climate Change (DP-023-R1); Climate Change (DP-30); and Sustainability (DP-033), among others.

This guidance establishes Caltrans' process for analyzing a transportation project's impacts under CEQA due to increases in VMT attributable to the project, and, offers an initial list of potential mitigation measures for significant impacts. This guidance does not change any of the basic analytic principles or methodologies currently in place for evaluating projects under applicable law or regulation. This guidance is not intended to address transportation impacts resulting from land-use projects which will be addressed in the separate guidance document published as the *Transportation Impact Study Guide* (TISG). Nor is this guidance intended to provide detailed instruction on performing the traffic analysis itself, which can instead be found in the separate guidance published as the *Transportation Analysis Framework: Induced Travel Analysis* (TAF).

2. Regulatory Setting

Transportation projects using federal transportation funding, or which are regionally significant for potential air quality impacts, are analyzed at both the regional level and then again at the project level. *Regional VMT analysis* takes place during the development of the Regional Transportation Plans (RTPs) which are prepared and

[1] Office of Planning and Research, *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018).

adopted every five years by the 26 rural Regional Transportation Planning Agencies (RTPAs), and which are prepared and adopted every four years for the 18 Metropolitan Planning Organizations (MPOs) located in air quality non-attainment areas and at least every five years for MPOs located in air quality attainment areas. An RTP is a long-range plan prepared subject to federal and state requirements which provides a vision for regional transportation investments over a period of 20 years or more and which analyzes the transportation system and its relationships to a region's economy, environment, livability, and more. These regional plans and their travel assumptions also form the basis for the regional federal air quality conformity determinations required under the federal Clean Air Act.

2.1 Senate Bill 375

Senate Bill 375 (Steinberg), known as the Sustainable Communities and Climate Protection Act, was enacted in 2008. SB 375 directed the California Air Resources Board (CARB) to adopt regional greenhouse gas (GHG) emissions reduction targets applicable to each MPO region. SB 375 also required the state's eighteen MPOs to: 1) prepare a sustainable communities strategy (SCS) to achieve the GHG-reduction target as part of the RTP; or 2) prepare an "alternative planning strategy" if the SCS does not achieve the reductions called for by the regional targets.

Senate Bill 375 also required the California Transportation Commission, in conjunction with the California State Air Resources Board (CARB), to maintain guidelines for the travel demand models used in the development of regional transportation plans.

Each RTPA or MPO must also complete an environmental analysis of its RTP pursuant to CEQA. These environmental documents analyze the anticipated environmental effects arising from the adoption of the RTP, including transportation impacts. The environmental documents prepared by the RTPAs and MPOs report a variety of VMT-related metrics or performance measures in their analyses including total annual VMT, per capita VMT, and congested VMT.

2.2 CEQA Guidelines

Section 15064.3 of the Guidelines addresses *Project-level VMT analysis* under CEQA.

The portion of the Guidelines which addresses transportation projects (rather than land use projects), begins at section 15064.3(b) and reads:

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

> *(3) Qualitative Analysis. If existing models or methods are not available to estimate the vehicle miles traveled for the particular project being considered, a lead agency may analyze the project's vehicle miles traveled qualitatively. Such a qualitative analysis would evaluate factors such as the availability of transit, proximity to other destinations, etc. For many projects, a qualitative analysis of construction traffic may be appropriate.*
>
> *(4) Methodology. A lead agency has discretion to choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure. A lead agency may use models to estimate a project's vehicle miles traveled, and may revise those estimates to reflect professional judgment based on substantial evidence. Any assumptions used to estimate vehicle miles traveled and any revisions to model outputs should be documented and explained in the environmental document prepared for the project. The standard of adequacy in Section 15151 shall apply to the analysis described in this section.*

The following things are important to note about section 15064.3 and this guidance:

- Per section 15064.3, VMT is "generally the most appropriate measure of transportation impacts." The simplest definition of VMT, or vehicle mile traveled, is "one vehicle traveling on a roadway for one mile" (Sacramento Area Council of Governments 2016 MTP/SCS). In section 15064.3(a) of the Guidelines, "vehicle miles traveled" is defined as "the amount and distance of automobile travel attributable to a project." This is a significant change from previous methodologies which typically analyzed Level of Service (LOS)[2], a travel time and congestion metric, as the most important consideration in transportation impacts analysis. When evaluating transportation impacts on the SHS, Caltrans will now evaluate the "induced travel," or the overall change in VMT attributable to the individual transportation project.

- Certain project types, primarily those which are non-capacity increasing, are presumed to result in a less than significant transportation impact. Those project

[2] The Highway Capacity Manual, which first introduced the concept of LOS in 1965, defines LOS as follows: "Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Safety is not included in the measures that establish service levels." Additionally, "each facility type that has a defined method for assessing capacity and level of service also has performance measures that can be calculated. These measures reflect the operating conditions of a facility, given a set of roadway, traffic, and control conditions. Travel speed and density on freeways, delay at signalized intersections, and walking speed for pedestrians are examples of performance measures that characterize flow conditions on a facility" (Highway Capacity Manual, 2000).

types are discussed in section 5.1 of this document and are also described in OPR's Technical Advisory.

- A lead agency has the discretion to determine "the appropriate measure of transportation impact," meaning it may adopt other methods to evaluate transportation impacts. This does not, however, relieve a lead agency from continuing to examine impacts from noise, greenhouse gas (GHG) emissions, energy, and air quality. VMT is a "proxy for transportation-related GHG emissions and the associated effect on the climate." [3]

- A lead agency may tier its transportation impact analysis, as appropriate, from the environmental impact reports (EIRs) prepared for regional transportation plans/sustainable community strategies (RTP/SCS).[4] See the discussion in section 5.1.b. of this document to assess whether transportation impacts have been appropriately analyzed at the programmatic level, and whether tiering from the RTP/SCS EIR may be appropriate.

- Qualitative analyses may be appropriate for projects, particularly when models are not available. Qualitative analysis should generally be limited to projects where quantitative tools are not able to fully assess impacts, rural counties of the state, and projects that are not likely to result in a substantial VMT increase. Please refer to the *Caltrans Transportation Analysis Framework: Induced Travel Analysis* (TAF) for more details.

- Quantitative analysis is most appropriate for projects which increase capacity or have a high potential to induce vehicle travel. Please refer to the TAF for further discussion.

- A lead agency may express a change in VMT using absolute terms, such as net, or per capita, if the method is appropriately documented.

3. Other Relevant Documents and References

3.1 Technical Advisory on Evaluating Transportation Impacts in CEQA (Technical Advisory)

OPR's Technical Advisory provides recommendations on assessing VMT, significance, and mitigation measures.

[3] California Air Resources Board, "CARB 2017 Scoping Plan-identified VMT Reductions and Relationship to State Climate Goals," (January 2019), 2.

[4] It should be noted that some RTPs/SCSs are not consistent with the state's climate goals according to the California Air Resources Board (CARB). See CARB, "CARB 2017 Scoping Plan," 4. A close review of the applicable EIR for the RTP will be required in order to "tier" from its analysis.

3.2 California Air Resources Board's Scoping Plan

In 2006, the Legislature passed Assembly Bill 32 (AB 32, Nunez), known as the California Global Warming Solutions Act of 2006. which created a comprehensive, multi-year program to reduce GHG emissions in California. AB 32 required CARB to develop the Scoping Plan to describe the approach California would take to reduce GHGs to achieve the goal of reducing emissions to 1990 levels by 2020. The Scoping Plan was first approved by CARB in 2008 and updated in 2014 and again in 2017.

In 2016, the Legislature passed SB 32 (Pavley), which codified a 2030 GHG emissions-reduction target of 40 percent below 1990 levels. Along with SB 32, the Legislature passed companion legislation, AB 197 (Eduardo Garcia), which provided additional direction for developing the Scoping Plan and updates. These changes were reflected in the second update to the Scoping Plan completed in 2017.

3.3 California Air Resources Board's Mobile Source Strategy

In May 2016, CARB released the updated Mobile Source Strategy which demonstrates how the State can simultaneously meet air quality standards, achieve GHG emissions reduction targets, decrease health risk, and reduce petroleum consumption from the transportation sector through a modeling scenario—the "Cleaner Technologies and Fuels Scenario" (CTF). Although the majority of GHG reductions in the scenario are assumed to be attributable to new vehicle technologies and low carbon fuels, the CTF also demonstrates the need for a fifteen percent reduction in total light-duty VMT by 2050 as compared to baseline 2050 levels. This scenario would require light-duty VMT growth of only five percent by 2030, compared to the current growth trajectory of approximately eleven percent.[5] The combined strategies within the CTF scenario, including VMT reduction, would achieve a 45 percent reduction in on-road GHG emissions by 2030, and an approximately fifty percent reduction in on-road petroleum demand by 2050, meeting both climate targets.

3.4 California Air Resources Board's Sustainable Communities and Climate Protection Act Progress Report

In November of 2018, CARB published the "2018 Progress Report: California's Sustainable Communities and Climate Protection Act" (Progress Report). The Progress Report indicates California is not on track to meet the GHG reductions expected under SB 375. According to the Progress Report, actual statewide per capita VMT has not declined as expected under SB 375 but instead is actually increasing. The fundamental finding in CARB's Progress Report is that California is not on track to meet GHG emissions reductions expected under SB 375 and will not meet SB 32 GHG emissions targets without significant changes to how communities and transportation systems are planned, funded, and built.[6]

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[5] California Air Resources Board, "Mobile Source Strategy," (May 2016), 37.

[6] California Air Resources Board, "2018 Progress Report: Sustainable Communities and Climate Protection Act". (November 2018), 3, 5.

4. Project Scoping

Formal scoping will continue to follow established procedures identified under CEQA, including preparation of a Notice of Preparation for an Environmental Impact Report (EIR). Scoping a project on the SHS is a collaborative process. Part of this process involves “programming” of projects. Transportation Programming is the commitment of transportation funds to be available over a period of several years to particular projects. Separate programming documents, prepared and adopted for somewhat different purposes, are required under both State and Federal law.

Deviating from the programmed scope, schedule or budget is an uncertain process, and represents a potential risk to a project’s successful delivery. Projects that do not have an accurate scope may face cost increases and schedule delays. Because of fiscal and schedule constraints, it may become increasingly difficult to achieve feasible and proportional project-level VMT mitigation as a roadway capacity-increasing project proceeds from initial scoping to final design. Therefore, it is important to thoroughly consider a range of project alternatives which can potentially minimize, or avoid altogether, the additional VMT from capacity-increasing projects. The following options, and others which may avoid VMT impacts, require close coordination with federal, state, and regional transportation partners, and should be considered early in the planning process, within the range of VMT-reducing alternatives to capacity-increasing projects.

- Invest in multimodal transportation infrastructure: Caltrans could directly invest in VMT-reducing infrastructure to mitigate the impacts of capacity increasing projects.

- Expand toll lane use or develop other pricing-based strategy options: This option would consist of expanding the use toll lanes or developing other pricing strategies, such as increasing parking prices in an area, to reduce VMT.

Other potential options to reduce project-level VMT are discussed in the mitigation section of this document (section 5.7).

In addition to mitigation, another consideration during the initial scoping of project involves the determination of the appropriate level of environmental document. For new projects, Project Development Teams (PDTs) should consider the likelihood of a significant environmental impacts when determining the appropriate level of document. PDTs should also evaluate whether projects initially determined to require a Negative Declaration/Mitigated Negative Declaration (ND/MND) may instead require an EIR if a significant impact to transportation appears to be a potential, and if a Statement of Overriding Considerations may be appropriate.

5. The CEQA Analysis

This guidance document is primarily intended to address the following question on the CEQA checklist found in Guidelines Appendix G, section XVII(b):

Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

The portion of section 15064.3(b) of the CEQA Guidelines pertaining to transportation projects states that for roadway capacity projects "…agencies have the discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements." Caltrans has selected VMT as the appropriate measure of transportation impact. Whether a project is in conflict or inconsistent with CEQA Guidelines section 15064.3(b) will be evaluated by practitioners based on its potential to increase VMT. The guidance in this document further explains the types of projects and impacts that would be considered significant within this context.

The remaining CEQA checklist questions generally associated with transportation impacts are listed in Appendix G and are addressed in Appendix 2 of this document. Each should be analyzed independently. If other potential impacts to transportation are identified for a particular project, the standard CEQA analytical process would apply and significance determinations should be made for each, as appropriate.

5.1 Screening

The use of VMT as the CEQA transportation metric will, for the most part, impact only capacity-increasing projects. For other types of transportation projects, CEQA does not require a VMT impacts analysis beyond the screening process. Generally, there are two reasons such an analysis is not warranted. The first is because the type of project is expected to decrease or have no impact on VMT. The second is because the project's VMT impacts have already been analyzed and, when necessary, mitigated to the extent feasible in an earlier CEQA document; thus, the analysis may "tier" from or otherwise rely on that earlier analysis.

5.1.a. Screening by Project Type: Non-Capacity-Increasing vs. Capacity-increasing Projects

Understanding the purpose and scope of the proposed project will assist the practitioner in determining which project types have the potential for a significant impact. Determination of the project type usually occurs early in the project development process and is supported by the "purpose and need" of the project. A key consideration for the practitioner when looking at project type is to ask whether a project type has the potential to induce travel. Induced travel is addressed below.

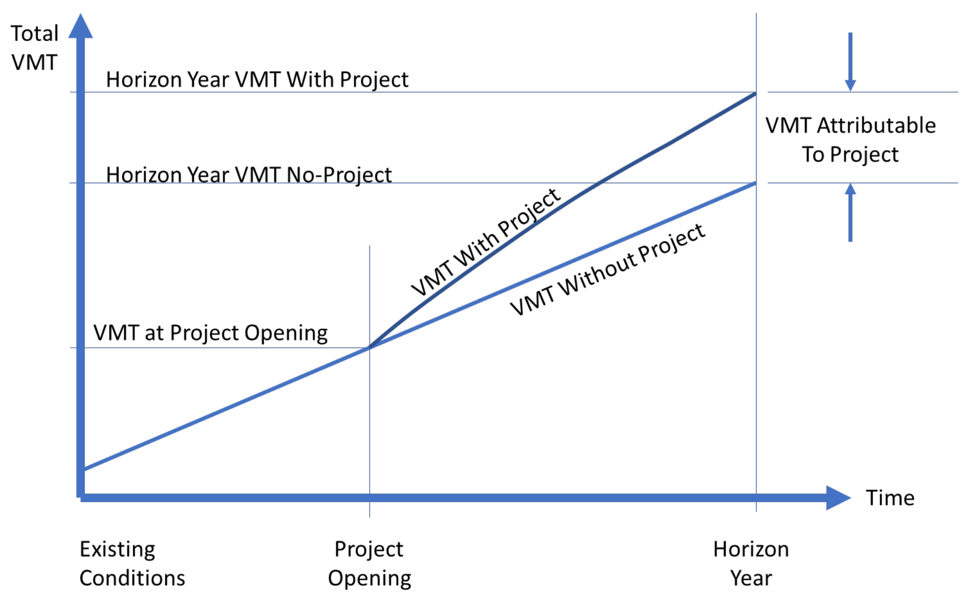
If a project increases capacity, it will generally require analysis to determine if there will be a significant transportation impact caused by an associated increase in VMT. Many projects Caltrans regularly undertakes such as maintenance projects including culvert repairs, overlays, and restriping, will not increase capacity. During the screening step, practitioners should examine the specific project circumstances to ensure that there are no unusual circumstances which could otherwise lead to an increase in VMT. Then, practitioners should provide a brief discussion in the environmental document that describes why the project is not expected to increase VMT.

Taken directly from OPR's Technical Advisory, the following excerpt describes types of projects that may create measurable increases in VMT.

> **i) *Project Types Likely to Lead to a Measurable and Substantial Increase in Vehicle Travel*[7]**
>
> *Addition of through lanes on existing or new highways, including general purpose lanes, HOV lanes, peak period lanes, auxiliary lanes, or lanes through grade-separated interchanges, and other projects adding capacity to the State Highway System.*

These are project types that include construction of new facilities or expansion of existing ones. These are common types of capacity-increasing projects that Caltrans constructs. These projects are likely to lead to a measurable and substantial increase in VMT and therefore an induced travel analysis is required to determine how much of the increase in VMT is attributable to the project (versus other variables such as the economy and population growth), and where impacts are significant, whether mitigation can reduce the impacts to a less than significant impact. Only the VMT that is directly attributable to the project should be analyzed (See TAC Figure 1):

TAC Figure 1: Identification of VMT Attributable to a Transportation Project – Conceptual Diagram



[7] Office of Planning and Research, *Technical Advisory on Evaluating Impacts in Transportation* (OPR December 2018), 20.

The emphasis of this guidance is to identify those projects that will lead to measurable and substantial increases in vehicle travel. Many projects would not be anticipated to lead to measurable and substantial increases in VMT. Taken directly from OPR's Technical Advisory, the following excerpt describes projects not likely to lead to a measurable and substantial increase in VMT and which are therefore presumed to have a less than significant transportation impacts:

ii) Project Types Not Likely to Lead to a Measurable and Substantial Increase in Vehicle Travel[8]

- *Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity*
- *Roadside safety devices or hardware installation such as median barriers and guardrails*
- *Roadway shoulder enhancements to provide "breakdown space," dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes*
- *Addition of an auxiliary lane of less than one mile in length designed to improve roadway safety*
- *Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left, right, and U-turn pockets, two-way left turn lanes, or emergency breakdown lanes that are not utilized as through lanes*
- *Addition of roadway capacity on local or collector streets provided the project also substantially improves conditions for pedestrians, cyclists, and, if applicable, transit*
- *Conversion of existing general-purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel*
- *Addition of a new lane that is permanently restricted to use only by transit vehicles*
- *Reduction in number of through lanes*
- *Grade separation to separate vehicles from rail, transit, pedestrians or bicycles, or to replace a lane in order to separate preferential vehicles (e.g., HOV, HOT, or trucks) from general vehicles*
- *Installation, removal, or reconfiguration of traffic control devices, including Transit Signal Priority (TSP) features*

[8] OPR, *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018), 20-21.

- *Installation of traffic metering systems, detection systems, cameras, changeable message signs and other electronics designed to optimize vehicle, bicycle, or pedestrian flow*
- *Timing of signals to optimize vehicle, bicycle, or pedestrian flow*
- *Installation of roundabouts or traffic circles*
- *Installation or reconfiguration of traffic calming devices*
- *Adoption of or increase in tolls*
- *Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase*
- *Initiation of new transit service*
- *Conversion of streets from one-way to two-way operation with no net increase in number of traffic lanes*
- *Removal or relocation of off-street or on-street parking spaces*
- *Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs)*
- *Addition of traffic wayfinding signage*
- *Rehabilitation and maintenance projects that do not add motor vehicle capacity*
- *Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of -way*
- *Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve non-motorized travel*
- *Installation of publicly available alternative fuel/charging infrastructure*
- *Addition of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor*

While the above list is thorough, it is not necessarily comprehensive. There may be other types of projects beyond those included in the Technical Advisory (the list above) that would not lead to a measurable and substantial increase in VMT. When concluding that a particular project may be screened out from further analysis, the practitioner should review and fully document the rationale supporting the conclusion that the particular project would not likely lead to a measurable and substantial increase in VMT.

5.1.b. Tiering

As outlined in PRC sections 21068.5, 21093 and 21094, as well as Guidelines sections 15152 and 15385, tiering is a means of reducing redundancy, focusing analysis and ensuring consistency with earlier CEQA analyses. Tiering “refers to using the analysis of general matters contained in a broader EIR (such as one prepared for a general plan or policy statement) with later EIRs and negative declarations on narrower projects; incorporating by reference the general discussions from the broader EIR; and concentrating the later EIR or negative declaration solely on the issues specific to the later project.”

Tiering the project-level analysis from the regional analysis completed for the RTP/SCS EIR would be the ideal method of determining the significance of transportation impacts. This is because if the regional modeling performed for a particular suite of projects (those that increase VMT and those that reduce VMT) has already accounted to some extent for the individual project's contributions, and the effects of the proposed project ideally would have already been mitigated entirely or in part. Although current RTP/SCS EIRs have limited utility for tiering transportation impact analysis, over time, tiering may become more available. Considerations to ensure that transportation impacts have been adequately evaluated and mitigated at the programmatic level could include:

- The RTP/SCS EIR must adequately evaluate the phenomenon of induced travel. The modeling performed for the suite of transportation projects and initiatives must accurately capture induced VMT from land use effects of those projects.
- The RTP/SCS EIR must demonstrate consistency with the State's GHG reduction targets because meeting the current SB 375 targets alone is not enough to demonstrate broad consistency between the RTP/SCS's VMT analysis and state climate goals. A transportation infrastructure project which substantially increases VMT may conflict with state climate goals, even if the project was included in an RTP/SCS that meets the applicable GHG reduction targets called for by SB 375[9]. This is because the current RTPs/SCSs will achieve only an 18% reduction in statewide per capita on-road light-duty transportation-related GHG emissions relative to 2005 by 2035, if those RTP/SCSs are successfully implemented. However, a 25% reduction is needed to meet the state's climate goals[10].
- All feasible mitigation measures normally considered at the project-level must be fully considered and properly applied at the plan level.

5.2. Baseline Determination

CEQA requires the comparison of impacts caused by a project to a "baseline" to determine whether those impacts are significant (Guidelines §15125).

Normally, future conditions with the project are compared to a baseline of "existing conditions." However, alternatives to an existing conditions baseline may be appropriate in certain circumstances, as noted in case law and summarized in the recent updates to the CEQA Guidelines:

> *Generally, the lead agency should describe physical environmental conditions as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. Where existing conditions change or fluctuate over time, and where necessary to*

[9] California Air Resources Board, "CARB 2017 Scoping Plan-identified VMT Reductions and Relationship to State Climate Goals," (January 2019), 4.

[10] California Air Resources Board, "CARB 2017 Scoping Plan-identified VMT Reductions and Relationship to State Climate Goals," (January 2019), 3.

> *provide the most accurate picture practically possible of the project's impacts, a lead agency may define existing conditions by referencing historic conditions, or conditions expected when the project becomes operational, or both, that are supported with substantial evidence. In addition, a lead agency may also use baselines consisting of both existing conditions and projected future conditions that are supported by reliable projections based on substantial evidence in the record (Guidelines § 15125(a)(1).)*

Additionally, a lead agency may also use a baseline of only projected future conditions (beyond the date of project operations) if the agency demonstrates with substantial evidence that use of existing conditions would be either misleading or without informative value to decision-makers and the public (Guidelines §15125(a)(2)). Transportation projects are typically built years after the CEQA analysis, and comparing to existing conditions would combine the project's VMT effects in with other effects on VMT that occur over time, such as increases in population or economic activity, in effect misleading the public by obscuring the impacts of the project itself. Therefore, regardless of whether a quantitative or qualitative analysis is performed, the CEQA baseline for VMT should be the future no-build condition. In other words, the future build alternative should be compared to the future no-build conditions (i.e., the conditions expected to exist in the future absent the project) to determine the amount of VMT attributable to the project per the CEQA Guidelines and the Technical Advisory. A simple comparison to existing conditions would not provide an accurate picture of the project's effects. Only by taking into account other variables not caused by the project, such as the projected future regional transportation system, population growth, economic growth and land use changes, can the *VMT that is attributable to the project* be separated from a general increase or decrease in VMT in a region overall. In order to fully apprise the reader of the VMT impacts of a project, VMT for existing conditions should be provided as a point of comparison. The environmental document will need to explain why a different baseline is being used for VMT than for other resources examined in the document.

Utilizing the approach noted above, and in order to appropriately use the future no-build condition as a point of comparison, consistent with Guidelines §15125(a)(2), the practitioner should expressly identify why use of future no build is the most appropriate and informative comparison for VMT analysis.

5.3. Direct Impacts to Vehicle Miles Traveled, Including Induced Travel

The CEQA Guidelines allow a qualitative approach to analyzing transportation impacts when quantitative methods are unavailable. A qualitative analysis describes in narrative form why or why not an increase in VMT is likely; how much induced travel is created, if any; and whether that increase, if any, will have a significant impact. Whether quantitative or qualitative, the analysis must 1) determine whether the project will cause a significant transportation impact, and 2) be supported by "substantial evidence" as defined in Guidelines §15384.

5.3.a. Quantitative or Qualitative Analysis.

TAC Figure 2, reproduced from the TAF, provides insight on when to apply quantitative versus qualitative methods. Users should refer to the TAF for fuller guidance regarding analysis of VMT impacts. There are two potential quantitative methods identified below, the travel demand model and the National Center for Sustainable Transportation (NCST) Calculator. The NCST Calculator is an elasticity-based tool that estimates annual induced VMT for capacity expansion projects. More information on the calculator is available at: https://blinktag.com/induced-travel-calculator/about.html.

TAC Figure 2: Induced VMT Assessment Method Selection Matrix

<table>
<tr><th>Project Location[11]</th><th>Add Capacity (GP or HOV) Lane to Interstate Freeway</th><th>Add Capacity (GP or HOV) to Other State Routes</th><th>Other Potentially VMT Inducing Projects on a State Route</th><th>Non-VMT Inducing Projects</th></tr>
<tr><td>Urban counties in MSA with Class I facilities[12]</td><td colspan="2">- Use NCST Induced Travel Calculator for proposed project.
- Use travel demand model (with off-model post processing and/or iteration.
- Report both results.</td><td rowspan="2">Use travel demand model (off-model post processing and/or iteration) for induced VMT analysis of proposed project, alternatives, and mitigations (as appropriate).</td><td rowspan="4">Brief description about why the project is not likely to result in substantial induced travel.</td></tr>
<tr><td>Other Urban Counties[13]</td><td>Use travel demand model (with off-model post processing and/or iteration) for induced VMT analysis of proposed project, alternatives, and mitigations (as appropriate).</td><td>- Use NCST Induced Travel Calculator for proposed project.
- Use travel demand model (with off-model post processing and/or iteration).
- Report both results.</td></tr>
<tr><td>Rural counties with existing or forecasted congestion at or near project site[14]</td><td colspan="2">Use travel demand model (off-model post processing and/or iteration) for induced VMT analysis of proposed project, alternatives, and mitigations (as appropriate).</td><td>Use travel demand model (off-model post processing and/or iteration) for induced VMT analysis of proposed project, alternatives, and mitigations (as appropriate).</td></tr>
<tr><td>Rural county with <u>No</u> existing or forecasted congestion at or near project site</td><td colspan="3">Qualitative assessment of likely VMT effects.</td></tr>
</table>

[11] Note that this chart applies only to the forecasting of state highway project induced VMT attributable to the project (induced travel) for CEQA transportation impact analysis. Other methods and tools are necessary to forecast total VMT in the horizon year for other CEQA and NEPA (when applicable) impact analysis purposes. Consult with Caltrans Division of Environmental Analysis (DEA) and Division of Transportation Planning (DOTP) for details.

[12] According to its technical documentation, the NCST Induced Travel Calculator can be applied to mainline general-purpose lane additions and mainline HOV lane additions on Class 1 facilities (Interstate freeways) and Class 2/3 facilities (Other Freeways, Expressways, and Other Principal Arterial state routes) as defined by FHWA (see Appendix C). Freeway ramps and minor arterials or collector-distributor roads associated with a freeway fall outside the scope of application for the NCST Induced Travel Calculator. The VMT inducing effects for ramp, minor arterial, and collector-distributor road capacity projects should be evaluated as “Other Potentially VMT Inducing Project” in this matrix.

Urban counties located within metropolitan statistical areas (MSAs) with sufficient Class I facilities for application of NCST Induced Travel Calculator tool are: Alameda, Contra Costa, Fresno, Imperial, Kern, Kings, Los Angeles, Marin, Merced, Orange, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Mateo, Santa Cruz, Shasta, Solano, Stanislaus, Sutter, and Yolo.

[13] Urban counties where the NCST Induced Travel Calculator is limited to Class 2 and 3 facilities are: Butte, El Dorado, Madera, Monterey, Napa, San Luis Obispo, Santa Barbara, Santa Clara, Sonoma, Tulare, Ventura, Yuba.

[14] Rural counties where the NCST Induced Travel Calculator should not be used for forecasting induced VMT are: Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Humboldt, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Plumas, Sierra, Siskiyou, Tehama, Trinity, Tuolumne.

5.3.b. Induced Travel

Some projects have the potential to result in a significant transportation impact because they are likely to induce vehicle travel. Induced travel, or induced vehicle travel, is the "additional vehicle travel that occurs when the cost [for travel] is lower," after travel constraints, such as congestion, are reduced.[15] It is the increase in travel that occurs when auto travel is made more convenient by new roadway capacity. The extent that this occurs due to new roadway capacity versus other variables such as the economy (wage changes, gas prices, parking prices) and population growth varies across research, but in general, changes in travel times and costs affect demand and therefore VMT. For this reason, capacity-increasing projects generally need to be evaluated for their potential induced travel. The mechanisms by which induced travel occur include:

- Route changes (may increase or decrease overall VMT)
- Mode shift to automobile use (increases overall VMT)
- Longer trips (increases overall VMT)
- More trips (increases overall VMT)
- More disperse development (increases overall VMT)

Induced travel can reduce the benefits of capacity expansion projects and increase VMT over time. While a project may reduce trip duration and increase travel speed on a short-term basis, this effect may be temporary as drivers may change their travel behavior in response to the newly expanded facility, particularly during peak periods of travel (work commutes). In the long run, an expanded facility may facilitate land development around. Ultimately, induced demand can lead to more and longer trips, increasing VMT, and to reducing travel time benefits of capacity increasing projects.[16]

5.3.c. Construction Impacts

Impacts associated with construction of a project may also require VMT analysis, particularly for large projects or projects located a substantial distance from available housing. A qualitative analysis of VMT impacts associated from the construction of the project may be appropriate.

5.4. Cumulative and Indirect Impacts

The term *cumulative impacts* refers to two or more individual effects that, when considered together, are considerable, compound, or increase other environmental effects. Pursuant to Guidelines section 15064(h), impacts are "cumulatively considerable" when the incremental effects of an individual project are significant when

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[15] Ronald T. Milam and Jerry Walters, et al., "Induced Travel Technical Investigation Final," Prepared for Caltrans (April 24, 2016), 1.

[16] This discussion is adapted from Cervero, "Road Expansion, Urban Growth, and Induced Travel," *Journal of the American Planning* Association Vol. 69, No. 2 (Spring 2003): 146 and Duranton and Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic Review* Vol. 101, No. 6 (2011), 2616-2617. It should be noted that there may be other benefits to congestion relief and capacity increasing projects.

viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

For transportation impacts and with respect to VMT, a cumulative impact is a project's potential, when combined with other projects in an area or region, to significantly increase VMT. In other words, a project may contribute to a potential impact through its incremental addition to regional VMT when examined in combination with the effects other past, present, and probable future projects. A project at an interchange may not significantly create new VMT on its own, but when looked at cumulatively with other past, present, or future probable projects in a travel corridor or region, it may be cumulatively considerable and therefore significant.

If a project has no potential to induce new VMT, or if it reduces VMT, then a cumulative analysis is not required, as the project could not contribute to a cumulatively considerable transportation impact.

Lead agencies are not required to mitigate for effects caused by other past or future projects—mitigation is required only for the project under consideration. When a project might contribute to a significant cumulative impact, but the contribution will be rendered less than cumulatively considerable through project-specific mitigation, then the impact can be considered less than significant.

A project's cumulative impacts may also be rendered less than cumulatively considerable if the project was analyzed as part of, and will comply with the requirements of, a previously-approved plan or mitigation program which includes enforceable requirements that will avoid or substantially lessen the cumulative impact within the geographic area in which the project is located (Guidelines §15064(h)(3)). However, see the tiering section (section 5.1.b.) in this document above for limitations related to compliance with a previously approved plan or mitigation program.

5.5. Consistency with Plans

Section 15125(d) of the CEQA Guidelines requires that an EIR "discuss any inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans. Such regional plans include, but are not limited to, the applicable air quality attainment or maintenance plan or State Implementation Plan, area-wide waste treatment and water quality control plans, regional transportation plans, regional housing allocation plans, regional blueprint plans, plans for the reduction of GHG emissions, habitat conservation plans, natural community conservation plans and regional land use plans for the protection of the Coastal Zone, Lake Tahoe Basin, San Francisco Bay, and Santa Monica Mountains."

Consistency with CARB's 2017 Scoping Plan as it pertains to both GHG emissions and any increase in VMT attributable to the project should be discussed in the "Consistency with State, Regional, and Local Plans and Programs" section of the environmental document, with references back to the Transportation and Climate Change sections, as needed. Capacity-increasing projects with the potential to lead to a measurable and substantial increase in VMT are likely to be inconsistent with State climate goals. Modeling completed by CARB for the Mobile Source Strategy shows capacity for statewide light-duty VMT growth is only five percent by 2030, as compared to the current growth rate of approximately eleven percent.[17] As stated previously, consistency with an RTP/SCS does not imply consistency with State climate goals.

5.6 Determining Significance

At the project level, the purpose of the CEQA analysis is to determine, and identify feasible mitigation for, adverse transportation impacts, such as increases in VMT, *which are directly attributable to the project*. CEQA does not require an improvement over baseline or existing conditions, just that the significant environmental effects of the project be mitigated to the fullest extent possible. A project need only mitigate for the significant effects or adverse changes brought about by the project. A "significant effect on the environment" means "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."

5.6.a. Rural (Non-MPO) Counties:

For projects within the rural, non-MPO counties, significance should be addressed on a case-by-case basis, taking into account context and environmental setting.

5.6.b. MPO Areas:

Within the MPO areas (including RTPAs within MPOs), a project that results in an increase in VMT when comparing the future build alternative to the future no-build alternative (i.e., the VMT is higher under the future build scenario) will generally be considered significant and mitigation will be required.

Remember that determining significance is a 3-step process. First, the impact is evaluated without any consideration of mitigation to determine if the impact is significant or not. If the impact is significant, mitigation is required and then "applied" to the project. The remaining impact is then evaluated again to determine if it remains significant or if the mitigation has reduced the impact to a less than significant level. If the impact remains significant after all feasible mitigation has been incorporated, and there are no additional, feasible alternatives which would avoid or lessen the adverse impact, a statement of overriding considerations may be appropriate to approve the project. There are instances in which an element of a project or a project feature may reduce adverse transportation impacts and be taken into account prior to the initial significance determination, but these instances may be more limited when considering VMT.

[17] California Air Resources Board, "Mobile Source Strategy," May 2016, pg. 37

5.7. Mitigation

A lead agency under CEQA has the authority to require feasible changes in any or all activities involved in the project in order to substantially lessen or avoid significant adverse impacts on the environment. Where changes to the project or project alternatives cannot avoid or substantially lessen the significant impact, mitigation is required. There must be a relationship between the impact and the mitigation for that impact (i.e., "nexus"), and the mitigation must be roughly proportional to the impact (i.e., "proportionality") (Guidelines §15041(a)).

Mitigation must be feasible and enforceable. Feasible under CEQA means "capable of being achieved in a successful manner within a reasonable amount of time, taking into account economic, environmental, legal, social, and technological factors" (Guidelines § 15364). When specific economic, social, or other conditions make mitigation measures or project alternatives infeasible, individual projects may be approved in spite of one or more significant effects of the project (PRC § 21002. See also, Appendix 1, "Considerations for Statements of Overriding Considerations").

As noted in the "Project Scoping" section of this document (Section 4), as a project proceeds toward final design it becomes increasingly difficult to achieve feasible, proportional project-level VMT mitigation for a roadway capacity-increasing project. Therefore, for capacity-increasing projects, early coordination and scoping of mitigation opportunities is advisable whether on-system or off-system mitigation is pursued. The following subsections of this document discuss on- and off-system mitigation. Off-system mitigation in particular requires considerable time to identify willing partners, opportunities, perform analyses of the opportunities, and negotiate and execute agreements to fulfill mitigation commitments.

On-system mitigation is mitigation which can be implemented within the Caltrans right-of-way. On-system mitigation may include mitigation within or outside the initial project limits of any given capacity increasing project. Caltrans, as owner and operator of the highway system and associated right-of-way, exercises more direct authority over on-system measures as opposed to off-system measures. Off-system mitigation, outside Caltrans' right-of-way, requires cooperation with those jurisdictions that have influence over land use and transportation systems outside of Caltrans direct control.

5.7.a. Mitigation Off the SHS

The Caltrans Division of Transportation Planning recently completed a literature review and assessment of VMT and GHG reduction strategies. The measures that resulted in the largest decreases in VMT are generally off-system and are not under Caltrans' direct control, such as land use authority, cordon pricing authority, parking management/pricing, and employer-based transportation demand management strategies and close coordination with federal, state, and regional transportation partners would be required to implement such off-system VMT mitigation.

Similarly, the most cost-effective measures identified in the literature review also tended to be outside of Caltrans' direct control (e.g., transit-oriented development (TOD), transportation demand management).

There will be a need for cost-effective, feasible, and proportional VMT mitigation measures, not just for Caltrans' projects, but for local lead agencies statewide that must comply with CEQA. Caltrans may ultimately develop or participate in a VMT credit or banking and exchange system operated by the state, an MPO, RTPA, or another entity. Under a banking system, Caltrans could purchase mitigation credits to reduce project impacts related to VMT. The revenues from the credit purchases could be utilized by the bank to facilitate the development of VMT-reducing projects. For example, the bank could invest in infrastructure improvements such as pedestrian facilities or aid in the development of regional transportation options, such as light rail. An exchange system would be similarly structured. In exchange for implementing a project that induces VMT, Caltrans would invest in a project identified by a local or regional transportation partner that reduces VMT.

VMT-reduction measures in rural areas may benefit from a coordinated approach. OPR has posted a document that includes strategies for different types of rural communities which can be found at: http://opr.ca.gov/docs/Mitigating_Vehicle-Miles_Traveled_(VMT)_in_Rural_Development.pdf.

5.7.b. Mitigation on the SHS

As indicated previously, on-system mitigation tends to be more within Caltrans' direct authority. However, this does not mean that Caltrans may unilaterally decide to implement measures within its right-of-way. For example, tolling strategies will require early coordination with appropriate transportation planning agencies and may require approval from other agencies such as the California Transportation Commission or Federal Highway Administration.

In addition to the measures noted above, all projects should consider strategies within the direct control of Caltrans and on the SHS. Measures listed in TAC Table 1 may be implemented to reduce VMT. Incorporating these types of measures as early as possible in the project development process will increase their feasibility. In certain circumstances, on-system measures may be able to sufficiently mitigate VMT attributable to a project or provide additional mitigation in situations where strategies beyond Caltrans' direct control are limited.

Additional measures and their approximate VMT-reduction potential can be found in the Caltrans Division of Transportation Planning's *Literature Review and Assessment of VMT and GHG Mitigation Strategies* as well as the transportation measures found in the California Air Pollution Control Officers Association's (CAPCOA) *Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures*. See Appendix 3 in this document for more information on these and other resources related to mitigation.

TAC Table 1. Project-Level Measures to Reduce VMT on the SHS

Description
1. Include detours for bicycles and pedestrians in all areas potentially affected by project construction. (SCAG RTP/SCS mitigation measures)
2. Incorporation of Complete Streets Elements
3. Consider and accommodate alternate modes of transportation consistent with the purpose and need of the project: • Bicycle paths and facilities • Pedestrian infrastructure and pedestrian-friendly features (wide sidewalks, overpasses on busy roads, signalized intersections with appropriate signal timing, etc.) • Routes connecting to public transportation options
4. Include measures to support multi modal transportation that will offset project impacts: additional Park & Ride lots
5. Social marketing efforts and incentives promoting mass transportation and carpooling. (Possible use of Cap and Trade Funds)
6. Social marketing and public education activities to improve awareness of the impacts driving habits and opportunities to reduce climate change impacts.
7. Incorporate infrastructure electrification into project design (e.g., charging for electric bikes).
8. Implement intelligent transportation systems and TDM elements to smooth traffic flow and increase system efficiency.
9. Implement Traffic Management Strategies: • Modify roadways to allow more efficient bus operation, including bus lanes and signal priority/preemption where necessary. Coordinate improvements on the SHS with arterials roadways. • Create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car sharing, bicycling and walking, if determined feasible and applicable by the Lead Agency.

5.8. Related Mitigation

It is important to note that mitigation that reduces VMT may also be identified as mitigation for adverse impact associated with GHG or criteria air pollutant emissions resulting from the project.

5.9. Statements of Overriding Considerations

If the lead agency cannot identify and implement feasible and enforceable mitigation to reduce the impact to a level that is less than significant, then it should identify those impacts as significant and unavoidable. Under CEQA, if a lead agency approves a project which will result in significant effects that are identified in the final EIR but are not avoided or substantially lessened, and if those impacts are outweighed by the economic, legal, social, technological, or other benefits of the project, including region-wide or statewide environmental benefits, the lead agency shall state in writing the specific reasons to support its decision based on the final EIR and/or other information in the record. This “statement of overriding considerations” shall be supported by substantial evidence in the record and included in the record of the project approval. It should also be mentioned in the Notice of Determination filed with OPR.

Appendix 1: Considerations for Statements of Overriding Considerations

A statement of overriding considerations is prepared when the project's effects are significant and not fully mitigable. According to Guidelines Section 15021(d):

> *CEQA recognizes that in determining whether and how a project should be approved, a public agency has an obligation to balance a variety of public objectives, including economic, environmental, and social factors and in particular the goal of providing a decent home and satisfying living environment for every Californian.*

The specific requirements for a statement of overriding considerations are found in the Guidelines Section 15093:

> *(a) CEQA requires the decision-making agency to balance, as applicable, the economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project against its unavoidable environmental risks when determining whether to approve the project. If the specific economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered "acceptable."*
>
> *(b) When the lead agency approves a project which will result in the occurrence of significant effects which are identified in the final EIR but are not avoided or substantially lessened, the agency shall state in writing the specific reasons to support its action based on the final EIR and/or other information in the record. The statement of overriding considerations shall be supported by substantial evidence in the record.*
>
> *(c) If an agency makes a statement of overriding considerations, the statement should be included in the record of the project approval and should be mentioned in the notice of determination. This statement does not substitute for, and shall be in addition to, findings required pursuant to Section 15091.*

A good place to start for the statement of overriding considerations are both the Purpose and Need statement for the project as well as the rationale used for the selection of the preferred alternative. Beyond the Purpose and Need Statement, lead agencies have substantial discretion in weighing specified economic, environmental and social factors which are relevant to their decision making. Any supporting factors relied upon by the lead agency should be documented in the agency's records relating to the project.

Appendix 2: CEQA Guidelines, Appendix G Checklist Questions

The Traffic and Transportation section of the environmental document should also address the following CEQA Checklist questions for each alternative under consideration, including the no-build alternative.

Would the project:

Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?
The planner should assess and discuss the consistency of the alternatives with the relevant plans that address the circulation system including any Caltrans plans for the project area, the circulation element of the general plan, area-specific plans, transit planning document, district-specific bicycle and/or pedestrian plans, regional transportation plans, etc. Be certain to discuss the relevant project features (including standardized measures) that have been incorporated into the project to avoid or minimize the project's environmental consequences. If an alternative was modified to achieve consistency with an adopted program, plan, ordinance or policy addressing the circulation system, describe that here. *Please note that consistency with California's 2017 Climate Change Scoping Plan will be addressed in the Greenhouse Gas section of the environmental document under the applicable CEQA Checklist question.*

Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
In general, a project is unlikely to substantially increase hazards.

Include information here from the project's purpose and need and project description to determine how a project will address non-standard geometric features such as horizontal and vertical curves, median width, shoulder width, access control, measures included to reduce flooding events, interchange improvements, separated bike lanes and/or other improvements for bicyclists and/or pedestrians or incompatible uses (for example, including wider shoulders for farm equipment in rural areas).

Project traffic analysis should include safety analysis based on the Caltrans Traffic Accident Surveillance and Analysis System (TASAS) or other historical safety performance results. The implementation of performance-based decision-making using the Highway Safety Manual (HSM) is encouraged to facilitate the integration of quantitative collision frequency and severity performance measures into roadway planning, design, operations, and maintenance decisions.

If the project is a safety project, explain how the project will improve safety.

Result in inadequate emergency access?
In general, most projects improve emergency access and/or response times. For example, projects that improve travel time can decrease emergency response time. Projects that create another means of ingress and egress can also improve emergency

access. Projects that widen shoulders can provide additional areas for emergency response vehicle staging. There could be temporary construction impacts related to emergency access. This should be addressed in the Transportation Management Plan for the project and Caltrans should coordinate with local emergency officials as part of the development of that plan.

Appendix 3: Mitigation

Strategies to mitigate VMT are available within the following resources. Additional mitigation resources will be added to Caltrans SB 743 Implementation webpage. The following pages include additional information on the CAPCOA report (as referenced in item "a" below) and the literature review (as referenced in item "b" below).

a. California Air Pollution Control Officers Association's (CAPCOA) 2010 Quantifying GHG Mitigation Measures is a current source of VMT reduction by mitigation strategy. (See attached table 6-2 from the CAPCOA report summarizing mitigation options).

b. Literature Review and Assessment of VMT and GHG Mitigation Strategies. Prepared in December 2019 by Caltrans Division of Transportation Planning. (See following page for more information).

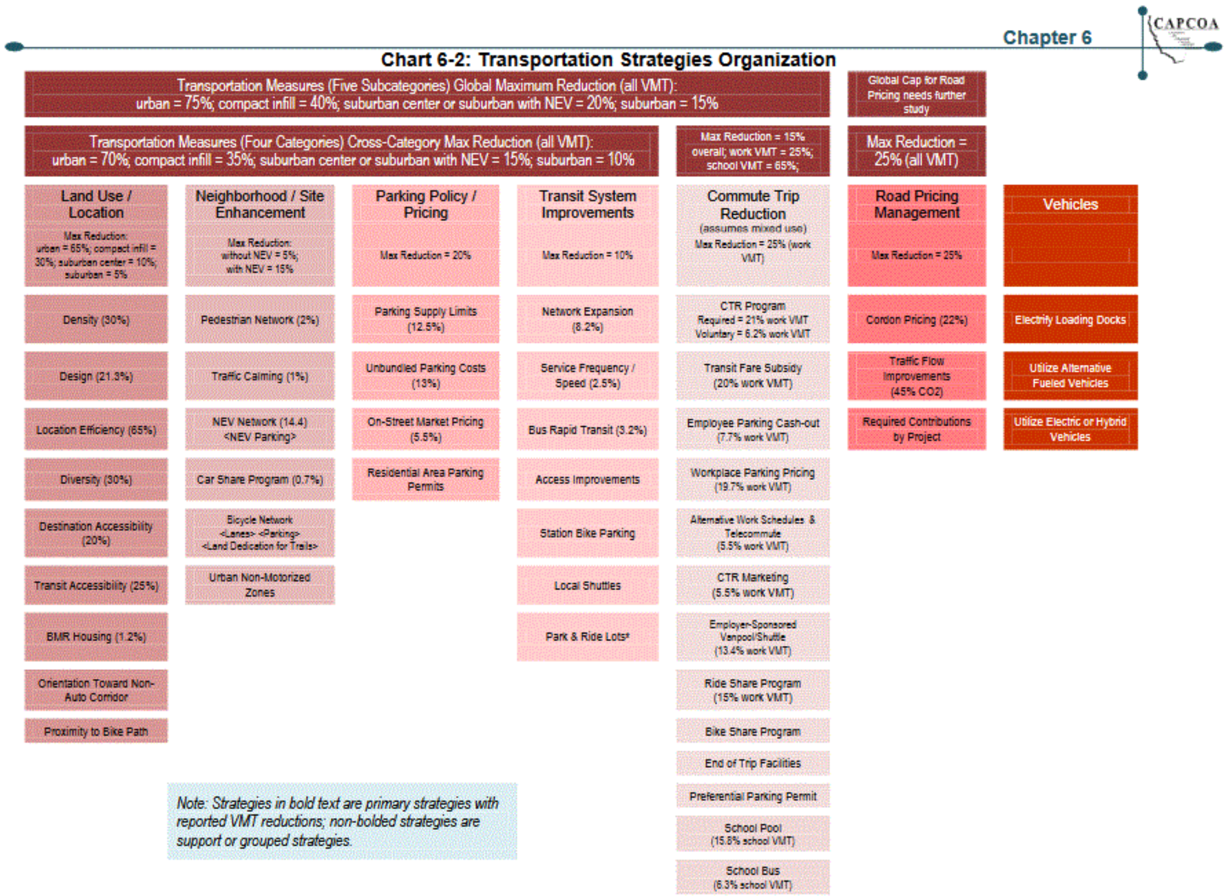
c. Governor's Office of Planning and Research's CEQA Guidelines Update and Technical Advisory website has information on VMT reduction strategies, even for rural areas.

d. A 2018 research paper from University of California Berkeley School of Law's Center for Law, Energy & the Environment focuses on two innovative models that could be used to implement programmatic VMT mitigation strategies for land use or transportation projects. VMT mitigation "banks" and "exchanges" are compared, and examples provided of ways to mitigate VMT under CEQA or the mitigation fee act. These models are conceptually similar to existing mitigation frameworks such as regional impact fee programs or habitat conservation banks.

e. A 2020 white paper prepared by Fehr & Peers VMT Mitigation Through Banks and Exchanges: Understanding New Mitigation Approaches highlights potential VMT mitigation programs including impact fee programs, mitigation exchange, and mitigation bank.

f. State Smart Transportation Initiative (SSTI) 2018 report Modernizing Mitigation: A Demand-Centered Approach outlines partnerships possible to reduce the demand for driving.

Chart 6-2 of the CAPCOA Report



Literature Review and Assessment of VMT and GHG Mitigation Strategies

Prepared in December 2019 by Caltrans Division of Transportation Planning

This report contains the results of a detailed, comprehensive review and synthesis of literature in order to compile estimates of the impacts of VMT and transportation greenhouse gas (GHG) emission reduction strategies at the program, plan, and project level. The study focused on strategies that influence emissions from users of the transportation system, as opposed to strategies that target transportation project construction and maintenance activity. In addition, the study focused on strategies that can reduce GHG emissions either by reducing VMT or by changing traffic speed or flow; the study did not review strategies that seek to increase the deployment of low emission vehicles or alternative fuels.

Methodology

This research reviewed a wide variety of documents, including original peer-reviewed literature, previous meta-analyses and compilations, practitioner-oriented guidance documents, plans and feasibility studies, and select calculator tools that provide information on VMT and GHG emissions impacts. The extent and quality of research varies widely across the types of strategies considered. For some types of strategies (e.g., certain land use changes), more than 10 original research studies have quantified effects on VMT. Other types of strategies (e.g. bicycle and pedestrian facilities) have received far less attention from researchers seeking to quantify VMT or GHG emission impacts.

Implementation Role for Caltrans

The implementation of VMT and GHG emission reduction strategies can be led by a variety of public and private sector organizations. The scale of strategy implementation can include employer-level, development project, neighborhood, transportation project, corridor, city, metropolitan area, or state-wide. Caltrans may have a lead or supporting role in implementation depending on the type of strategy and scale of application. The table below shows the strategies for which Caltrans has a supporting role and strategies for which Caltrans could lead implementation:

Appendix 3. Table 1. Mitigation Strategies by Caltrans Role

Strategy Category	Strategies for which Caltrans has a Support Role	Strategies for which Caltrans has a Lead or Support Role
Bicycle, Pedestrian, and Urban Design Strategies	Bikeshare	Bikeway network expansion Bike lane/path development Pedestrian facility network expansion Pedestrian facility development Street connectivity
Transit Strategies	Transit system expansion Transit frequency improvements Transit travel time improvements Transit reliability improvements Transit fare reduction	

Appendix 3. Table 1. Mitigation Strategies by Caltrans Role

Strategy Category	Strategies for which Caltrans has a Support Role	Strategies for which Caltrans has a Lead or Support Role
Land Use and Parking Strategies	Land use mixing Higher density development Transit oriented development Destination accessibility Parking management and pricing	
Transportation Demand Management Strategies	Employer alternative commute option programs Rideshare Carsharing programs Telework Community-based travel marketing	Park and ride lots
Transportation System Management Strategies		Roadway pricing Arterial signal timing Ramp metering Traffic incident management programs HOV and HOT lanes

Summary of Findings

The following table list each of the strategies, the number of sources identified within the report that quantify the impact of those strategies with respect to VMT/GHG , and key findings.

Appendix 3. Table 2. Quantifiable mitigation strategies with respect to VMT/GHG

Strategy	Number of sources identified that quantify VMT or GHG impacts	Key Findings
Bikeway network expansion	2	Doubling bikeway density (in terms of bikeway miles per square mile or per capita) can reduce city-wide VMT by 0.05% to 0.1%
Bike lane or bike path development	2	A new class 2 or 4 bikeway can reduce GHG emissions by 1 to 85 metric tons (MT) per year. The wide range reflects different assumptions for facility usage.
Bikeshare program expansion	3	The Bay Area Bike Share pilot program reduced GHG emissions by 79 tons in the first year. Several other documents report negligible impacts on VMT and GHG emissions.
Pedestrian facility network expansion	5	A 10% increase in sidewalk coverage can reduce area-wide VMT by 0.2% to 0.5%.
Pedestrian facility development	1	CARB's calculator tool estimates a pedestrian facility project will reduce 4 to 22 MT of GHG emissions per year.
Street connectivity improvement	11	A 10% increase in intersection density (in terms of intersections per square mile) can reduce area-wide VMT by 1.2%
Transit frequency improvements	3	Doubling transit frequency can reduce VMT by 0.5% to 2.5% in affected areas.
Transit travel time reduction	1	One study found that a 10% reduction in transit travel time is associated with an approximately 2.5% reduction in VMT and vehicle GHG emissions in affected areas.

Appendix 3. Table 2. Quantifiable mitigation strategies with respect to VMT/GHG

Strategy	Number of sources identified that quantify VMT or GHG impacts	Key Findings
Transit service expansion	3	In larger urban areas, increases in bus route miles of 10-42% were found to reduce region-wide VMT by an average of 0.13%.
Transit fare reduction	2	A calculator tool suggests that a 50% reduction in transit fares would typically reduce community wide VMT by 0.2%.
Land use mixing	8	A 10% increase in land use mixing (measured using an entropy index) is associated with 0.1% to 1.7% lower VMT.
Higher density development	8	A 10% increase in residential density is associated with 0.5% to 1.2% lower VMT.
Transit oriented development	5	Residents of transit-oriented development (TOD) in California are observed to have a transit mode share that is 4.9 times higher than residents of surrounding areas. Residential building in a transit-oriented location can reduce project VMT by up to 15% compared to building the project in a non-TOD location.
Destination accessibility	10	Locating a residential development 10% closer to the central business district is associated with a 2.3% reduction in VMT. A 10% improvement in regional jobs accessibility is associated with a 1.3% to 2.5% reduction in VMT.
Parking management and pricing	11	Doubling of parking prices can reduce VMT by 3% at lower parking price levels and 15% at higher parking price levels. Employer-based parking cash out programs are observed to reduce VMT by 12% for employees who opt in.
Employer alternative commute option programs	8	Implementation of a voluntary employer-based alternative commute option program has been shown to reduce VMT associated with the employer site by 4% to 6%. Larger VMT reductions are reported for programs that involve mandatory monitoring, reporting, and targets.
Rideshare	8	Carpool and vanpool programs can reduce VMT by 3% to 8% at participating employers. Region-wide, rideshare programs are typically estimated to reduce VMT by less than 1%.
Telework	7	Participants in telework programs reduce their daily VMT by 50% to 75% on telecommute days. The community or region-wide VMT and GHG impacts of telecommute programs depend heavily on assumptions regarding levels of participation and have not been studied in recent years.
Carsharing programs	6	Participants in carsharing programs reduce their personal or household VMT and GHG emissions. Studies for MPOs suggest that expansion of carsharing programs can reduce community or region-wide VMT by 0.5% to 2%.
Community-based travel marketing	2	Studies of community-based travel marketing programs have found reductions in SOV trips of roughly 10% in targeted neighborhoods. Large-scale program deployment in the Bay Area was estimated to reduce per capita light duty vehicle GHG emissions by 1.2% to 1.7%.
Park and ride facilities	4	Among park and ride lots serving carpoolers, the observed average annual VMT reduction per lot was 156,000 in New York (7 lots) and 608,000 in Maine (39 lots). The annual VMT reduction per parking lot space is estimated to range from 2,700 to 7,200.

Appendix 3. Table 2. Quantifiable mitigation strategies with respect to VMT/GHG		
Strategy	**Number of sources identified that quantify VMT or GHG impacts**	**Key Findings**
Roadway pricing	8	Tolling of the roadway system for the purpose of VMT and GHG reduction has not been implemented in the U.S., and thus the potential impacts are not well understood. Simulation modeling in the Seattle region found that tolling applied to all freeways would reduction regional VMT by 6%. Implementation of cordon pricing has resulted in a VMT reduction of approximately 15% in several international cities.
Arterial signal timing	5	During the time period of implementation, traffic signal coordination has been shown to reduce GHG emissions by 1% to 10% on the facility affected. Reductions may be over-estimated because they do not account for induced vehicle traffic effects.
Ramp metering	1	A study in South Korea found that ramp metering reduced system-wide GHG emissions by 7.3%.
Traffic incident management programs	6	Statewide incident management programs in Florida and Maryland are estimated to reduce annual GHG emissions by 238,000 and 65,000 MT, respectively. At the corridor level, estimated GHG reductions range from 0.07% to 4%.
HOV and HOT lanes	7	There is little recent academic research regarding the VMT and GHG impacts of HOV and HOT lanes. Projects that added HOV lanes to freeways in the 1980s or 1990s resulted in an increase in average vehicle occupancy (AVO) by an average of 9%. Other research concludes that HOV lanes do not encourage carpooling because HOV travel time savings do not provide a statistically significant carpooling incentive. Conversion of HOV to HOT (express) lanes appears to reduce carpooling. Development of new HOV lanes typically increases VMT and GHG emissions as compared to a no-build alternative.

Conclusions

This report illustrates the breadth and variety of literature covering VMT and transportation GHG reduction strategies. The relevant documents differ widely in terms of the level of rigor applied for determining results, which can make it challenging to compare and summarize results across multiple sources.

For many of the strategies that Caltrans could lead or support to reduce VMT and GHG emissions, there has been relatively little research to quantify VMT or GHG emissions impacts. Relevant research is particularly limited for bicycle and pedestrian strategies, as well as for transit strategies and some types of TSM strategies such as ramp metering. There is generally more VMT and GHG emission impacts research for land use strategies and employer-based TDM strategies.

In addition to the limited sources, several factors can make it challenging to apply research findings to estimate VMT or GHG emissions impacts in the context of Caltrans' decision-making processes. Results are sometimes reported as a wide range, with other factors having a strong influence on the level of VMT or GHG reduction. This can make it difficult to generalize about the effectiveness of one strategy versus another. Research results are also sometimes reported at a scale that is inconsistent with Caltrans' processes.