



EDMUND G. BROWN JR.  
GOVERNOR

STATE OF CALIFORNIA  
GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH



KEN ALEX  
DIRECTOR

## Preliminary Evaluation of Alternative Methods of Transportation Analysis

December 30, 2013

As required by statute, the Governor's Office of Planning and Research is developing a new way to measure environmental impacts related to transportation. This is an opportunity both to reduce costs associated with environmental review, and, importantly, to achieve better fiscal, health and environmental outcomes. We need your help in this effort.

### I. Introduction

On September 27, 2013, Governor Brown signed [Senate Bill 743](#) (Steinberg, 2013). Among other things, SB 743 creates a process to change analysis of transportation impacts under the California Environmental Quality Act (Public Resources Code section 21000 and following) (CEQA). Currently, environmental review of transportation impacts focuses on the delay that vehicles experience at intersections and on roadway segments. That delay is measured using a metric known as "level of service," or LOS. Mitigation for increased delay often involves increasing capacity (i.e. the width of a roadway or size of an intersection), which may increase auto use and emissions and discourage alternative forms of transportation. Under SB 743, the focus of transportation analysis will shift from driver delay to reduction of greenhouse gas emissions, creation of multimodal networks and promotion of a mix of land uses.

Specifically, SB 743 requires the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines (Title 14 of the California Code of Regulations sections and following) to provide an alternative to LOS for evaluating transportation impacts. Particularly within areas served by transit, those alternative criteria must "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." (New Public Resources Code Section 21099(b)(1).) Measurements of transportation impacts may include "vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated." (*Ibid.*) OPR also has discretion to develop alternative criteria for areas that are not served by transit, if appropriate. (*Id.* at subd. (c).)

Though a draft of the Guidelines revisions is not required until July 1, 2014, OPR is seeking early public input into its direction. This document provides background information on CEQA, the use of LOS in transportation analysis, and a summary of SB 743's requirements. Most importantly, it also contains OPR's preliminary evaluation of LOS and different alternatives to LOS. It ends with a description of open

questions and next steps. In developing a better alternative to LOS, OPR will rely heavily on input from all stakeholders. We hope that you will share your thoughts and expertise in this effort.

Input may be submitted electronically to [CEQA.Guidelines@ceres.ca.gov](mailto:CEQA.Guidelines@ceres.ca.gov). Please include “LOS Alternatives” in the subject line. While electronic submission is preferred, suggestions may also be mailed or hand delivered to:

Christopher Calfee, Senior Counsel  
Governor’s Office of Planning and Research  
1400 Tenth Street  
Sacramento, CA 95814

Please submit all suggestions before **February 14, 2014 at 5:00 p.m.**

## II. CEQA Background

Since SB 743 requires a change in the analysis of transportation impacts under CEQA, this section provides a brief overview of CEQA’s requirements.

CEQA generally requires public agencies to inform decision makers and the public about the potential environmental impacts of proposed projects, and to reduce those environmental impacts to the extent feasible. The rules governing that environmental analysis are contained in the Public Resources Code, in the administrative regulations known as the CEQA Guidelines, and in cases interpreting both the statute and the CEQA Guidelines.

Many projects are exempt from CEQA. Typically, however, some form of environmental analysis must be prepared. If a project subject to CEQA will not cause any adverse environmental impacts, a public agency may adopt a brief document known as a Negative Declaration. If the project may cause adverse environmental impacts, the public agency must prepare a more detailed study called an Environmental Impact Report (EIR). An EIR contains in-depth studies of potential impacts, measures to reduce or avoid those impacts, and an analysis of alternatives to the project.

The key question in an environmental analysis is whether the project will cause adverse physical changes in the environment. CEQA defines the “environment” to mean “the *physical* conditions that exist within the area which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, noise, or objects of historic or aesthetic significance.” (Pub. Resources Code, § 21060.5 (emphasis added).) As this definition suggests, the focus of environmental review must be on physical changes in the environment. Generally, social and economic impacts are not considered as part of a CEQA analysis. (CEQA Guidelines, § 15131.)

Once an agency determines that an impact might cause a significant adverse change in the environment, it must consider feasible mitigation measures to lessen the impact. (Pub. Resources Code, § 21002.) Specifically, a lead agency may use its discretionary authority to change a project proposal to avoid or minimize significant effects. (CEQA Guidelines, § 15040(c).) The authority to mitigate must respect constitutional limitations, however. Mitigation measures must be related to a legitimate governmental

interest, and must be “roughly proportional” to the magnitude of the project’s impact. (CEQA Guidelines, § 15126.4(a)(4).)

### III. Background on Measures of Automobile Delay

Many jurisdictions currently use “level of service” standards, volume to capacity ratios, and similar measures of automobile delay, to assess potential traffic impacts during a project’s environmental review. Level of service, commonly known as LOS, is a measure of vehicle delay at intersections and on roadway segments, and is expressed with a letter grade ranging from A to F. LOS A represents free flowing traffic, while LOS F represents congested conditions. LOS standards are often found in local general plans and congestion management plans.

Traffic has long been a consideration in CEQA. (See, e.g., *Fullerton Joint Union High School Dist. v. State Bd. of Education* (1982) 32 Cal. 3d 779, 794 (school district’s reorganization could potentially affect the environment by altering traffic patterns).) In 1990, the Legislature linked implementation of congestion management plans, including LOS requirements, with CEQA. (Gov. Code, § 65089(b)(4).) LOS has been an explicit part of CEQA analysis since at least the late 1990’s, when the sample environmental checklist in the CEQA Guidelines asked whether a project would exceed LOS standards. (See former CEQA Guidelines, App. G. § XV; see also, *Sacramento Old City Assn. v. City Council* (1991) 229 Cal. App. 3d 1011, 1033 (addressing claims of an EIR’s inadequacy related to level of service analysis).)

### IV. Problems with using LOS in CEQA

Though, as explained above, LOS has been used in CEQA for many years, it has recently been criticized for working against modern state goals, such as emissions reduction, development of multimodal transportation networks, infill development, and even optimization of the roadway network for motor vehicles. The following are key problems with using LOS in CEQA:

**LOS is difficult and expensive to calculate.** LOS is calculated in several steps:

- First, the number of vehicle trips associated with a project must be estimated.
- Second, after estimating the number of vehicle trips generated by the project, an analysis requires assumptions about the path that those vehicles may take across the roadway network.
- Third, traffic levels must be estimated at points along the roadway network, as compared to traffic that might occur without the project.
- Fourth, microsimulation models are used to determine traffic outcomes of volume projections.

Thus, an analysis under LOS typically requires estimates of trip generation, estimates of trip distribution, conducting existing traffic counts at points along the network, and an analysis and comparison of traffic function at each point for future project and “no project” scenarios.

**LOS is biased against “last in” development.** Typical traffic analyses under CEQA compare future traffic volumes against LOS thresholds. A project that pushes LOS across the threshold triggers a significant impact. In already developed areas, existing traffic has already lowered LOS closer to the threshold. Because the LOS rating used to determine significance of the project’s impact is determined by total traffic (existing traffic plus traffic added by the project), infill projects disproportionately trigger LOS thresholds compared to projects in less developed areas.

**LOS scale of analysis is too small.** LOS is calculated for individual intersections and roadway segments. As traffic generated by a project fans out from the project, it substantially affects a few nearby intersections and roadway segments, then affects more distant intersections and roadway segments by a smaller amount. LOS impacts are typically triggered only at the nearby intersections and roadway segments where the change is greatest. Projects in newly developed areas typically generate substantially more vehicle travel than infill projects,<sup>1</sup> but that traffic is more dispersed by the time it reaches congested areas with intersections and roadway segments operating near the thresholds. As a result, while outlying development may contribute a greater amount of total vehicle travel and cause widespread but small increases in congestion across the roadway network, it may not trigger LOS thresholds. Further, piecemeal efforts to optimize LOS at individual intersections and roadway segments may not optimize the roadway network as a whole. Focusing on increasing vehicle flow intersection-by-intersection or segment-by-segment frequently results in congested downstream bottlenecks, in some cases even worsening overall network congestion.<sup>2</sup>

**LOS mitigation is itself problematic.** Mitigation for LOS impacts typically involves reducing project size or adding motor vehicle capacity. Without affecting project demand, reducing the size of a project simply transfers development, and its associated traffic, elsewhere. When infill projects are reduced in size, development may be pushed to less transportation-efficient locations, which results in greater total travel. Meanwhile, adding motor vehicle capacity may induce additional vehicle travel, which negatively impacts the environment and human health.<sup>3</sup> It also negatively impacts other modes of transportation, lengthening pedestrian crossing distances, adding delay and risk to pedestrian travel, displacing bicycle and dedicated transit facilities, and adding delay and risk to those modes of travel.

**LOS mischaracterizes transit, bicycle, and pedestrian improvements as detrimental to transportation.** Tradeoffs frequently must be made between automobile convenience and the

---

<sup>1</sup> For information on the relationship between infill and compact development, and vehicle travel and GHG emissions, see [Growing Cooler, Evidence on Urban Development and Climate Change](#), September 2007.

<sup>2</sup> This phenomenon is called Braess’ Paradox. For a description, see Braess, Dietrich. 1968, translated 2005. “On a Paradox of Traffic Planning.” *Transportation Science*, 39 (4), pp. 446-450. ISSN 0041-1655. For prevalence, see Steinberg, Richard and Zangwill, Willard I. (1983) The prevalence of Braess' paradox. *Transportation science*, 17 (3). pp. 301-318. ISSN 0041-1655

<sup>3</sup> Duranton, Gilles, and Matthew A. Turner. 2011. "The Fundamental Law of Road Congestion: Evidence from US Cities." *American Economic Review*, 101(6): 2616-52.

provision of safe and efficient facilities for users of transit and active modes. Since LOS measures the delay of motor vehicles, any improvement for other modes that might inconvenience motorists is characterized as an impediment to transportation.

**Use of LOS thresholds implies false precision.** Calculating LOS involves a sequence of estimates, with each step using the output of the previous step. Imprecision in an early step can be amplified throughout the sequence. While it is difficult to estimate the distribution of future trips across the network with a high level of precision, the calculation of congestion levels is highly sensitive to that estimate. Further, LOS is typically reported in environmental analyses without acknowledging potential uncertainty or error.

**As a measurement of delay, LOS measures motorist convenience, but not a physical impact to the environment.** Other portions of an environmental analysis will account for vehicular emissions, noise and safety impacts.

## V. SB 743

SB 743 marks a shift away from auto delay as a measure of environmental impact. It does so in several ways.

First, it allows cities and counties to designate “infill opportunity zones” within which level of service requirements from congestion management plans would no longer apply. (See, SB 743, § 4 (amending Gov. Code, § 65088.4).)

Second, it requires OPR to develop criteria for determining the significance of transportation impacts of projects within transit priority areas, and further provides OPR with discretion to develop such criteria outside of transit priority areas. The Secretary for the Natural Resources Agency must then adopt the new criteria in an update to the CEQA Guidelines. (See, SB 743, § 5 (adding Pub. Resources Code § 21099).)

Third, and perhaps most importantly, once the CEQA Guidelines containing the new criteria are certified, “automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any.” (*Id.* at subd. (b)(2).)

SB 743 includes legislative intent to help guide the development of the new criteria for transportation impacts. For example, Section 1 of the bill states: “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.” Further, subdivision (b) of the new Section 21099 requires that the new criteria “promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses.” It also suggests several possible alternative measures of

potential transportation impacts, including, but not limited to: “vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated.”

Notably, SB 743 does not limit the types of projects to which the new transportation criteria would apply. Rather, it simply authorizes the development of criteria for the “transportation impacts of projects[.]” (New § 21099(b)(1); see also subd. (c)(1) (referring only to “transportation impacts”).) The Legislature intended the new criteria to apply broadly. An early version of this provision, in SB 731, would have limited the new criteria to “transportation impacts for residential, mixed-use residential, or employment center projects [on] infill sites within transit priority areas.” (See, SB 731 (Steinberg), amended in Assembly August 6, 2013.) Therefore, OPR will investigate criteria that would apply to all project types, including land use development, transportation projects, and other relevant project types.

An earlier version of SB 731 would have limited the application of these changes by determining that automobile delay is not an environmental impact only in transit priority areas. (See, SB 731(Steinberg), amended in Assembly September 9, 2013, at § 12 (“Upon certification of the guidelines by the Secretary of the Natural Resources Agency pursuant to this section, automobile delay, as described solely by level of service or similar measures of capacity or congestion within a transit priority area, shall not support a finding of significance”) (emphasis added).) As adopted in SB 743, however, automobile delay may only be treated as an environmental impact “in locations specifically identified in the guidelines, if any.” (New § 21099(b)(2).) Further, subdivision (c) explicitly authorizes OPR to develop criteria outside of transit priority areas. Given the statement of legislative intent that new transportation metrics are needed to better promote the state’s goals, OPR intends to investigate metrics and criteria that will apply statewide.

## VI. OPR Goals and Objectives in Developing Alternative Criteria

In developing alternative transportation criteria and metrics, OPR must choose metrics that “promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses.” (New Section 21099(b)(1).) In addition to this statutory directive, OPR will also weigh other factors in evaluating different criteria. Those additional factors include:

**Environmental Effect.** The California Supreme Court has directed that CEQA “be interpreted in such manner as to afford the fullest possible protection to the environment within the reasonable scope of the statutory language.” (*Friends of Mammoth v. Board of Supervisors* (1972) 8 Cal. 3d 247, 259.) OPR, therefore, seeks to develop criteria that maximize environmental benefits, and minimize environmental harm.

**Fiscal and Economic Effect.** Our state and local governments have limited fiscal resources. The state’s planning priorities are intended to, among other things, strengthen the economy. (Gov. Code, § 65041.1.) In evaluating alternative criteria, OPR seeks criteria that will lead to efficient use of limited fiscal resources, for example by

reducing long run infrastructure maintenance costs, and to the extent relevant in the CEQA context, promotion of a stronger economy.

**Equity.** OPR will look for alternative criteria that treat people fairly. The state’s planning priorities are intended to promote equity. (Gov. Code, § 65041.1.) OPR seeks to develop criteria that facilitate low-cost access to destinations. Further, OPR recognizes that in its update to the General Plan Guidelines, OPR must provide planning advice regarding “the equitable distribution of new public facilities and services that increase and enhance community quality of life throughout the community, given the fiscal and legal constraints that restrict the siting of these facilities.” (Gov. Code, § 65040.12.) In addition, OPR must also provide advice on “promoting more livable communities by expanding opportunities for transit-oriented development so that residents minimize traffic and pollution impacts from traveling for purposes of work, shopping, schools, and recreation.” (*Ibid.*) Though this advice must be developed within the General Plan Guidelines, OPR recognizes that similar issues may be relevant in the context of evaluating transportation impacts under CEQA.

**Health.** OPR recognizes that “[h]ealthy and sustainable communities are the cornerstones of the state’s long-term goals.” (Environmental Goals and Policy Report, Discussion Draft (September 2013), at p. 26.) OPR will, therefore, look for alternative criteria that promote the health benefits associated with active transportation and that minimize adverse health outcomes associated with vehicle emissions, collisions and noise.

**Simplicity.** The purpose of environmental analysis is to inform the public and decision-makers of the potential adverse effects of a project. (Pub. Resources Code, § 21003(b).) Environmental documents must “be written in plain language and may use appropriate graphics so that decision makers and the public can rapidly understand the documents.” (CEQA Guidelines, § 15140.) OPR, therefore, seeks to develop criteria that are as simple and easy to understand as possible. The criteria should enable the public and other interested agencies to participate meaningfully in the environmental review process.

**Consistency with Other State Policies.** SB 743 included legislative intent that the alternative criteria support the state’s efforts related to greenhouse gas reduction and the development of complete streets. OPR will also be guided by the state’s planning priorities, and in particular, the promotion of infill development, as described in Government Code section 65041.1.

**Access to destinations.** Even as it serves and impacts many other interests, the fundamental purpose of the transportation network is to provide access to destinations for people and goods. A transportation network does this by providing mobility and supporting proximity. In growing communities, some degree of roadway congestion is

inevitable<sup>4</sup>; we cannot “build our way out of congestion” by adding roadway capacity because doing so induces additional vehicle travel. Therefore, accommodating better proximity of land uses and improving the overall efficiency of network performance is essential for providing and preserving access to destinations. Transit and active mode transportation options can play a key role in providing access to destinations and supporting proximity.

The objectives described above need not be the only considerations in selecting alternative criteria. In fact, OPR invites your input into these objectives. *Are these the right objectives? Are there other objectives that should be considered?*

## VII. Preliminary Evaluation of the Alternative Criteria

This section provides OPR’s preliminary evaluation of the alternative metrics set forth in SB 743, as well as other metrics suggested during our initial outreach. This preliminary evaluation asks whether the alternative satisfies the objectives set forth in SB 743, as well as OPR’s own objectives described above. It also attempts to identify which mitigation measures and project alternatives might flow from use of each candidate metric. Finally, this evaluation seeks to identify the level of difficulty of using each metric, including availability of models and data required.

### Vehicle Miles Traveled

*Variant 1: per capita for residential, per employee for employment centers, per trip for commercial*  
*Variant 2: per person-trip for all projects*

Vehicle Miles Traveled (VMT)<sup>5</sup> is one of two metrics specified by SB 743 for consideration. VMT counts the number of miles traveled by motor vehicles that are generated by or attracted to the project. VMT captures motorized trip generation rates, thereby accounting for the effects of project features and surrounds. It also captures trip length, and so can also account for regional location, which is the most important single determinant of vehicle travel. Although VMT counts only motor vehicle trips, not trips taken by other modes, it registers the benefits of transit and active transportation trips insofar as they reduce motor vehicle travel. In this way, VMT captures the environmental benefits of transit and active mode trips.

Of the metrics we consider here, VMT is relatively simple to calculate. Assessing VMT is substantially easier than assessing LOS because it does not require counting existing trips, estimating project trip distribution, or traffic microsimulation for determining congestion. Assessing VMT requires only estimates of trip generation rates and trip length, and can be readily modeled using existing tools such as the U.S. Environmental Protection Agency’s EPA’s MXD model.

---

<sup>4</sup> Duranton, Gilles, and Matthew A. Turner. 2011. "The Fundamental Law of Road Congestion: Evidence from US Cities." *American Economic Review*, 101(6): 2616-52.

<sup>5</sup> For additional information about VMT and its relationship to environmental impacts, see U.S. Environmental Protection Agency, “[Our Built and Natural Environments: A Technical Review of the Interactions Between Land Use, Transportation, and Environmental Quality](#) (2nd Edition),” June 2013.



Mitigation to reduce VMT can include designing projects with a mix of uses, building transportation demand management (TDM) features into the project, locating the project in neighborhoods that have transit or active mode transportation opportunities, or contributing to the creation of such opportunities. Since VMT is sensitive to regional location, it can also be mitigated by choosing a more central location for the project.

Used as a transportation metric under CEQA, VMT could encourage reduction of motor vehicle travel, increase transit and active mode transportation, and increase infill development.

### **Automobile Trips Generated**

*Per capita for residential, per employee for employment centers*

Automobile trips generated (ATG) is one of two metrics specified by SB 743 for consideration. ATG counts the number of motor vehicle trips that are generated by or attracted to the project. ATG thereby accounts for the effects of project features and project surroundings (i.e., the availability of transit). It does not, however, account for the length of the trip, and therefore it does not account for regional location, the most important determinant of vehicle travel<sup>6</sup>. Although ATG counts only motor vehicle trips, not trips taken by other modes, it registers the benefits of transit and active transportation trips insofar as they reduce motor vehicle trips taken. In this way, ATG captures some of the environmental benefits of transit and active mode trips.<sup>7</sup>

Of all the metrics considered, ATG is the easiest to calculate. It does not require counts of existing traffic, estimation of project trip distribution, or traffic microsimulation for determining congestion. In fact, calculating ATG is simply the first step in calculating most of the other metrics, including LOS.

Mitigation for ATG can include locating a project in an area that facilitates transit or active mode transportation, such as an infill or transit oriented location, and including transportation demand management features in the project.

Used as a transportation metric under CEQA, ATG could encourage reduction of motor vehicle travel, increased active mode transportation, and increased infill development. Because it omits regional location, however, it may be less effective at achieving those ends than VMT.

### **Multi-Modal Level of Service**

Multi-Modal Level of Service (MMLOS) is a metric of user comfort for travelers on various modes. Along with the traditional motor vehicle LOS metric, MMLOS includes additional ratings for transit, walking

---

<sup>6</sup> Reid Ewing & Robert Cervero (2010) [Travel and the Built Environment](#), Journal of the American Planning Association, 76:3, 265-294, DOI: 10.1080/01944361003766766.

<sup>7</sup> For more information on the ATG metric, see [Automobile Trips Generated: CEQA Impact Measure & Mitigation Program](#), City of San Francisco, October 2008.

and biking modes. It rates intersections and roadway segments, delivering an A through F grade for each mode at each location. However, like LOS, MMLOS does not account for the total extent of motor vehicle travel, just its effect near the project. It also does not examine the transportation system on the scale of an entire trip length for other modes. The most commonly used MMLOS methodology is that put forth by the 2010 Highway Capacity Manual.

Assessing MMLOS requires detailed data on existing conditions for each mode of travel at intersections and roadway segments analyzed, plus trip generation and distribution by mode from the project. MMLOS is more difficult to calculate than LOS. Further, the methodology for non-motorized modes continues to develop. MMLOS is the subject of expert debate. For example, increased pedestrian traffic may be a desirable environmental outcome rather than an impact to be mitigated. Meanwhile, reducing the number of motor vehicle lanes on a street with bicycle lanes can benefit cyclists, but can degrade MMLOS under the Highway Capacity Manual's methodology.

Impacts determined by MMLOS can be mitigated by adding motor vehicle capacity, improving transit service, and/or adding amenities for transit and active mode travelers. Since transportation facilities near infill projects often already support a variety of modes, projects in these locations may require more mitigation than projects further from these amenities, potentially discouraging infill development.

MMLOS could act either to increase or reduce motor vehicle travel, depending on the relative weight of ratings between modes. It could encourage development of transit and active mode facilities, potentially increasing use of those modes. However, because it would assign the burden of those mitigations to development, it has the potential to raise infill costs and thereby reduce infill development.

### **Fuel Use**

*Per capita for residential, per employee for employment centers, per trip for commercial*

Fuel use counts the amount of fuel used by vehicle trips generated by or attracted to the project. In doing so, it captures motorized trip generation rates, thereby accounting for the effects of project features and surrounds. It also captures trip length, and so can also account for regional location, which is the most important single determinant of vehicle travel. Finally, it also captures fuel efficiency, which is affected by vehicle mix and traffic conditions. Although fuel use counts only motor vehicle trips, not trips taken by other modes, it registers the benefits of trips taken by other modes insofar as they reduce motor vehicle travel. In this way, Fuel Use captures the environmental benefits of transit and active mode trips.

Assessing Fuel Use with precision would require the application of microsimulation tools over the area affected by project motorized vehicle traffic. Alternately, a fuel efficiency multiplier could be applied to VMT, but that would eliminate sensitivity to roadway operations, rendering this metric equivalent to the VMT metric.

Mitigation for Fuel Use can include building in transportation demand management (TDM) features as part of the project, locating the project in neighborhoods that supply transit or active mode transportation opportunities. Also, because Fuel Use traces the full extent of motor vehicle trips and therefore is sensitive to regional location, it can also be mitigated by choosing a more central location for the project. Mitigation measures for Fuel Use might also include improving motor vehicle traffic operations and speeds. However, to the extent that these mitigation measures would induce demand, they would lose effectiveness. In the coming years, fuel efficiency improvements will necessitate shifting thresholds, and zero emissions vehicles could eventually render the metric irrelevant. Also, permeation of electric-drive vehicles with regenerative braking reduces the effect of traffic operations improvements on fuel use.

Used as a transportation metric under CEQA, Fuel Use would act to reduce motor vehicle travel, except where transportation operations improvements or capacity expansions induce more travel in the long run. It would tend to increase transit and active mode transportation, although it could penalize their operation if they have a negative effect on motor vehicle traffic operations. Finally, it would tend to increase infill development, with the same caveats.

### **Motor Vehicle Hours Traveled**

*Per capita for residential, per employee for employment centers, per trip for commercial*

Motor Vehicle Hours Traveled (VHT) counts the time taken by motor vehicle trips generated by or attracted to the project. In doing so, it captures motorized trip generation rates, thereby accounting for the effects of project features and project surroundings. It also captures trip length, and so can account for regional location, which is the most important single determinant of vehicle travel. Finally, it also captures travel time, which is affected by traffic conditions. Although VHT counts only motor vehicle trips, not trips taken by other modes, it registers the benefits of trips taken by other modes insofar as they reduce motor vehicle travel. In this way, VHT captures the environmental benefits of transit and active mode trips.

Assessing VHT with precision would require the application of more sophisticated modeling tools than those needed to assess VMT. In some areas, those tools may not be available or data might not be available to support them.

Mitigation for VHT can include building in transportation demand management (TDM) features as part of the project, locating the project in neighborhoods that supply transit, or active mode transportation opportunities. Because VHT traces the full extent of motor vehicle trips and therefore is sensitive to regional location, it can also be mitigated by choosing a more central location for the project. In the near term, VHT could be mitigated by increasing travel speeds, e.g. by increasing vehicle capacity. In the long run, however, increased travel speeds generate additional vehicle travel, eventually re-congesting the roadway and congesting traffic. Increased vehicle speeds may also adversely affect bicycle and pedestrian travel.

As a metric, VHT could act to reduce motor vehicle travel, except if it were used to justify roadway expansion to create short-run benefit without considering long-run induced demand. VHT would in many cases tend to increase transit and active mode transportation, although it would penalize their operation if they have a negative effect on traffic operations. Finally, in some cases VHT would remove a barrier to infill development, although mitigation measures that increase roadway capacity could have the opposite effect.

### **Presumption of Less Than Significant Transportation Impact Based on Location**

Development in centrally-located areas and areas served by transit generally impacts the regional transportation network substantially less than outlying development. Given the lower motor vehicle trip generation rates and shorter trip distances that have been shown for projects in such areas compared with projects elsewhere, project location could serve as predetermined “transportation-beneficial development” areas. Such areas might be presumed to cause less than significant regional transportation impacts. These areas could be mapped so as to be easily identified. Projects outside of such areas may require additional analysis, and mitigation if necessary, using one of the metrics described above.

## **VIII. Open questions and next steps**

The discussion above described OPR’s initial impressions of several suggested transportation metrics. Many open questions remain at this point. Some of those open questions, as well as next steps, are set forth below.

1. SB 743 requires that whatever metric is developed, it must promote reductions in greenhouse gas emissions. Increases in roadway capacity for automobiles may lead to increases in noise, greenhouse gas emissions and other air pollutants. SB 743 similarly provides that air quality, noise, safety and other non-delay effects related to transportation will remain a part of a CEQA analysis.
  - a. Are there environmental impacts related to transportation other than air quality (including greenhouse gas emissions), noise and safety? If so, what is the best measurement of such impacts that is not tied to capacity?
  - b. Are there transportation-related air quality, noise and safety effects that would not already be addressed in other sections of an environmental analysis (i.e., the air quality section or noise section of an initial study or environmental impact report)? If so, what is the best measurement of such impacts that is not tied to capacity?
  - c. Would consistency with roadway design guidelines normally indicate a less than significant safety impact?

2. What are the best available models and tools to measure transportation impacts using the metrics evaluated above? SB 743 allows OPR to establish criteria “for models used to analyze transportation impacts to ensure the models are accurate, reliable, and consistent with the intent of” SB 743. Should OPR establish criteria for models? If so, which criteria?
3. SB 743 provides that parking impacts of certain types of projects in certain locations shall not be considered significant impacts on the environment. Where that limitation does not apply, what role, if any, should parking play in the analysis of transportation impacts?

OPR will continue conducting research and meeting with stakeholders while this preliminary evaluation is being publicly reviewed. Following the close of the comment period, OPR will evaluate the input it receives, and develop a discussion draft of the alternatives to LOS and relevant changes to the CEQA Guidelines. The public will be invited to provide input on that discussion draft. If necessary, OPR may further revise the discussion draft based on that input. OPR intends to transmit a final draft of the changes to the CEQA Guidelines to the Natural Resources Agency by July 1, 2014.