Evolving Use of Level of Service Metrics in Transportation Analysis – California Case Study

Background and Context

California has long been a national leader in environmental policy, passing the California Environmental Quality Act (CEQA) in 1970, the year after passage of the National Environmental Policy Act (NEPA) in 1969. Most proposals for physical development in California are subject to the provisions of CEQA, as are many governmental planning decisions that do not immediately result in physical development (such as adoption of a general or community plan). Every project that requires a discretionary governmental approval requires at least some environmental review pursuant to CEQA, unless an exemption applies.[1]

In 2006 California passed Assembly Bill 32, requiring California to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020 — a reduction of approximately 15 percent below emissions expected under a "business as usual" scenario. It was followed by the Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375), supporting the state's climate action goals to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities.[2] SB 375 calls for each metropolitan planning organization (MPO) in California to develop a Sustainable Communities Strategy (SCS), with land use, transportation, and housing strategies that allow the region to meet its GHG reduction targets. It provides relief from certain CEQA requirements for developers working on new residential or mixed use projects that are consistent with a regional SCS.

In 2013, the California legislature also passed Senate Bill 743 to create a process to change the way that transportation impacts are analyzed under CEQA. Specifically, SB 743 requires the Governor's Office of Planning and Research (OPR) to amend the CEQA Guidelines to provide an alternative to the use of Level of Service (LOS) as the primary metric for evaluating the transportation impacts of development projects. Those alternative criteria must "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." SB 743 also amended congestion management law to allow cities and counties to opt out of LOS standards within certain infill areas.[3,4]

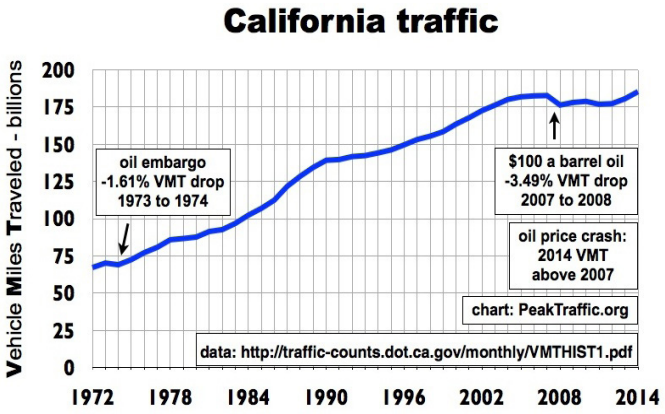

Figure 1: Total vehicle miles traveled in California from 1972-2014
Source: PeakTraffic.org

[1] Frequently Asked Questions about CEQA, http://resources.ca.gov/ceqa/more/faq.html
[2] California EPA Air Resources Board, Sustainable Communities, http://www.arb.ca.gov/cc/sb375/sb375.htm
[3] State of California, Office of Planning and Research, https://www.opr.ca.gov/s_sb743.php
[4] Urban infill is defined as new development that is sited on vacant or undeveloped land within an existing community, and that is enclosed by other types of development. The term "urban infill" itself implies that existing land is mostly built-out and what is being built is in effect "filling in" the gaps. (Source: National League of Cities http://www.sustainablecitiesinstitute.org/topics/land-use-and-planning/urban-infill-and-brownfields-redevelopment)

OPR released Updating Transportation Impact Analysis in the CEQA Guidelines: Preliminary Discussion Draft of Updates to the CEQA Guidelines Implementing SB 743 in August 2014 and a Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA in January 2016. The agency expects to initiate the final rulemaking process in 2017, with the goal of finalizing the rule by late 2017. OPR has proposed a two-year implementation period to allow time for jurisdictions and transportation professionals to update their methods and address ancillary issues related to implementation; they may begin to use the updated metrics immediately, and will be required to do so by the end of the two-year period. While OPR is the state office responsible for implementing SB 743, it is working closely with many partner and stakeholder agencies, particularly the California Department of Transportation (Caltrans), to prepare the state for implementation. In addition to its collaboration with OPR, Caltrans is also reviewing its own use of LOS and other performance metrics in transportation operational analyses, as will be discussed later in this case study.

Case for Change

While CEQA does not specifically require or encourage the use of LOS metrics for impact analyses, LOS had become the de facto method that agencies used to evaluate and mitigate project impacts relating to transportation. SB 743 was prompted by concern that the way in which LOS metrics were used to analyze environmental impacts and mitigation strategies for CEQA analyses was inappropriate and in fact worked against California's environmental goals. For example, infill development projects that added relatively little vehicle traffic to the transportation network were flagged as having significant environmental impacts because they were located in already congested areas, whereas projects in outlying areas that added significantly more traffic to the network were able to proceed, because they did not appear to lead to localized congestion or delay.[5] In urban areas, LOS analysis might lead development projects to reduce their impacts by narrowing sidewalks and widening roadways. Overall, project-level experience demonstrated that the actions needed to mitigate the traffic congestion impacts identified in CEQA analyses could be inconsistent with the actions needed to support GHG reduction and multimodal, sustainable communities.[6]

Further, many felt that such mitigation actions would actually exacerbate the environmental impacts associated with automobile traffic, as numerous studies have consistently shown that adding capacity to roadways fails to alleviate congestion for long, and it actually increases vehicle miles traveled (VMT). An increase in VMT attributable to increases in roadway capacity where congestion is present is called "induced travel."[7] Induced travel counteracts the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and offsets, in part or in whole, reductions in GHG emissions that would result from reduced congestion.[8] Expanding the roadway footprint also brings associated potential environmental and fiscal impacts, related to habitat disruption, stormwater management, and the financial need to preserve and maintain additional infrastructure.

[5] February 2016 Presentation on Revised CEQA Proposal. California Governor's Office of Planning and Research https://www.opr.ca.gov/s_sb743.php

[6] For additional information, see presentation: "Is SB 743 an Evolutionary Change to Transportation Impact Analysis?" http://www.dot.ca.gov/hq/tpp/offices/owd/horizons_files/CaltransMilam8.26.pdf

[7] The basic economic principles of supply and demand explain this phenomenon: adding capacity decreases travel time, in effect lowering the "price" of driving; and when prices go down, the quantity of driving goes up.

[8] "Increasing Highway Capacity Unlikely to Relieve Traffic Congestion." National Center for Sustainable Transportation, October 2015. http://www.dot.ca.gov/newtech/researchreports/reports/2015/10-12-2015-NCST_Brief_InducedTravel_CS6_v3.pdf

With support from a broad range of stakeholders, the state legislature passed language to refocus from addressing congestion to managing additional VMT and associated GHG emissions. The legislation is intended to ensure consistent application across the state. As stated in SB 743, the intent is to:

- 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.
- 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 GHG emissions.[9]

Implementation

Change in Metrics for CEQA Analysis

SB 743 instructs OPR to eliminate LOS and establish criteria for determining the significance of transportation impacts of land use and transportation projects. The criteria must promote GHG emission reductions, development of multimodal transportation networks, and diverse land uses. It also requires OPR to recommend metrics to measure transportation impacts; the metrics could include, but were not limited to, VMT, VMT per capita, automobile trip generation rates, or automobile trips generated. SB 743 also allows OPR to establish criteria for models used to analyze transportation impacts to ensure that the models are accurate, reliable, and consistent with the intent of the legislation.[10]

OPR selected VMT as the primary metric of choice, both because it is an umbrella metric for GHG emissions, other environmental impacts, and impacts to human health, and because it is already used in California for air quality analyses. In identifying and developing the proposed metric, OPR conducted significant stakeholder outreach, holding approximately 150 meetings with over 100 stakeholder groups, including local government staff, transportation modelers, technical experts, a liaison from the Institute

Project Type	Current	Proposed
Land Use	LOS on local intersections and highway segments	Full extent of VMT loaded onto the roadway network
Transit and Active Transport	Transit, active transportation projects presumed to slow automobile traffic, trigger LOS “impact to transportation”	Transit, active transportation presumed to reduce VMT unless demonstrated otherwise
Roadway Expansion	LOS impacts at nearby intersections from rerouted/induced vehicle travel (Also: Induced VMT analysis required for GHG calculation)	Induced (or reduced) VMT

Table 1: Proposed Changes in Analysis Metrics and Assumptions for Transportation Projects

[9] SB 743, Section 1, (b). http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743
[10] Modernization of Transportation Analysis for Transit-Oriented Infill Projects (b)(1). Chapter 2.7 http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743

of Transportation Engineers (ITE), and many others. While some practitioners have concerns about the technical approach, analysis, implementation, and application (in particular in rural areas), OPR staff generally agree that the outreach effort has been positive and that there is broad support for the change.

In addition to evaluating transportation impacts of land use projects, SB 743 also directs OPR to evaluate transportation projects, analyzing the inducement effects of capacity expansion projects, and recognize that non-auto projects (e.g., transit, bicycle, and pedestrian) will generally not increase VMT. Table 1 shows the current and proposed metrics for different types of transportation projects.

While OPR staff believe that the VMT approach is less technically complicated than the LOS approach, they recognize that SB 743 requires a change in approach for local governments and the transportation field, which could present a challenge for some agencies, especially those with limited staff capacity. OPR is developing technical resources to assist local governments and other transportation professionals with implementing the new approaches. These include guidance on how to address induced travel, recommendations for estimating VMT resulting from different types of projects, and VMT data from the California Statewide Travel Demand Model. OPR is not updating guidance related to trip generation rates at this time but references other current and recent efforts through ITE, Caltrans,[11] and the Washington DC DOT (DDOT) to update trip generation estimates, and may adjust its guidance in the future as more accurate approaches are operationalized.

Caltrans Implementation

While the legislation designated OPR as the agency responsible for SB 743 implementation, successful implementation depends on close coordination with and support from multiple agencies, most notably Caltrans. When SB 743 first passed in 2013, Caltrans and OPR worked together closely on statewide outreach and education, and identifying potential issues and opportunities related to implementation.

Caltrans has taken several important steps to support SB 743 implementation and more broadly consider opportunities for VMT reduction, GHG reduction, improved system performance, and improved coordination between land use and transportation. This is consistent with the 2015-2020 Caltrans Strategic Management Plan, which established a new mission statement for the Department, shifting from a focus solely on mobility, to one highlighting the importance of safety, sustainability, land use integration, efficiency, and California's economy and livability. Under this umbrella, the agency has also set out several strategic objectives related to reducing VMT and GHG emissions, including: increasing Complete Streets features on state highways that also serve as local streets; and reducing peak period travel times and delay for all modes through Intelligent Transportation Systems (ITS), operational strategies, demand management, and land use/transportation integration.

Local Development – Intergovernmental Review Program

One important day-to-day change at Caltrans is the updated Local Development – Intergovernmental Review (LD-IGR) Program interim guidance published in September 2016 and revised in November 2016. The LD-IGR program reviews land use and infrastructure plans and projects across the state for potential impacts and enhancements to the state's environment, natural resources, and multimodal transportation system. Through the program, Caltrans advises Lead Agencies (typically local governments) on potential

[11] Phase 1 Report (2008), and Phase 2 Report (2009)

Caltrans Mission, Vision, and Goals

Mission

Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability

Vision

A performance-driven, transparent and accountable organization that values its people, resources and partners, and meets new challenges through leadership, innovation and teamwork

Goals

Safety and Health
Provide a safe transportation system for workers and users, and promote health through active transportation and reduced pollution in communities.

Stewardship and Efficiency
Money counts. Responsibly manage California's transportation-related assets.

Sustainability, Livability and Economy
Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl

System Performance
Utilize leadership, collaboration and strategic partnerships to develop an integrated transportation system that provides reliable and accessible mobility for travelers.

Organizational Excellence
Be a national leader in delivering quality service through excellent employee performance, public communication, and accountability.

Figure 2: Caltrans Mission, Vision, and Goals
Source: Caltrans 2015-2020 Strategic Management Plan

impacts and ways to avoid, minimize, and/or mitigate adverse impacts. It also identifies land use and built environment design strategies to enhance connectivity and access to destinations.[12]

The new high level desk reference for Caltrans District staff refocuses the LD-IGR program attention on local development projects' VMT, appropriate transportation demand management (TDM) measures, and determining how best to address multimodal operational issues. The guidance notes that while project Lead Agencies are responsible for selecting and implementing mitigation measures, they typically follow the recommendations from Caltrans, which in the past have primarily relied on LOS analysis and focused recommendations on more "traditional" road improvements.

With the Strategic Management Plan objectives and SB 743's changes to CEQA, LD-IGR coordinators and functional reviewers now will transition away from using delay-based analysis (e.g., LOS or other measures of vehicular capacity or traffic congestion) to determine the impacts of land use and infrastructure plans and projects. Instead, they will focus on identifying opportunities for reduced VMT generation, safe operations, and recommendations for land use development that is more centrally located and incorporates TDM measures.[13]

Caltrans notes that some local jurisdictions have set LOS thresholds for the State Highway System (SHS) either through plans or by ballot measures and will provide this analysis during plan review. LOS can still be used as a transportation analysis tool in California; however, because of

[12] LI-DGR interim guidance, page 2
[13] LI-DGR interim guidance, page 5

SB 743, review of transportation impacts for purposes of CEQA analysis will need to focus on VMT. District staff can highlight LOS deficiencies on the SHS and request mitigation that minimizes new VMT on the SHS. The LD-IGR Interim Guidance stipulates that Caltrans staff should focus first on operational impacts and consistency with Complete Streets principles and should only sparingly suggest roadway capacity improvements.[14]

The Interim Guidance also highlights the importance of analyzing and mitigating VMT through local and regional plan-level documents, as VMT is primarily a regional scale issue. It discusses the potential for "streamlining" impact analysis for project-specific approvals based upon plan or program-level environmental impact reviews (EIRs), and the use of programmatic mitigation strategies, such as impact fee programs.

Finally, the guidance acknowledges a need for a shift in organizational culture, changing language from focusing on "traffic" impacts to "transportation" impacts, emphasizing the need to analyze all modes, and strongly considering land use when reviewing planning documents and mitigation fee programs. It also highlights a need for, and commits to providing, extensive training to Caltrans staff at the headquarters and district levels to adapt to the new analysis methods. Face-to-face training on applying the Interim Guidance was provided to the planners, engineers, and modelers in Caltrans LD-IGR program. Additional training is planned to assist with statewide consistency in tone and approach to comments.

Transportation Analysis Guide / Transportation Impact Studies Guide

While VMT measures impact of, and on, the transportation system (e.g., emissions, energy consumption, demand on infrastructure, and health, etc.), they do not measure how well the transportation system provides access to destinations. Beyond environmental analyses required for CEQA, additional analyses are needed to better understand and address the operations of the transportation system. Having long recognized many of the challenges and limitations associated with LOS analysis, and as part of preparing for SB 743 implementation, Caltrans has begun to explore alternate methods for measuring multimodal mobility.

In 2015, Caltrans initiated an effort to develop a Transportation Analysis Guide (TAG) and an updated Transportation Impact Studies Guide (TISG). The TAG/TISG guidance would address the analysis of impacts related to transportation projects on the State Highway System and land use projects that may affect the transportation system and users of the system. This guidance will develop a comprehensive suite of metrics and methods as well as tools and techniques for performing multimodal transportation analysis and analysis and performance-based decision-making.

Another goal of the effort is to develop performance objectives across all modes of travel based on the contextual setting. The context would be largely defined by system performance and stewardship goals based on the existing and expected future degree of urbanization, modal availability, user need (for example, commerce, home to work, recreation), reliability, safety, environmental setting, and air quality. Caltrans intends to develop new methodologies and analytic best-practices required to perform multimodal performance and impact analysis, to implement SB 743, and provide the technical and analytical support needed by transportation practitioners and decision makers to move California in a more sustainable direction. Caltrans is working with partners to address related technical and policy issues, in order to move this effort forward.

[14] LI-DGR interim guidance; Appendix B

Insights and Lessons Learned

While the revised CEQA requirements to implement SB 743 are not yet final and in place, making it too soon to evaluate the impacts of the proposed changes, the process leading to this point has yielded several important insights related to technical as well as organizational issues:

- **SB 743 promotes integrating transportation and land use planning in order to accomplish goals across multiple levels of government**. Project-level VMT studies highlight the impacts of land use and transportation investments in a manner that enables connection of those impacts to local, regional, and state goals (e.g., health, environment, economic). Analysis at the plan level illuminates the interactions between transportation and land use, and further enables connection to statewide goals. Metrics can address multiple goals and can be tailored to suit the project type (e.g., VMT/capita for residential, VMT/employee for office, VMT/service population for general plans).
- **Balancing land use planning, transportation operations, GHG emission reductions, and associated system investments requires an update to analysis methods**. The California legislation is focused on reducing environmental impacts associated with transportation and land development, mandating a shift away from an LOS-based transportation impact analysis in order to more appropriately balance the needs of congestion management with other statewide goals, such as prioritizing infill development, improving public health, and reducing harm to the environment. Caltrans anticipates that SB 743 implementation will likely lead to closer alignment of project-specific impact analysis and mitigation with investment priorities and management strategies identified through the regional and systems planning process.[15]
- **The transition from LOS to VMT will require deployment of new tools and training with up-front costs but may ultimately save time and money**. While there have been some concerns about time and resource costs associated with the change in analysis process, OPR's initial estimates indicate that the VMT analysis in CEQA will be more straightforward and substantially less costly than LOS analysis. OPR convened hundreds of experts over more than three years in developing the technical advisory and developing recommended methods for modeling VMT for different project types, and OPR will provide and arrange training and technical assistance for public and private practitioners.
- **There is no single performance measure that "does it all."** OPR and Caltrans both note that while VMT is a useful umbrella metric for transportation impacts, it is not designed to be a performance metric for the functioning of the transportation system. Operating an effective transportation system requires a focus on accessibility for people and goods to reach destinations in an efficient manner. Further, transportation professionals need a comprehensive set of metrics at both the user-level and system-level to measure and support accomplishing these goals.

Outside of the SB 743/CEQA context, some jurisdictions will continue to undertake operational analyses, as there is a continued need for understanding the functioning of the roadway network, and how it provides access to destinations. While LOS will still be used in California for some of these analyses, there is a consensus on the need for metrics that support access to destinations for all modes. Caltrans, OPR, and other partners continue to actively work on developing those metrics.

[15] LI-DGR interim guidance; Appendix B