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CALIFORNIA

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Transportation Engineering and Planning Consultant Firms

Subject: LADOT Transportation Assessments - Interim Guidance for Freeway Safety Analysis

On July 30, 2019, the City of Los Angeles adopted vehicle miles traveled (VMT) as a criteria in determining transportation impacts under the State's California Environmental Quality Act (CEQA). This was required by Senate Bill (SB) 743 and the adoption of Section 15064.3 to the CEQA Guidelines. SB743 also provided that the change from delay, as described by level of service (LOS), to VMT analysis as the CEQA metric does not relieve a public agency of the requirement to analyze a project's potential significant impacts related to air quality, noise, safety, or any other impact associated with transportation. The purpose of this memorandum is to provide interim guidance on the preparation of freeway safety analysis for land use proposals that are required by LADOT to prepare a Transportation Assessment.

BACKGROUND

This freeway safety analysis interim guidance will help address the recent comment letters sent by Caltrans District 7 to the Department of City Planning on development project environmental documents. In these letters, Caltrans requested that environmental analyses for new land use development projects include freeway off-ramp safety considerations. Specifically, they requested that the City evaluate a development project's effects on vehicle queuing on freeway off-ramps. Such an evaluation would measure a project's potential to lengthen a forecasted off-ramp queue and create speed differentials between vehicles exiting the freeway off-ramps and vehicles operating on the freeway mainline.

In order to respond to these comment letters in absence of published guidelines by Caltrans that evaluate safety concerns on freeways, the City of Los Angeles Department of City Planning, in collaboration with LADOT and the Los Angeles City Attorney's Office, convened a Freeway Analysis Technical Working Group that included transportation engineering, planning, and environmental firms with a long history of preparing transportation analyses in Southern California. The goal of this Working Group was to establish interim guidance on how transportation assessments for land use proposals should review and analyze potential safety impacts on the freeway system. The Working Group, which met weekly throughout the month of April 2020, developed the steps described below to conduct a freeway safety analysis to determine if a project may potentially result in off-ramp queuing and differential travel speeds that could constitute a potential safety impact under CEQA.

The Working Group included staff from LADOT, the Department of City Planning, Los Angeles City Attorney's Office, and the following consultants:

- Cambridge Systematics, Inc.
- Gibson Transportation Consulting, Inc.
- Fehr & Peers
- Hirsch/Green Transportation Consulting, Inc.
- Iteris, Inc.
- Linscott, Law & Greenspan, Engineers
- The Mobility Group
- Overland Traffic Consultants
- Rincon Consultants, Inc.

It should be noted that new Caltrans Transportation Study Guidelines are expected to be released later this year to meet the State's deadline of July 1, 2020, which requires all California agencies to comply with SB743. Caltrans announced that their new guidelines will include a State Highway System safety analysis section. Therefore, the City's interim guidance is expected to be revisited once Caltrans releases the State guidelines to determine if changes are necessary.

FREEWAY SAFETY ANALYSIS STEPS

Effective immediately, land use development projects within the City of Los Angeles that are required to prepare a transportation assessment shall conduct a freeway safety analysis as follows:

1. Identify the number of Project trips expected to be added to nearby freeway off ramps serving the site. If the Project adds 25 or more trips to any off ramp in either the morning or afternoon peak hour, then that ramp should be studied for potential queueing impacts following the steps below. If the project is not expected to generate more than 25 or more peak hour trips at any freeway off-ramps, then a freeway ramp analysis is not required.
2. Using Synchro analysis software, or similar tools, prepare a queuing study for the "Future with Project" conditions for the proposed project build-out year. LADOT's Transportation Assessment Guidelines provide recommended steps to forecast future traffic volumes.
3. To evaluate the adequacy of the existing and future storage lengths, use the 95th percentile queue provided from the Synchro results worksheet, and use 100% of the storage length on each lane of the ramp from the stop line to the gore point. If an Auxiliary Lane exists, add 50% of the length of the auxiliary lane to the ramp storage area.
4. If the Project traffic is expected to cause or add to a queue extending onto the freeway mainline by less than two car lengths, the project would cause a less-than-significant safety impact. If the queue is already extending or projected to extend onto the freeway mainline, and the Project increases the overflow onto the mainline lanes by less than two car lengths, the project would cause a less-than-significant safety impact. If the Project adds two or more car

lengths to the ramp backup that extends to the freeway mainline, then the location must be tested for safety issues which include a test for speed differential between the off-ramp queue and the mainline of the freeway during the particular peak hour.

5. The speed differential would identify the operating speed of the freeway mainline lanes during the peak hour that corresponds to the peak hour during which the ramp is expected to experience project-related queue overflow. Caltrans Performance Measurement System (PeMS) data should be used to identify freeway operating speed(s) during the peak hour being analyzed. If reliable PeMS data are not available at the subject location, other sources of speed data including location-based services data from available sources could be used.
6. If the speed differential between the mainline lane speeds and the ramp traffic is below 30 mph, the project would be considered to cause a less-than-significant safety impact.
7. If the speed differential is 30 mph or more, then there is a potential safety issue. To offset this potential condition, the project should consider the following preferred corrective measures:
 - a. Transportation demand management program(s) to reduce the project's trip generation,
 - b. Investments to active transportation infrastructure, or transit system amenities (or expansion) to reduce the project's trip generation, and/or
 - c. Potential operational change(s) to the ramp terminal operations including, but not limited to, lane reassignment, traffic signalization, signal phasing or timing modifications, etc. This option requires coordination with Caltrans and LADOT to assess feasibility and for approval of the proposed measure(s).

A physical change to the ramp itself (addition of auxiliary lane, ramp widening, etc.) may be considered. However, this change would have to demonstrate substantial safety benefits, not be a VMT-inducing improvement, and not result in other environmental issues.

8. If the cost of the physical change to the ramp is substantial, then a fair-share contribution to the improvement may be required if necessary requirements are met, including, but not limited to, Caltrans defining the improvement cost, and opening a Project File/Project Account to accept a financial contribution for the improvement. If required, the Applicant would pay the Project's fair-share of the improvement cost, and the fair-share contribution would be deposited in the Project Account to be used for the identified improvement.

We understand that Caltrans' direction on evaluating transportation impacts under CEQA continues to evolve. Relevant State documents are being drafted for release later this year, including a VMT-focused Transportation Impact Study Guide that guides Caltrans comments on land use project EIRs of local agencies, and a Transportation Analysis Framework that addresses how Caltrans evaluates the CEQA impacts of capacity-increasing projects on the State Highway System (SHS). While we look to these guidance documents to inform our methodology of safety impacts on freeway facilities, we release this

interim guidance to inform practitioners on the technical approach, developed by the Working Group that can be applied to project-level Transportation Assessments immediately.

If you have any questions, please email me at tomas.carranza@lacity.org or call me at 213-435-4056.

Sincerely,

A handwritten signature in black ink, appearing to read 'T. Carranza', written over a light blue horizontal line.

Tomas Carranza, PE

Principal Transportation Engineer

c: Kathryn Phelan / John Fox, City Attorney's Office
Lisa Webber / Arthi Varma / Luci Ibarra, DCP
Rubina Ghazarian / Eddie Guerrero / Jesus Serrano, LADOT

Attachment 1
Freeway Safety Analysis Working Group
Findings

The City of Los Angeles formed a Working Group made up of City staff and transportation engineering and planning consultants to develop a policy to respond to Caltrans' requests that off-ramp safety considerations be included in the environmental analyses for new development projects. While SB 743 calls for the inclusion of safety considerations, Caltrans District 7 verbal and written comments focus on the potential backup of off-ramps onto the mainline freeway lanes as their primary safety concern.

Since Caltrans has not established a methodology or thresholds based on substantial evidence, the Working Group was tasked with developing a freeway safety analysis based on research, local traffic conditions, and best practices. The Working Group met weekly during the month of April 2020 to share research into the number of project trips that should constitute a threshold for triggering an off-ramp investigation, the issue of speed differential and its relationship to freeway safety, the ability to collect reliable mainline freeway speed data, and a study process to identify freeway locations where queuing and speed differential is a concern that should be addressed.

RECOMMENDED POLICY DRAFT

The recommendations by the Working Group, which are summarized in the cover memorandum, were developed based on research, a review of best practices, and an analysis of local data. The first step was to determine when an off-ramp near a proposed project should be studied. The consultants participating in the Working Group researched their previous project transportation assessments to identify the level at which project-related traffic can cause traffic to back up onto the freeway. From these case studies, over 100 off-ramps were evaluated and it was determined that very few of these locations were expected to result in queues extending onto the freeway. So, this is not a common occurrence.

Project trips added to an off-ramp varied between one trip and over 100 trips per hour. Very rarely did an evaluated off-ramp result in a projected back-up onto the mainline.

Screening Threshold

The Working Group recommended a screening threshold of 25 or more project trips during a peak hour assigned to an off-ramp as the threshold for selecting that off-ramp for further study. The consultants on the Working Group cited inconsistencies in the direction given by Caltrans District 7 for different projects. In one case, a large land use proposal near the junction of two major downtown freeways was estimated to generate over 800 trips in each of the peak hours. Caltrans requested the analysis of up to 16 interchange ramps. During the project traffic assignment, the project was expected to generate 25 or more peak hour project trips at only four of the off-ramps. A screening threshold of 25 or more project trips was identified by the Working Group as a reasonable threshold to measure those ramps

where congestion already exists, while eliminating the locations where the addition of fewer project trips is not expected to cause a backup onto the freeway.

Speed Data Source

The Working Group discussed the premise that a queue extending onto the freeway mainlines is a safety concern when the speed on the freeway was high enough to potentially lead to a collision because freeway mainline traffic did not have enough time to stop safely. So the group discussed how to consistently determine the actual operating speed of the mainline of a particular freeway, in the appropriate direction, during the affected peak hour. Two data sources were discussed: Caltrans Performance Measurement System (PeMS) data and big data platforms that aggregate location based services data such as StreetLight Data, NPMRDS, or other available sources.

The group agreed that the needed speed data can be collected from PeMS - a source managed by Caltrans. PeMS data can be obtained in graphic and tabular formats which make it easy to identify the mainline speed at the correct spot on the freeway during the right hour in the appropriate direction. The group determined that for some of the freeways with relatively less traffic (e.g., SR 170), there were freeway segments where the data points were less robust. Freeway segments near Downtown Los Angeles, Hollywood, and the West side did not have this problem.

Speed Differential

The Working Group evaluated the amount of speed differential that could be used to define a safety issue. A freeway mainline operating at slow speeds during the peak hour did not present the safety concerns compared to a mainline operating at higher speeds.

Research revealed hundreds of studies related to speed differential analyses with not much agreement on their effects on safety. However, the research did yield information on the severity of collisions at varying speeds. The two most relevant studies suggested 30 mph as the critical speed differential level that would apply to freeway segments. The Caltrans Design Manual does not provide Decision Sight Distance readings for speeds less than 30 mph, implying that speeds less than 30 mph may not be an issue on freeway segments.

According to the [Texas Transportation Institute](#): “Drivers are usually aware that they are closing in on a slower vehicle; however, if there is a large speed differential (over 25 mph) they often have a very poor perception of just how quickly they are closing in until they get very close to the slower vehicle. Often that can be too late, especially when the faster vehicle is a heavy vehicle that needs more room to brake. The slower vehicles risk getting rear-ended; the faster ones risk being cut off by turning or lane-changing drivers who think they have an adequate gap in traffic but do not.”

Based on this literature research, the Working Group selected 30 mph as the speed differential included in this interim guidance. At less than 30 mph, the stopping sight distance related to driver’s perception and reaction times is much lower, thereby minimizing the potential for a collision.