Vehicle Miles Traveled (VMT) Reporting in HCS

Dr. Gustavo de Andrade

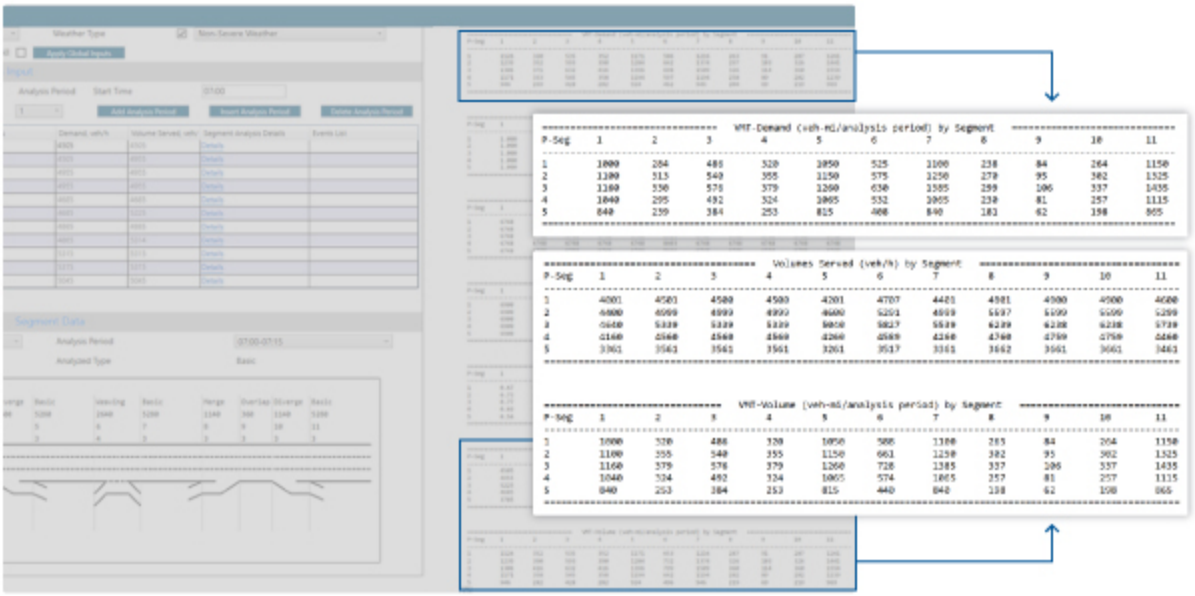
California Senate Bill 743 was passed by the legislature and signed into law by the Governor in the fall of 2013. Read more here. This legislation was conceived to adjust to new policies under the California Environmental Quality Act (CEQA) to promote “the reduction of greenhouse gas emissions, the development of multimodal transportation networks and a diversity of land uses”.

To support the goals of the SB 743 legislation, officially required since July 1, 2020, an alternative metric from the traditional delay was needed. The Vehicle Miles Traveled (VMT) was recommended by the Governor’s Office of Planning and Research (OPR) and is the performance measure specified in the revised CEQA Guidelines.

Vehicle Miles Traveled (VMT) is calculated as the sum of the distance traveled (in miles) by each vehicle on a facility during the analysis period. It is used extensively in transportation planning directly as a measure of effectiveness, as a main input for gas emissions, noise, fuel consumption and vehicle operating cost estimation models. It is also the preferred exposure metric for road safety analysis, including those of the Highway Safety Manual (HSM).

Although Caltrans is using VMT as the performance measure for transportation impacts based on the implementation of SB 743, traffic operational analysis with LOS and delay are still needed to provide input to decisions related to the effectiveness of operation management strategies, planning and design, including but not limited to elements such as highway and freeway facility geometry, intersection lane configuration, signal warrants and signal timing and coordination.

To support a combined LOS and VMT analysis, HCS has been implementing VMT and related measures in several modules. Currently, the Freeways module already presents both VMT based on demand that would use the facility in each analysis period and the VMT based on volumes served, accounting for capacity constraints.



STAFF SPOTLIGHT

Melissa Ginoza

Visual Designer

I grew up on the island of Oahu in Hawaii. As a child, I always enjoyed creating art and this passion inspired me to pursue a profession in design. When I began working at McTrans, I immediately loved the diversity of the team. Hawaii is a place rich with different cultures and backgrounds - the diverse part of McTrans reminds me a lot of my home. As I have gotten to know and work with my colleagues, I found their mutual value in collaboration, respect, and growth to be incredibly inspiring.

One of my favorite aspects about my job is working with different people. McTrans has a very multidisciplinary team and working with different people has introduced me to different parts of the company. Over the last 6 months of my employment, this has included creating designs for training materials, the website, and various online platforms. I don't have a background in engineering or transportation so there is a lot I get to learn everyday. I am thankful for the opportunity to learn while working alongside experts in the industry and to be a part of the team at McTrans!

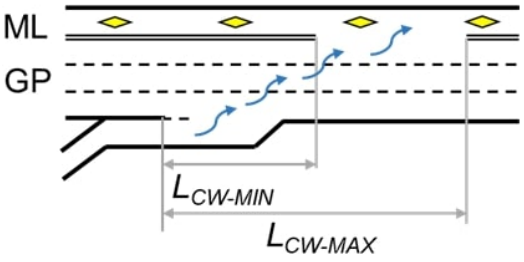
Defining the Location of Managed Lanes Access Points on Freeway Facilities with HCS

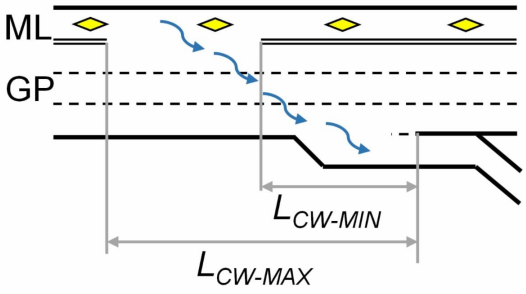
Dr. Shen Dong

As an extension of the weaving methodology, the Highway Capacity Manual 6th Edition presents methods to calculate the capacity reduction due to cross-weaving movements in freeway facilities. Cross-Weaving movements are defined as vehicle movements between a managed lane (ML), which is on the leftmost lane of the freeway, and the nearby entry or exit ramps. This configuration causes the freeway general purpose lanes (GP) to operate as a weaving segment. The vehicle performance is also sensitive to the availability of road length (L_{CW}) to complete maneuvers.

The definition of the access point location for ML facilities becomes a design decision which affects operations along the facility. Research has shown an optimal access point may exist to maximize the performance for a cross-weave facility[1].

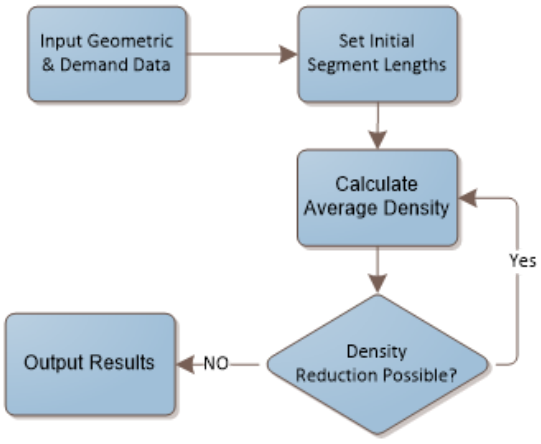
For example, where an on-ramp is followed by an off-ramp, the managed lanes access locations should be adjusted so that both the upstream merge and the downstream diverge have sufficient length to allow vehicles to efficiently move between ramps and access points. This is a trial-and-error process to balance these and find an optimal configuration.



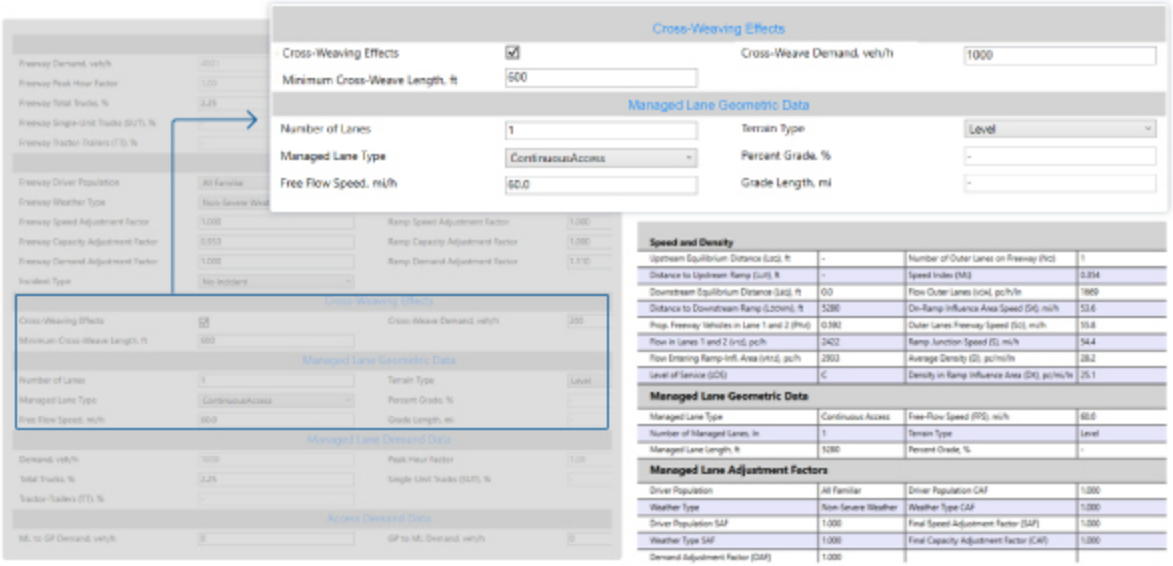


[1] Dong, S., Khanapure, V., Taningco, S., Sampson, B. (2017) Optimize the Location of Managed Lanes Access Segment for Efficient Cross-Weaving in Freeway Facilities, *Presented at the 5th Annual UTC Conference for the Southeastern Region, STRIDE,* University of Florida, Gainesville, FL.

The HCS Freeways module can be used to find the optimal location for managed lane access points on freeway segments, allowing the engineer to measure the efficiency of cross-weaving movements. As a result, it can be used to provide guidance on the design of managed lane access segments.



By testing values for length L_{CW} (see figure), an optimal design can be proposed to minimize average segment and facility density, resulting in better LOS. Starting from an initial value, new lengths may be tested iteratively until the estimated density reaches desirable, if not optimal, standards.



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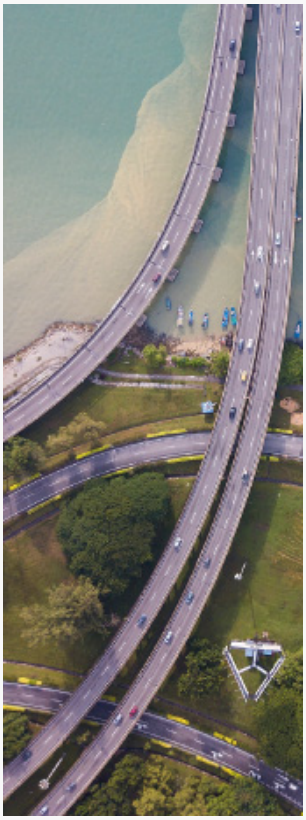

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