



DIVISION OF RESEARCH, INNOVATION & SYSTEM INFORMATION

Research Initial Scope of Work

I. Task Title: Operational and Safety Analysis Tool for Various TSMO Active Traffic Management Strategies

II. Task ID: 4961

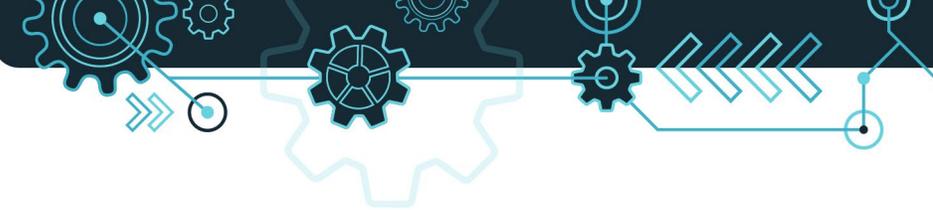
III. Project Problem Statement:

Caltrans has increasingly incorporated various combinations of ATM strategies into Operational Improvement (OI) and Safety Improvement (SI) projects under the State Highway Operation and Protection Program (SHOPP). However, districts are continuously faced with challenges of analyzing and estimating long-term operational and safety benefits of various ATM strategies in future opening years using existing data sources and tools. Therefore, there is a research need to develop a comprehensive analysis tool to assist Caltrans in analyzing and estimating the operational (i.e. speed improvement) and safety (i.e. reduced number of crashes) improvements of various combinations of ATM strategies to support the identification of effective TSMO projects, optimize funding allocation, and ensure maximum return on investment.

IV. Objective:

The objective of this research project is to develop a comprehensive analysis tool to analyze and estimate long-term operational and safety benefits of various combinations of ATM strategies. In parallel, the project will eliver statewide training programs of using this analysis tool to support the evolving needs of TSMO initiatives—specifically in the review and implementation of SHOPP OI and SI projects. Additionally, the outcomes of this research will advance the development of Caltrans' TSMO ATM strategic plan and future workforce development.

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V. Task Description of Work:

(1) An operational and safety analysis tool (e.g. spreadsheet) along with instructions to analyze and estimate speed and safety (i.e. crash modification factor) improvements of various combinations of ATM strategies, which generates inputs for Caltrans Daily Person Hours of Delay Savings calculation spreadsheet and Traffic Safety Index tool. (2) Statewide trainings for the use of the developed operational and safety analysis tool to promote technical discussion and collaboration between headquarter and districts in the Division of Traffic Operations. The operational and safety analysis tool along with training materials serve as major references for Division of Traffic Operations to perform technical analysis and review for evolving TSMO ATM OI projects, which facilitates SHOPP project delivery process.

VI. Expected Deliverables:

Research will proceed in the following steps: (1) Project Kickoff: Kick off the project and clarify task orders with the consultant. (2) Literature Review: Perform literature review on the existing practice of operational and safety analysis of various combinations of TSMO ATM strategies. (3) Tool Development: Develop an operational and safety analysis tool for various combinations of ATM (4) Training Development: Develop statewide training materials for the use of the operational and safety analysis tool (5) Technical Review: Establish a statewide transportation system analysis panel to review and test the developed tool using real-world projects and provide feedback on the tool. (6) Statewide Training: Provide statewide training for the use of the developed tool for ATM operational improvement project examples and receive feedback from districts

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VII. Background:

Transportation Systems Management and Operations (TSMO) encompasses an integrated set of strategies aimed at enhancing the efficiency and reliability of the existing transportation system before adding extra capacity. Active Traffic Management (ATM), such as dynamic speed limits, adaptive ramp metering, dynamic lane management signs, queue warning system, etc., is one of the cost-effective TSMO strategies to improve freeway operational and safety performance. As traffic congestion continues to intensify across freeways in California, Caltrans has integrated ATM into effective solution assets to proactively manage traffic flows, mitigate recurring and non-recurring delays, and reduce the likelihood of traffic accidents.

VIII. Related Research:

1. Kuhn, B., Balke, K., & Wood, N. (2017). Active traffic management (ATM) implementation and operations guide (FHWA-HOP-17-056). Federal Highway Administration. <https://ops.fhwa.dot.gov/publications/fhwahop17056/fhwahop17056.pdf>

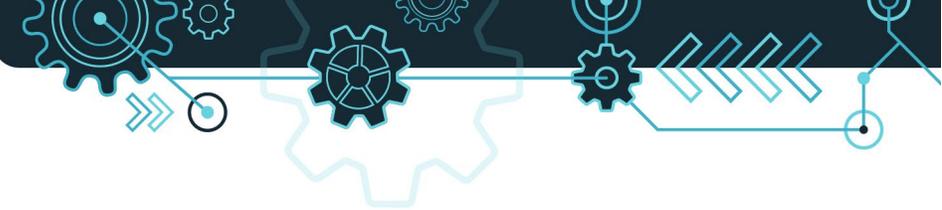
2. National Academies of Sciences, Engineering, and Medicine. 2024. Active Traffic Management Strategies: A Planning and Evaluation Guide. Washington, DC: The National Academies Press. <https://doi.org/10.17226/27871>

3. Neudorff, L., & McCabe, K. (2014). Active traffic management (ATM) feasibility and screening guide (FHWA-HOP-14-019). Federal Highway Administration. <https://ops.fhwa.dot.gov/publications/fhwahop14019/fhwahop14019.pdf>

4. Levecq, C., Kuhn, B., & Jasek, D. (2011). General guidelines for active traffic management deployment. Texas Transportation Institute. https://utcm.tti.tamu.edu/publications/final_reports/Kuhn_10-01-54_Interim.pdf

5. Ishimaru, J. M., Hallenbeck, M. E., & Wright, D. (2014). Guidelines for prioritization of future active traffic management deployment (WA-RD 808.1). Washington State Department of Transportation. <https://www.wsdot.wa.gov/research/reports/fullreports/808.1.pdf>

6. Boyles, S. D., Walton, C. M., Duthie, J., Jafari, E., Jiang, N., Khani, A., Li, J., Osorio, J., Pandey, V., Rambha, T., & Yahia, C. (2014). A planning tool for active traffic management combining microsimulation and dynamic traffic assignment. Center for Transportation Research, The University of Texas at Austin. <http://library.ctr.utexas.edu/ctr-publications/0-6859-1.pdf>



IX. Deployment Potential:

The Transportation System Analysis branch of the Office of Mobility & System Performance in the Division of Traffic Operations will lead the efforts in project development and management as well as technical support of the developed analysis tool.

X. Estimate of Duration:

2 years

XI. Estimated Cost:

\$350,000.00