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FEBRUARY 2022

Project Title:
Developing Segment and
Intersection-Level BLOS measures
for the SHS

Task Number: 3657

Start Date: June 1, 2020

Completion Date: May 31, 2023

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Developing Segment and Intersection-Level BLOS Measures for the SHS

Developing segment and intersection-level bicycle level of service (BLOS) measures for the California State Highway System.

WHAT IS THE NEED?

Bicycle level of service (BLOS) measures are essential tools for transportation agencies to monitor and prioritize improvements to infrastructure for cyclists. They attempt to relate objective measures of the roadway environment to subjective measures of cyclist safety or comfort. Existing BLOS measures were developed in other regions and do not account for the roadway features and driving culture in California.

Additionally, as bicycle facility improvements have advanced, existing measures do not account for many of the changes. A previous BLOS pilot study utilized and tested a statistical and behavioral modeling approach to developing a BLOS measure for the California state highway system (SHS).

WHAT ARE WE DOING?

To accomplish these goals the research team will perform the following activities:

1. Conduct kick-off meeting - To discuss research approach and project needs, which purpose is to discuss the existing data sources, the proposed research approach, and identify key California Department of Transportation (Caltrans) staff to form an advisory team for providing the necessary support for this research.
2. Perform literature review - To identify the most recent research on bicycle performance measures, BLOS applications, and modeling approaches used in these efforts. Generate a technical memo describing literature review results.



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3. Collect video data - Produce a library of at least 30 video clips to be used in the user experience survey. These videos will allow the survey respondents to imagine themselves riding a bicycle in the specific road environments, while not exposing them to potential traffic dangers.
4. Conduct intersection video testing - Since intersection videos were not included in the pilot study, multiple approaches to recording the experience of traveling through an intersection, including different turn movements, shooting straight ahead vs. turning the view left and right in the approach, and different camera mounting techniques will be used in this study.
5. Collect video data - Record videos from the perspective of a cyclist riding on a variety of roads and intersections covering the current and anticipated bicycle facility types on the SHS.
6. Collect facility attribute data - Gather facility attribute data that can be used as the independent variables in the models. A spreadsheet containing data attributes and data dictionary will be made available.
7. Develop and implement user experience survey - Gather data on opinions of different types of bicycle facilities that can be used as the dependent variable in the models. The survey will capture responses to the videos for a large sample of California cyclists and potential cyclists of all experience and skill levels. The deliverable will be a link to the final survey.
8. Estimate BLOS models - Estimate models that can be used to generate BLOS measures for the SHS.
9. Segment BLOS model - Referencing the methods piloted in a previous study, the research team will use a behavioral modeling approach to classify the types of cyclists in California, and their likelihood or perceived safety or comfort of riding on a given road segment. The goal of this approach is to develop a level of service measure that account for the varying preferences of different types of cyclists.
10. Pilot intersection BLOS model - Test the approach used for the segment model to the intersection model and possibly test other modeling approaches if they show potential.
11. Pilot application of the relevant models to a jurisdiction - The purpose of this task is to pilot the implementation of the segment and intersection BLOS measures on real world data.
12. Prepare final report - Compiles all the project deliveries in one coherent document, and describes the process to achieve the project goals and outcomes. The final report will also document the required next steps to continue and develop related future efforts.

WHAT IS OUR GOAL?

The output of this project will support the Bicycle Collision Monitoring Program (BCMP) by providing an opportunity to evaluate the impact of specific improvements on BLOS. Moreover, establishing such models can potentially be used to refine the identification of high collision bicycle corridors that are an important part of BCMP.

WHAT IS THE BENEFIT?

The research aligns with Caltrans' Goals in achieving:

1. **Safety and health** - Reduce injuries and fatalities of workers and users including auto, bicycle, pedestrian, and transit travel modes during construction, maintenance, and operations. It also promotes active transportation by encouraging increased use of active modes of transportation such as biking and walking.
2. **Stewardship and efficiency** - Reduce lifecycle costs for Caltrans projects, products, or services which by decreasing the one-time and recurring costs over the life span of a structure, system, or service. It includes capital, installation, and operating costs; maintenance and upgrade costs; salvage value; and retirement cost at the end of its useful life.

WHAT IS THE PROGRESS TO DATE?

October 1, 2021 – December 31, 2021

- **Task 2**
 - Completed literature review with a focus on previous research on bicyclist preferences, bicycle level of service measures, and bicycles imulators and submitted to Caltrans for review
- **Task 3**
 - Continued programming virtual reality environments to replace real-world video of roadway facilities to capture feedback on different types of facilities in the user experience survey.
 - Continued work on experimental design to identify the routes and variables to focus on within the SHS.
- **Task 4:**
 - Built virtual reality bicycle simulator lab, including bicycle, stationary smart trainer, VR headset kid, and workstation with GPU.
 - Began trouble-shooting of operating the bicycle within the simulator environment.
- **Task 5**
 - Continued planning structure and approach for conducting the survey in a bicycle simulator lab.

IMAGE

Bicycle User Experience Survey



Safety
Comfort
Satisfaction
Performance
Would you ride it?

Different Types of Riders on the roadway