



Caltrans Division of Research,
Innovation and System Information

Research

Notes

Transportation
Safety and
Mobility

NOVEMBER 2019

Project Title:
Wrong Way Driver Mitigation

Task Number: 3705

Start Date: September 1, 2019

Completion Date: August 31, 2022

Task Manager:
John Slonaker
Sr. Transportation Electrical
Engineer (Specialist)
john.slonaker@dot.ca.gov

Developing engineering countermeasures for severely intoxicated drivers

Identifying methods to communicate wrong way information to severely intoxicated drivers leading to the development of effective engineering countermeasures.

WHAT IS THE NEED?

Wrong-way collisions account for only about 3 percent of accidents on high-speed divided highways, but they are much more likely to result in fatalities than other types of highway crashes. Most wrong-way events on controlled-access highways are head-on collisions caused by drivers who are severely intoxicated.

Research has consistently identified the cause of many wrong way driving collisions, as drivers whose blood alcohol content is twice or more than the legal limit of 0.08 percent, often 0.20 and higher. Current countermeasures include installation of larger signs at driver sight level, flashing beacons, and retroreflective pavement markings. Research indicates these countermeasures are effective in producing self-corrective actions of wrong way driver movements when the driver is not intoxicated, but that they have had little to no effect on reducing wrong way collisions caused by severely intoxicated drivers.

Current countermeasures require a certain level of cognitive ability to see the countermeasure, recognize what it means, and take appropriate action. The proposed research seeks to understand the cognitive abilities of severely intoxicated drivers as a first step in developing effective engineering countermeasures to prevent severely intoxicated drivers from entering highways in the wrong direction and causing fatal collisions.

WHAT ARE WE DOING?

The research team has developed a scope of work which outlines how this project should be divided into a series of subtasks and



DRISI provides solutions and
knowledge that improves
California's transportation system

the expected deliverables along the lines of the following:

- Based on the objective, design experiments to gather data on the cognitive ability of severely intoxicated (2 times the legal limit or higher) drivers
 - *Deliverable:* Project plan and experiment design document
- Obtain approval for human subject testing
 - *Deliverable:* Documented approval from appropriate authority
- Set up experiments
 - *Deliverable:* Functioning experiment apparatus
- Recruit test subjects and conduct experiment
 - *Deliverable:* Recorded data
- Analyze data and prepare final report
 - *Deliverable:* Report characterizing the cognitive abilities of impaired test subjects relative to non-impaired ones, identifying the types of stimulus to which these drivers may respond, and design recommendations for countermeasures tailored to severely intoxicated drivers

WHAT IS OUR GOAL?

The proposed research seeks to understand the cognitive abilities of severely intoxicated drivers as a first step in developing effective engineering countermeasures to prevent severely intoxicated drivers from entering highways in the wrong direction.

WHAT IS THE BENEFIT?

Although this task is in the conceptual stage, focusing on which types of stimuli most affect severely intoxicated drivers, future study could use its findings to develop and deploy engineering countermeasures to prevent wrong way entries onto state highways. This would align with the Caltrans' Strategic Goal of Safety and Health.

WHAT IS THE PROGRESS TO DATE?

The Division of Research, Innovation and System Information completed a Call for Submissions and received three proposals from different universities. The next step is to select a proposal, then write and execute a contract.

IMAGES

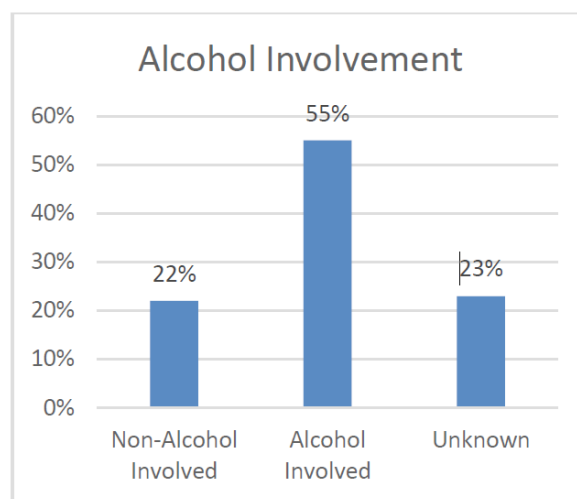


Figure 1: Alcohol Involvement in wrong way driving incidents

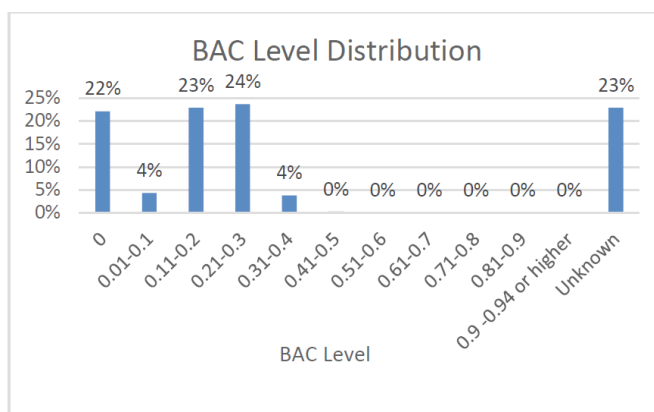


Figure 2: Blood Alcohol Content in Wrong Way Drivers

The contents of this document reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the California Department of Transportation, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, or regulation. No part of this publication should be construed as an endorsement for a commercial product, manufacturer, contractor, or consultant. Any trade names or photos of commercial products appearing in this document are for clarity only.