

Sign Code Draft  
Frequency of Message Changes Information

Studies:

**1. Statistical Analysis of the Relationship between On-Premise Digital Signage and Traffic Safety (by Texas A & M University and Texas A & M Transportation Institute, sponsored by Signage Foundation and Texas Engineering Extension Service)**

Date: December 17, 2012

Available online at: <http://www.signresearch.org/wp-content/uploads/Digital-Signage-Traffic-Safety-A-Statistical-Analysis.pdf>

*In this study, researchers collected large amounts of sign and crash data in order to conduct a robust statistical analysis of the safety impacts of on-premise digital signs. The statistical tools used the latest safety analysis theory developed for analyzing the impacts of highway safety improvements. The research team acquired the crash data from the Highway Safety Information System, which is a comprehensive database of crash records from several states. One of the advantages of these data is that they also include information about roadway characteristics, such as the number of lanes, speed limit, and other factors. The research team then acquired information about the location of on-premise digital signs from two sign manufacturing companies. Through significant effort by the researchers, these two datasets were merged into a single dataset that represented potential study locations in California, North Carolina, Ohio, and Washington. Of the initial set of over 3,000 possible sites, the research team was able to identify 135 sign locations that could be used for the safety analysis. Potential sites were eliminated from consideration due to any of the following factors:*

- *The sign location was not on a roadway that was included in the crash dataset; only major roads were represented in the crash data.*
- *The sign location provided by a sign manufacturing company could not be verified through online digital images of the location.*
- *Only signs installed in calendar years 2006 or 2007 could be included in order to have adequate amounts of crash data before and after the sign was installed.*

***Summary of study results***

*The results of this study provide scientifically based data that indicate that the installation of digital on-premise signs does not lead to a statistically significant increase in crashes on major roads.*

## 2. Compendium of Recent Research Studies on Distraction from Commercial Electronic Variable Message Signs (CEVMS) (Prepared by The Veridian Group)

Date: February 2018

Available online at:

<http://www.kverulant.org/upload/kc/files/Konec%20d%C3%A1lni%C4%8Dn%C3%A4ch%20billboard%C5%AF/studie%20o%20vlivu%20billboard%C5%AF%20na%20nezpe%C4%8Dnost%20%C3%BAnor%202016.pdf>

A review of 22 studies. Includes a summary of the findings of each of the studies reviewed. Studies reviewed included below. Where available, a copy of the study is included below, as a PDF.

- Empirical Evaluation on a Driving Simulator of the Effects of Distractions Inside and Outside the Vehicle on Driver's Behavior (United States, 2008)
- Conflicts of Interest: The Implications of Roadside Advertising for Drive Attention (United Kingdom, 2009)
- Relative Crash Involvement Risk Associated with Different Sources of Driver Distraction (Norway, 2009)



Relative crash  
involvement risk Bac

- Investigating Driver Distraction: The Effects of Video and Static Advertising (United Kingdom, 2009)



Investigating driver  
distraction-the effec

- Driver Distraction from Roadside Advertising: The Clash of Road Safety Evidence, Highway Authority Guidelines, and Commercial Advertising Pressure (Australia, 2009)



DRIVER  
DISTRACTION FROM

- Influence of Billboards on Driving Behavior and Road Safety (Israel, 2010)
- The Role of Roadside Advertising Signs in Distracting Drivers (Saudi Arabia, 2010)

- External Driver Distractions: The Effects of Video Billboards and Wind Farms on Driver Performance (Canada, 2011)  
*Did not seek a copy – we do not allow video signs*

- Advertising Billboards Impair Change Direction in Road Scenes (Australia, 2011)



Advertising  
billboards impair ch

- Effects of Electronic Billboards on Driver Distraction (Sweden 2012)
- Driver Visual Behavior in the Presence of Commercial Electronic Variable Message Signs (CEVMS) (United States, 2012)



cevmsfinal.pdf

- Effects of External Distractions (United States, 2013)
- Impact of Roadside Advertising on Road Safety (Australia, 2013)



Impact of Roadside  
Advertising on Roac

- Roadside Advertising Affects Driver Attention and Road Safety (Denmark, 2013)



Roadside  
Advertising Affects I

- Statistical Analysis of the Traffic Safety Impacts of On-Premise Digital Signs (United States, 2014)

*Online PDF is dated August 2013, so may not be final copy*



Statistical Analysis  
of the Traffic Safety

- Evaluation of the Visual Demands of Digital Billboards Using a Hybrid Driving Simulator (United States, 2014)

- Accidents on Ayalon Highway – Three Periods of Comparison: Billboards Present, Removed, and Returned (Israel, 2014)
- Investigation of Potential Relationship between Crash Occurrences and the Presence of Digital Billboards in Alabama and Florida (United States, 2015)
- Digital and Projected Advertising Displays: Regulatory and Road Safety Assessment Guidelines (Canada, 2015)
- Digital Billboards ‘Down Under’: Are they Distracting to Drivers and can Industry and Regulators Work Together for a Successful Road Safety Outcome? (Australia, 2015)



Digital billboards  
down under.pdf

- A Field Study on the Effects of Digital Billboards on Glance Behavior During Highway Driving (United States, 2016)
- Influence of an Illuminated Digital Billboard on Driving Behavior with a Focus on Variable Display Time and Distance from a Pedestrian Crossing (Belgium, 2018)

### 3. Federal Highways Administration (FHWA) Memorandum



FHWA Memo Off  
Premise Changeable

*Excerpt:*

Based upon contacts with all Divisions, we have identified certain ranges of acceptability that have been adopted in those States that do allow CEVMS that will be useful in reviewing State proposals on this topic. Available information indicates that State regulations, policy and procedures that have been approved by the Divisions to date, contain some or all of the following standards:

- Duration of Message: Duration of each display is generally between 4 and 10 seconds - 8 seconds is recommended.
- Transition Time: Transition between messages is generally between 1 and 4 seconds - 1-2 seconds is recommended.

- Brightness: Adjust brightness in response to changes in light levels so that the signs are not unreasonably bright for the safety of the motoring public.
- Spacing: Spacing between such signs not less than minimum spacing requirements for signs under the FSA, or greater if determined appropriate to ensure the safety of the motoring public.
- Locations: Locations where allowed for signs under the FSA except such locations where determined inappropriate to ensure safety of the motoring public.

Other standards that the States have found helpful to ensure driver safety include a default designed to freeze a display in one still position if a malfunction occurs; a process for modifying displays and lighting levels where directed by the State DOT to assure safety of the motoring public; and requirements that a display contain static messages without movement such as animation, flashing, scrolling, intermittent or full-motion video.