



TRANSPORTATION POOLED FUND
PROGRAM

TECHNICAL SUMMARY

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Principal Investigators:

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TOTAL PROJECT COST:

\$165,000

MnDOT CONTRIBUTION:

\$30,000

PARTICIPATING STATES:

CA, CO, FL, IA, MN, WV



The four fonts evaluated in this study were (from top to bottom) E(Mod), Enhanced E(Mod), Clearview 5W and Clearview 5WR.



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Pooling Our Research: Are New Fonts for Traffic Signs Easier to Read?

Why a Pooled Fund Study?

To make traffic signs visible at night, manufacturers use retroreflective materials that reflect light from vehicle headlights with a minimum of scattering. To create this effect, sign materials have traditionally been embedded with glass beads. Over the years, manufacturers have replaced these beads with microprisms, which allow designers to increase sheeting brightness for specific geometries. With this advance, however, the driving public complained that the newer signs were less readable. This brightness, later identified as the halation effect, causes letters to become so bright that their edges appear blurred and can be a problem for older drivers and others with reduced contrast sensitivity.

To counter this effect, researchers developed a new family of highway sign font called ClearviewHwy® in the 1990s, which increased legibility by decreasing letter stroke width and—for lowercase letters—increasing loop height. One of these fonts, Clearview 5W, is considered comparable to Series E-Modified [E(Mod)], the font traditionally used for highway signs. Although Clearview received interim approval from the Federal Highway Administration in 2004, it has not been incorporated into the [Manual on Uniform Traffic Control Devices](#) or adopted by all states because of the lack of definitive research showing that Clearview is superior to E(Mod) and because Clearview requires a licensing fee while E(Mod) is free. Further, Clearview 5W results in wider words, requiring wider and more expensive signs.

Research was needed to address the knowledge gap concerning the performance of these fonts.

What is the Pooled Fund Study's Goal?

MnDOT led transportation pooled fund study TPF-5(262) to evaluate the field performance of a number of highway sign fonts and in particular to determine:

- Whether Clearview 5W provides greater legibility than E(Mod) for overhead guide signs.
- Whether Enhanced E(Mod), a free font developed from E(Mod) to provide the benefits of Clearview, provides greater legibility than E(Mod) for overhead guide signs.
- The performance of E(Mod), Enhanced E(Mod) and Clearview 5W for whole numbers on shoulder-mounted signs.

What Did We Do?

Researchers conducted a driving study on a closed-course test track in Bryan-College Station, Texas, using male and female participants in two age groups: 18 to 35 years old and 65 years and older.

The test track included three full-size overhead guide signs and one full-size shoulder-mounted guide sign. Each overhead sign used one of the three fonts to be studied—E(Mod), Enhanced E(Mod) and Clearview 5W—while the shoulder-mounted sign was designed to alternate these fonts.

TPF-5(262) Evaluation of Guide Sign Fonts.

Improving the legibility of highway guide sign fonts could help improve driver safety, especially for older drivers at night, by giving them longer to react to the information displayed.

“This project was a step forward toward determining whether the legibility of guide sign fonts can be increased to improve driver safety, especially for older drivers.”

—Sue Groth,
Director, MnDOT Office
of Traffic, Safety and
Technology

“This project did not show Clearview 5W to be significantly better than E(Mod). There is no reason, then, for states to use it or to be disallowed from using it. Since Clearview 5W will cost states more, I would not recommend it. But if we could create a font that reduced the size of signs without reducing legibility, that could be a real benefit to practitioners.”

—Jeff Miles,
Assistant Research
Engineer, Texas A&M
Transportation Institute

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Researchers conducted the driving study at a 2,000-acre former U.S. Air Force base at Texas A&M's Riverside Campus. The closed-course route was geometrically designed like a typical highway while providing an atmosphere free from other roadway traffic.

Participants were asked to view these signs while driving an instrumented vehicle during both daytime and nighttime conditions, using low-beam headlights at night. Researchers recorded the distance from which signs were legible and converted results to a legibility index by dividing the distance by the legend height of 16 inches so that the results could be better compared to other studies.

What Did We Learn?

Results did not show a statistically significant difference in font legibility. In some instances, Clearview 5W and Enhanced E(Mod) appeared to provide greater legibility than E(Mod) based on the mean legibility index values. But results overall were inconsistent, with no statistically significant advantage over E(Mod).

The research team concluded that the large observation angle between the overhead guide sign and the headlights resulted in luminance levels that did not create a halation effect, and that the luminance levels for the shoulder-mounted sign, while higher than for the overhead sign, were not enough to cause impairment. These luminance levels were representative of existing highway signs.

Overall, the study's results do not support the use of Clearview 5W or Enhanced E(Mod) over E(Mod). While there is no performance reason to disallow continued use of Clearview 5W, its cost to states is higher. However, a preliminary cost-benefit analysis showed that the use of Clearview 5WR, a modified version of Clearview 5W with a reduced footprint, could lead to a cost savings of 2 percent over E(Mod) based on the potential reduction in sign size.

What's Next?

Minnesota does not use Clearview fonts and will continue to use E(Mod) unless future research shows another font to have better performance. Researchers recommend continuing to evaluate fonts that could reduce sign size without reducing legibility.

They also recommend developing a tool that practitioners could use to design signs by estimating their performance using factors such as font type and geometric design constraints, a laboratory technique to quickly and inexpensively test candidate fonts prior to more expensive field testing, and improved signing guidelines to reduce sign costs by removing and/or reducing sign size of redundant signs.

This Technical Summary pertains to Report 2014-11, "Evaluation of Guide Sign Fonts," published February 2014. The full report can be accessed at <http://www.lrrb.org/PDF/201411.pdf>. Information about TPF-5(262) can be found at <http://www.pooledfund.org/Details/Study/490>.

For more than 25 years, FHWA's Transportation Pooled Fund Program has been providing state DOTs and other organizations the opportunity to collaborate in solving transportation-related problems. The TPF Program is focused on leveraging limited funds, avoiding duplication of effort, undertaking large-scale projects and achieving broader dissemination of results on issues of regional and national interest.