TEXAS TRANSPORTATION INSTITUTE
THE TEXAS A&M UNIVERSITY SYSTEM

Project Summary Report 4049-S

Project 0-4049: Evaluation of Clearview Alphabet with Super High Intensity Prismatic Sheeting

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PROJECT SUMMARY REPORT

Legibility of Microprismatic Sheeting and Clearview Alphabet: Summary Report

In the 1950s, national signing standards introduced the use of white on green guide signs for freeways. These signs used a lowercase alphabet [Series E(Modified)] for destination names, which was the first use of lowercase letters on U.S. highway signs. This lowercase alphabet has remained the same since it was introduced in the 1950s. The only change has been in the manner in which the letters are fabricated.

Figure 1. Series E(Modified) Alphabet

Figure 2. Clearview Alphabet

The original generation of freeway sign legend used button copy letters, in which retroreflector buttons were placed in an aluminum letter. Most modern legends are cut-out letters, in which the letters are cut directly from retroreflective sheeting. When these fully retroreflective letters are combined with the use of brighter sheetings (particularly,

microprismatic sheeting), a phenomenon known as irradiation (also known as halation, overglow, or blooming) can occur for some drivers. In this phenomenon individual features of some letters are washed out, causing reduced legibility distances.

Researchers conducted this project to determine if the legibility of guide signs fabricated with microprismatic sheeting could be increased by using the Clearview alphabet instead of Series E(Modified). Series E(Modified) is the current U.S. standard lowercase alphabet and has been for more than 50 years. Clearview is a new alphabet that was developed by Meeker & Associates and the Pennsylvania Transportation Institute to overcome the irradiation effects of bright retroreflective sheeting, such as microprismatic sheeting. Figures 1 and 2 show the same sign with the two alphabets studied for this project. Figure 1 uses Series E(Modified) and Figure 2 uses Clearview.

In addition to the two alphabets, researchers evaluated sign position (shoulder-mounted and overhead), subject age, sheeting type, and vehicle type (passenger car and large sport-utility vehicle). Researchers conducted these studies only at nighttime.

What We Did. . .

In the experimental procedure, test subjects driving the test vehicles would start at a distance from which the signs were not legible. They would accelerate to 35 mph, set the cruise control, and begin to concentrate on reading the test word. When the subject read the word correctly, a researcher in the vehicle recorded the distance. Each subject read 28 randomly selected test words in each of the two test vehicles. A total of 60 subjects participated in the study. There were 20 young drivers, 20 middle-aged drivers, and 20 older drivers.

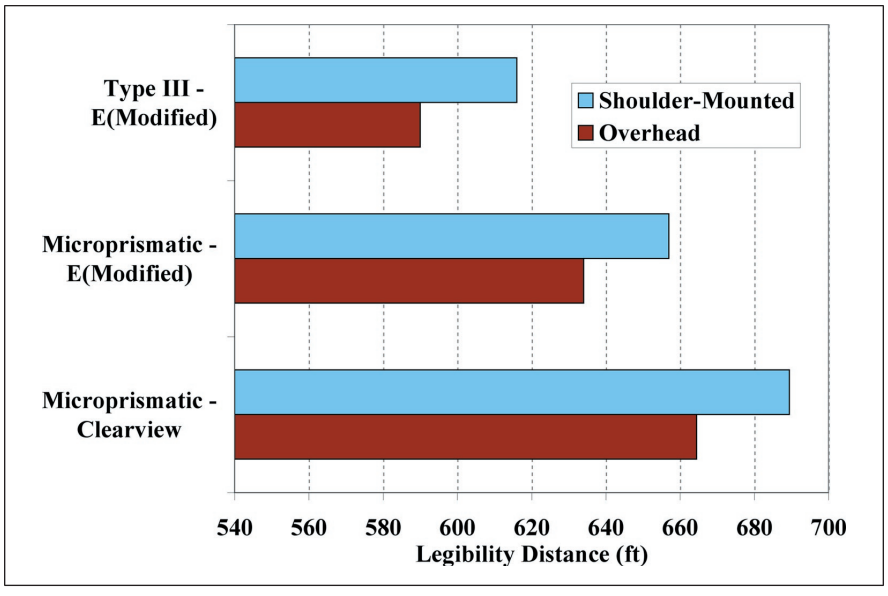

Figure 3. Legibility Results

What We Found. . .

The results show that the Clearview alphabet provides longer legibility distances than Series E(Modified) for all cases studied, including shoulder-mounted and overhead guide signs. The differences in each case were statistically significant. The research findings also show that guide signs fabricated with microprismatic sheeting produce statistically longer legibility distances than guide signs constructed with Type III sheeting (the Texas Department of Transportation's current guide sign policy). Figure 3 shows a summary of the average legibility distances by sheeting type and alphabet.

Sequentially, the differences between Type III guide signs with Series E(Modified) legends, microprismatic guide signs with Series E(Modified) legends, and microprismatic guide signs with Clearview legends were modest.

However, the combined effect of switching from Type III guide signs with Series E(Modified) legends to microprismatic guide signs with Clearview legends were noteworthy. For overhead signs, the combined effect results in an overall mean legibility improvement of 70 ft, or 11.9 percent. For shoulder-mounted guide signs, the improvement was 74 ft, or 12.0 percent. Furthermore, the largest legibility distance improvements of the Clearview alphabet were associated with older drivers.

Assuming a 70 mph highway, the overall overhead guide sign legibility improvement provides drivers an extra 0.68 second to read an overhead guide sign. Assuming a last-look distance equivalent to 3 seconds before passing the signs, these time improvements are even more significant. For instance, on a 70 mph highway, an extra 0.68 second would equate to a 26.4 percent increase in time to read an overhead guide sign.

Again, assuming a 70 mph highway, the overall shoulder-mounted guide sign legibility improvement provides drivers an extra 0.72 second to read a shoulder-mounted guide sign. Assuming a last-look distance equivalent to 3 seconds before passing the signs, these time improvements are even more significant. For instance, on a 70 mph highway, an extra 0.72 second would equate to a 24.1 percent increase in time to read a shoulder-mounted guide sign.

The Researchers Recommend. . .

The Texas Department of Transportation (TxDOT) has already installed a small sample of guide signs with Clearview for evaluation. Anecdotal comments have been favorable. Besides, TxDOT already owns approximately 100 licensed versions of Clearview (although not the most current version, it was the version that was used to make the signs for this study). Additionally, TxDOT has provided Interstate Signs, Inc. (a sign manufacturer that fabricates nearly all of TxDOT's guide signs) one licensed version of Clearview (to be used for TxDOT signs, exclusively). Using this licensed copy of Clearview, Interstate Signs, Inc. fabricated the small sample of Clearview guide signs already installed in Texas. The fabrication costs were no different than if TxDOT had specified Series E(Modified).

Therefore, the researchers recommend statewide implementation of microprismatic sheetings with Clearview legends for overhead guide signs and shoulder-mounted guide signs. This policy should be implemented on a maintenance basis.

For More Details . . .

The research is documented in the following report:
Report 4049-1: *Evaluation of Clearview Alphabet with Microprismatic Retroreflective Sheetings*

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TxDOT Implementation Status
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This research project was conducted to determine the legibility of the Clearview alphabet on freeway guide signs constructed with microprismatic retroreflective sheeting. One product was required for this project: research results to be used by the Traffic Operations Division to revise current policy for text on freeway guide signs. The research results were submitted as an inclusion in Research Report 4049-1. The Clearview alphabet is currently displayed on freeway guide signs on a limited basis for evaluation purposes. The Traffic Operations Division is also in the process of developing a policy with the intention of implementing the Clearview alphabet for statewide use.

For more information, contact Mr. Wade Odell, P.E., RTI Research Engineer, (512) 302-2363 or e-mail wodell@dot.state.tx.us.

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