

ABSTRACT

Title of Dissertation : Durability of Retroreflective Signs.

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Traffic signs are manufactured from retroreflective sheeting to reflect the headlights of oncoming vehicles back to the driver in order for signs to be visible at night. Nighttime visibility of signs is the more critical than that of daytime. It is a function of several variables among them retroreflectivity, or Specific Intensity per unit Area (SIA) of signs. Retroreflectivity of signs deteriorates as a function of time and other variables. This study analyzed the variables that contribute to retroreflectivity deterioration along with other variables that affect the nighttime visibility of signs. A model for predicting the month of replacement of symbol warning signs was developed.

The study utilized and modified the decision sight distance model in order to determine the minimum required recognition distance for each sign type. The minimum required recognition distance was recommended as the criterion for sign replacement. However, since measurement of available nighttime recognition distance is not practical for a large number of signs, a surrogate measure was

adopted. Recognition distances of symbol warning traffic signs were correlated to their SIA values in a field test that involved eleven subjects. Nonlinear models were developed for computing the minimum SIA values. The prediction of the service life of signs was achieved through a regression analysis of measured SIA values for in-service signs with known date of installation. Data for about 500 signs were collected in three states: Wisconsin, Virginia, and Florida.

The end result of this study is a computerized model that predicts the service life of signs based on loss of retroreflectivity. The program input is variables that were determined to significantly affect the recognition distance of signs. The output includes selected input data plus the expected month of replacement and the minimum required SIA value for each sign. The program serves as a data inventory system for highway agencies.

The study shows that modeling of service life of traffic signs is feasible and superior to the existing subjective methods. However, further research is needed to improve the accuracy of the model and to encompass all possible signs and situations.