Theoretical Examination of Passing Sight Distance with Application to Marking No-Passing Zones

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Rural two-lane highways constitute the majority of the road system in the United States. Over 62 percent of the Texas Department of Transportation (TxDOT) center line highway miles are two-lane highways. No-passing zones, which are indicated by solid lines separating the traffic moving in opposite directions, tell drivers where there are segments of two-lane highways that do not have sufficient sight distance to safely perform passing maneuvers.

This study describes a method for automating the process for locating no-passing zones using global positioning system (GPS) data. The researcher developed new analytical algorithms for analyzing the availability of horizontal and vertical sight distances along the alignments of two-lane highways. A new analytical algorithm was also developed to evaluate three-dimensional passing sight distances for any arbitrary alignment of two-lane highways. The algorithms were incorporated into a computer model that can use GPS data as the input and produce a method for locating no-passing zones. The resulting automated system processes GPS coordinates and converts them into easting and northing values, smoothes GPS data, and evaluates roadway alignment for possible sight restrictions that indicate where no-passing zones should be located. The automated system was tested on three highway segments using different GPS receivers, and the results obtained were in agreement with the existing conditions. The verification shows that the developed algorithm and computer program can be used to determine the available sight distance and locate no-passing zones.