Passing maneuvers allow faster drivers to continue driving at their desired speeds without being delayed behind impeding vehicles. On two-lane rural roads, such maneuvers require the passing driver to occupy the opposing lane; this condition has tremendous implications for the safety and operation of two-lane roads. Several studies have investigated the passing behavior of drivers, and some studies have used driving simulators to analyze drivers' behavior during following and passing maneuvers. However, the validity of simulators has not been ensured, because their results have rarely been compared with real data. The objective of this study was to compare drivers' passing behavior as observed in the field with passing behavior in a driving simulator. For this purpose, data on passing performance and passing gap acceptance decisions were required. The study carried out a comparative analysis of the most significant variables related to passing behavior. The results showed similarities between passing time and passing distance of completed maneuvers (during the occupation of the opposing lane). However, drivers passed faster in the driving simulator and maintained greater clearances. Gap acceptance decisions were found to be similar, as the distributions of accepted and rejected gaps were similar, although critical gaps were found to be lower in the driving simulator. This finding might
be explained by the absence of objective risks. The applicability of driving simulation seems reasonable, although some improvements are still possible, to account for sight distance limitations, replicate age and gender distributions, and reproduce the opposing traffic flow.