

Systematic Evaluation of a Dynamic Late Merge System in Central Missouri

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ABSTRACT

This paper describes the systematic evaluation of a dynamic merge system (DMS) deployed at a short-term work zone on I-44 near Lebanon, Missouri. Qualitative and quantitative data were collected for this evaluation from various sources. The data included Missouri Department of Transportation (MoDOT) staff feedback, video data at two locations upstream of the merge point and at two locations within the work zone, vehicle speed collected using speed radar, and global positioning systems within and beyond the work zone, traffic parameters derived from video, and detector and message logs from the DMS vendor. Eight objectives were formulated, and a performance measure and data collection methods for each were defined. The objectives were to evaluate ease of installation and startup of the system, system operation compared with system specifications, positioning of changeable message signs (CMS), accuracy and availability of traffic information from the vendor, work zone capacity, driver compliance to changeable message signs, safety, and overall effectiveness of the DMS. In terms of the operation of the system, system messages for late merge and high-speed merge conditions were evaluated as per the specifications provided by MoDOT. Based on an evaluation using data from the vendor and the data collected onsite independent of vendor's data, the late merge mode operated according to the

specifications, but the high-speed mode did not. In terms of the accuracy and availability of traffic information, the system performed adequately. The positioning of the DMS components was also adequate, since the longest queue only extended to the CMS or approximately one mile upstream from the merge point. The lack of extensive queuing was due to the rerouting of traffic carried out by MoDOT. The comparison between the DMS work zone and the standard work zone showed that there was no difference in the traffic characteristics, i.e., neither the flow rates nor the discontinuous lane usage was significantly different between the DMS and the standard work zones. Average speeds for the left and right lanes near the merge point were also found to be similar during the DMS and standard operations. The main reason was that the work zone was already operating in a static late merge fashion as a result of the system setup and topography of the site. There was also no difference in vehicle speeds and speed variability during high-speed conditions. No clear evidence was found that the DMS improved the safety near the merge point of the work zone.

Keywords: changeable message signs—dynamic late merge system—work zone