

Evaluation of Temporary Traffic Signals in Conjunction with Pilot Car Operations at Two-Way Long Temporary Work Zones

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Introduction

The primary objective of this study was to evaluate the use of Portable Traffic Signal (PTS) systems at long, rural two-lane work zones and to compare three different conditions for controlling one-lane traffic in conjunction with pilot car operations: flagging only, a PTS system with the presence of a flagger, and a PTS system without the presence of a flagger. The primary measures of effectiveness were determined as Red Light Running (RLR) violation percentages, vehicle delay estimates, queue lengths, signal timing operations, and general field operations. Data were collected three days per week over a period of four weeks from August 5, 2014, to August 28, 2014, at four different temporary work zones in Kansas. Two PTS units were used for the purpose of the study in conjunction with pilot car operations.

Project Description

It was found that the percentage of violations for the flagger only, PTS with a flagger, and PTS without a flagger were 1.1, 1.3, and 3.1 percent, respectively. A test of proportions conducted on the three samples at a 0.05 level of significance indicated that there was a statistically significant difference in the number of violations when a PTS was used with a flagger and without a flagger, as compared to when flagging only operations were used. Similarly, there was a statistically significant difference in the number of violations when a PTS was used with a flagger and when a PTS was used without a flagger. It was also found that there was no statistically significant difference between the number of RLR vehicles that followed an already departed queue for the PTS with a flagger and PTS without a flagger conditions. It was found that there was a statistically significant difference in the number of RLR vehicles that left the stopped queue and the number of vehicles that disregarded the PTS control for both the conditions.

Project Description (Continued)

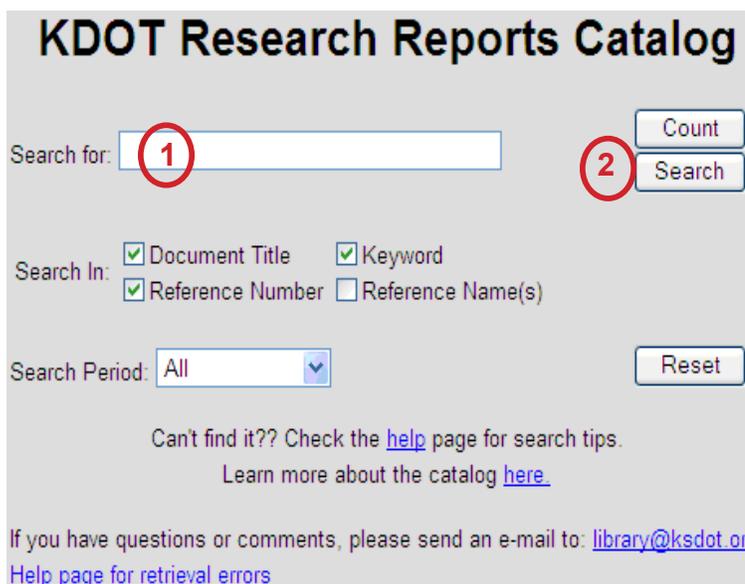
An exploratory delay analysis indicated that the presence of a flagger reduced the total delay by approximately 5 percent of the delay that could have occurred during the normal operations when flaggers waved the vehicles through the red light. Finally, equations were developed to determine the volume thresholds at which the PTS system would fail and the appropriate green intervals needed to serve a certain queue length. It was found that based on the existing KDOT policy of a maximum pilot car roundtrip time of 15 minutes, the PTS system would fail at an annual average daily traffic (AADT) of approximately 7,083 vehicles per day and at a corresponding maximum green time of approximately 446 seconds.

Project Results

In conclusion, it was recommended to use a PTS unit without a flagger in conjunction with pilot car operations at long, rural two-lane work zones but other measures were suggested, such as engineering studies to more accurately estimate queue lengths, installation of static signs indicating the expected wait time, and regular inspections of the PTS units by site supervisors or crew members to mitigate excessive delays and monitor for RLR vehicles.

Project Information

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