



The benefit/cost analysis was performed in 2003



JTRP / INDOT RESEARCH PROGRAM

Research Pays Off

Traffic Signals in School Zones—SPR 2751

Traffic signal installation at intersections adjacent to schools is a focus of many public debates. Strict engineering guidelines are published in the Manual on Uniform Traffic Control Devices (MUTCD) that engineers use to determine if a traffic signal is “warranted”. The general public views signalized intersections as safer than unsignalized ones. This belief is often heightened when there are personal injuries and even higher when children are involved. Parents, city officials, and local groups usually vigorously request the installation of traffic signals. Upon receiving the requests, an engineering study is performed, and a traffic signal is often determined as not warranted. However, these results are not the desired response to the public resulting in a cycle of request and denials often seen at intersections adjacent to school zones.

INDOT follows the MUTCD procedure for approving traffic signals. The process begins with an engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location. Typically, a 12 hour traffic count is taken. Types of vehicles and pedestrian volume characterize the peak hour data. Information on surrounding facilities, approach speed

limits, and intersection geometry, and crash data from previous years are collected. An engineering evaluation is carried out to determine if the conditions meet the standards of any of the eight warrants outlined in the MUTCD and entails the use of engineering judgment.

The purpose of this research was to examine signal installations at minimally warranted intersections from 1991 to 1999. Before and after accident data was analyzed at a total of 19 intersections showing difference in annualized crash rates for accident types and severity. Of these 19 intersections, seven signals are located adjacent to school zones. The data was evaluated at three different study areas, 200 feet, 500 feet, and 1000 feet from the intersections. Statistical tests were performed to determine if there was any significant improvement or degradation after a traffic signal installation. It is noted, however, that the national standards are guidelines that work very well when signals are clearly justified or clearly not justified. It is not clear how well they work for borderline cases.

Research Findings and Implementation

The results of statistical evaluation on all 19 intersections show that there was a significant safety improvement for the crash types ‘Right Angle’ and ‘Right Turn’. There was also a significant safety degradation for the crash types ‘Rear End, Neither Turning’, ‘Head On, Neither Turning’ (for 200 feet and 500 feet only), ‘Off Road Collision’, ‘Left Turn’, and ‘Other/Unknown’ (for 500 feet and 100 feet only). Crash severity ‘Personal Injury’ was also found to be significant for degradation at distances of 500 feet and 1000 feet.

The results do not indicate that it is beneficial to install traffic signals in school zones when the warrants defined by the MUTCD have not been met. In fact, they suggest that for marginal intersections, traf-

fic signals should not be installed.

Based upon these findings, it is recommended that the INDOT continue following the nationally prescribed warrants for determining when a traffic signal should be installed.

Potential Benefits

As obtained from the INDOT Traffic section, the cost of installation of one traffic signal in a typical school zone is currently ranging between \$65,000.00 to \$70,000.00. As a result of this study, it is estimated that 40 such signals could be avoided in the INDOT districts. Using an average signal cost of \$68,000, the total potential of saving, by avoiding above

unwarranted signals, results in an estimated amount of \$2,720,000.

***Cost of
Research
\$39,545***

Estimated Economic Value Of the Study

Number of Unwarranted Traffic Signals [1]	Savings Per Installation [2]	Total Savings [3] = [2] x [1]	Benefit/Cost Ratio [4] = [3] / \$39,545
40	\$68,000.00	\$2,720,000	68.78

Assumptions

- That INDOT identified 40 unwarranted traffic signals as a result of the study.
- That the average cost per installation of traffic signals that could have been saved is \$ 68,000.00.

References

- Kevin L. and Darcy B., "Traffic Signals in School Zones," Joint Transportation Research Project FHWA/IN/ JTRP-2002/32 Final Report, May 2003.
- Communication with the INDOT Traffic Section.