

JOINT TRANSPORTATION RESEARCH PROGRAM

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Speed Enforcement in Work Zones and Synthesis on Cost-Benefit Assessment of Installing Speed Enforcement Cameras on INDOT Road Network

Motivation

Work zone safety is a high priority for transportation agencies across the United States. High speeds in construction zones are a well-documented risk factor that increases the frequency and severity of crashes. It is therefore important to understand the extent and severity of high-speed vehicles in and around construction work zones.

There are several speed compliance measures adopted by agencies to limit speeds in work zones, including traffic control devices, design alterations, and enforcement. Studies have found law enforcement to have a large impact on speed compliance when present; however, this is very resource intensive. Recently, automated speed enforcement programs have been gaining popularity, but assessing them without biasing the data is quite difficult. Connected vehicle (CV) trajectory data now provides an opportunity to perform a comprehensive analysis of work zone speeds using a variety of enforcement strategies over extended periods without introducing any sampling bias.

Study

This study uses CV trajectory data to evaluate the impact of several work zone speed compliance measures, such as posted speed limit signs, radar-based speed feedback displays, and automated speed enforcement, on controlling speeds inside the work zone. This study also presents several methodologies to characterize

both the spatial and temporal effects of these control measures on driver behavior and vehicle speeds across the work zones.

Results

Spatial analysis showed that the posted speed limit signs inside work zones had poor compliance, with nearly 90% of vehicles traveling over the posted speed, and 50% travelling more than 11 mph over the posted speed. A 1-week before/after analysis to study the impact of radar-based speed feedback display showed a significant speed reduction beginning approximately 1,000 ft upstream of the radar speed sign. Analysis also showed that the upper extreme speeds (15 mph above the speed limit) in this region dropped by 10%–15%.

This study looked at several work zones in Pennsylvania that had automated enforcement deployed in 2021. For work zones with automated speed enforcement programs, results showed that overall speed compliance inside the work zones increased during the presence of automated enforcement. In the three Pennsylvania work zones analyzed, the proportions of vehicles travelling within the allowable 11 mph legal threshold above the posted speed limit were 63%, 75%, and 84%. In contrast, in Indiana, a state with no automated enforcement, the proportions of vehicles travelling within the same 11 mph threshold were found to be 25% and 50%. Shorter work zones (less than 3 miles) were associated with better compliance than longer work zones. Spatial analysis also found that speeds

rebounded within 1–2 miles after leaving the enforcement location.

This study also examined the impact of a radar-based speed feedback display sign with automated enforcement in reducing speeds inside the work zone. Although speed feedback signs had a mild impact in reducing speeds, the median speeds were still 14 mph above the speed limit and around 3 mph above the 11-mph legal threshold. In comparison, automated enforcement had a strong impact in speed compliance with median speeds within 1–2 mph of the speed limit and 9–10 mph below the 11-mph legal threshold.

In late 2022 and early 2023, several intensive enforcement activities were undertaken on I-70 east of Indianapolis. Results from enforcement activities conducted by public safety agencies showed a 5–19 mph reduction in median speeds during the enforcement period. On a few occasions the lasting impact of this enforcement was also seen during the next day and the next week. Although these details were successful, there is broad consensus that these types of details are too resource-intensive to scale broadly and would probably be most effective when paired with an automated enforcement program in high-risk areas.

Recommendations

The main recommendations from this study include but are not limited to the following.

- It is important to have consistent and properly placed speed limit regulatory signs in and around

work zones. This is important to ensure motorists are aware of the regulatory speed limits and ensure public safety colleagues that write tickets will not face challenges from motorists that receive tickets.

- It is important to establish an unbiased method to monitor work zone speeds using connected vehicle data to understand which work zones may be of concern and to understand trends.
- Automated enforcement programs are a viable option that allow law enforcement agencies to free up important resources without compromising speed compliance and safety in and around work zones.

Recommended Citation for Report

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