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Tech Brief

Effectiveness of Certain Design Solutions on Reducing Vehicle Speeds

FHWA-NJ-2005-007

December, 2005

SUMMARY

The overall objective of the work performed under the project *Effectiveness of Certain Design Solutions* is to evaluate the effectiveness of various traffic calming treatments on motorist's speeds. The research focuses on treatments appropriate for commercial and residential areas where speed limits are less than 35 miles per hour. The research also focuses on treatments and study locations to improve the safety of motorists, while maintaining and or improving the safety of pedestrians and bicyclists.

Specific objectives accomplished in the research include:

- To identify locations in New Jersey where traffic calming treatments may be beneficial to motorists, bicyclists and pedestrians;
- To determine appropriate traffic calming treatments for these locations; and
- To conduct a human factors study to evaluate the potential benefits and effectiveness of the proposed traffic calming treatment.

INTRODUCTION/BACKGROUND

One of the initiatives of the U.S. Department of Transportation is to increase the use of bicycling and to accommodate bicycle and pedestrian needs in designing transportation facilities for urban and suburban areas. The congressionally mandated *National Bicycling and Walking Study* also has set goals to: (1) double the percentage of all trips made by bicycling or walking; and (2) to reduce the current number of bicycling and walking injuries and fatalities by 10 percent. One approach to enhancing the safety of bicyclists and pedestrians is to ensure safe vehicular speeds on residential and commercial roadways through the use of traffic calming measures.

Traffic calming is defined by the Institute of Traffic Engineers as "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users". The objective of traffic calming is to reduce the speed and volume of traffic to acceptable levels and to thereby increase the safety of the roadway.

Traffic calming measures had their beginnings in the late 1960s in the Dutch city of Delft. To avoid cut-through traffic, streets were turned into "woonerven" or "living yards" which amounted to obstacle courses for motor vehicles. Streets were beautified to include tables, benches and parking designed to narrow the street. The primary purpose of traffic calming is to reduce vehicle speeds and volume to levels that are acceptable for the functional classification of the roadway or surrounding areas. Traffic calming can be used to reduce vehicle speeds, volumes, or both. Volume-control measures limit the access of vehicles and have as their primary purpose to discourage or eliminate through traffic. Some of the treatments used to control volume include: full street closures, half-closures, diagonal diverters, median diverters, median barriers, and forced-turn islands.

RESEARCH APPROACH

The tasks performed to achieve the research objectives include performing a literature search covering: (1) the state-of-the practice of traffic calming in the United States and abroad; (2) experience of local and state Departments of Transportation using various traffic calming measures; and (3) the legal and political concerns governing the installation of traffic calming measures on New Jersey roadways.

To identify locations in New Jersey where traffic calming treatments may be beneficial to motorists, bicyclists and pedestrians, a pedestrian and bicyclists crash analysis was performed. Field visits to high crash locations showed these roadways were not always suitable for traffic calming measures based on a redesign of the roadway (e.g. speed humps/tables, center island, chicanes) as these types of measures are more appropriate for residential roadways. As a result, State roadways with a posted speed limit of 25 mph were selected for the use of traffic calming measures.

To determine the effectiveness, suitability and potential of the traffic calming treatments to reduce speeds, a human factors study was performed as part of this research. Field studies found in the literature were used to determine the potential speed and crash reduction associated with various traffic calming measures. To gather information on the preference and acceptability of the measure by the community, the human factors study also included a visual preference survey. The survey was administered to various road user groups, including motorists, pedestrians and bicyclists, from the communities where the traffic calming measures are proposed to be implemented. The survey gathered information about the perception of safety for pedestrians or bicyclists; reasons for perceived lack of safety; preferred roadway travel speed; rating of traffic calming measure for pedestrian/bicyclist safety, driver convenience, and for its aesthetics. The four traffic calming measures assessed in the survey include a speed

hump, speed table, median divider, and median with a breakpoint for pedestrians. Surveys were performed over a two week period at five locations in Cranford, Westfield, New Brunswick, and Princeton.

FINDINGS

Sixty-seven percent of respondents stated that they did not believe that their street was safe for pedestrians and bicycles. This type of response was similar for all of the locations studied, with New Brunswick showing the highest percentage (76 percent) of respondents stating that the roadway was not safe. Respondents stating “No” were then asked to specify a reason why the roadway was unsafe. “Too many vehicles” had the highest percentage of respondents with twenty-seven percent. “Speeding” and “Lack of pedestrian crossing” were the next highest reasons stated with 22 percent and 21 percent, respectively. Forty-four percent of respondents stated that “25 mph” was a safe speed for the roadway. Twenty percent selected “30 mph” and 15 percent selected “35 mph”.

Respondents were asked to rate each of the four traffic calming measures studied for three aspects include: the ability of the measure to improve safety for pedestrians; the inconvenience the measure would have on drivers; and the aesthetics of the measure. The median with the breakpoint had the highest rating for improving safety, for lowering inconvenience and for aesthetics. Speed humps and speed tables show similar ratings and ranked lowest of the four measures.

RECOMMENDATIONS

An evaluation and implementation plan was developed for each of the study locations where traffic calming is proposed for implementation. The intent of the implementation and evaluation plan is to be able to provide an assessment on the effectiveness of traffic calming measure to reduce speeds and improve safety. For each of the study locations, a median with a breakpoint opening for pedestrians was identified as the most preferred traffic calming device for its ability to improve the safety for pedestrians and bicyclists, for driver convenience and for aesthetic value.

This research focused on design solutions for reducing speeds on State routes. Although the research identified locations on State routes where design solutions would be appropriate for reducing speeds, these types of roadways tend to have higher volumes and truck volumes that may limit the applicability of design solutions for reducing speeds. In addition to design solutions, traffic control measures should also be included as elements in the safety plan for these roadways. The research demonstrated that crash analyses, by themselves, are not a good indication of whether traffic calming would be appropriate for a location. Further research is needed to develop a procedure for identifying locations where traffic calming would be warranted and be beneficial in reducing speeds.

The visual preference survey found that despite the widespread use of speed humps, this measure was selected as the least preferred traffic calming measure by road users in this study. Study results suggest that road users may need to be educated on the effectiveness of various traffic calming measures to reduce speeds and improve safety for bicyclists and pedestrians. More research is needed to better understand the preference of road users in the selection of these measures and to understand the factors that impact road users' perception of road safety.

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A final report is available online at <http://www.state.nj.us/transportation/research/research.html>

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NJDOT Research Report No: FHWA-NJ-2005-007