

Overview of TxDOT and Federal Research Projects

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TxDOT Research Program

- \$20 Million Annual Program
- Contract with state supported universities
- 5 Research Management Committees
- The Research Program Cycle



The Research Program Book



0-5446 Guidelines for Signs and Markings on Toll Roads

- Evaluate current toll road signing practices
- Conduct driver comprehension research of proposed sign designs and sign sequences (pavement markings will also be studied)
- Guidelines and a field book will be developed



0-5470 Comprehensive Guide to Traffic Control Near Schools

- Guidelines for the use of school zone traffic control devices
- Recommendations on the use of school zone speed limits



0-5629 Best TxDOT Practices for Signal Timing and Detection Design at Intersections

- Assess the current state-of-the-practice for traffic signal operations in Texas
- Develop a Manual of Traffic Engineering Procedures for Signals that will promote consistency
- Develop workshop materials

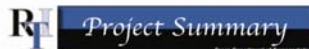


0-5772 Developing Comprehensive Roadway Delineation Guidelines

- Examine the combined effects of lane striping, pavement marking symbols, raised pavement markers, post mounted delineators, chevrons, advisory speed plaques, and curve warning signs
- Nighttime performance on horizontal curves
- Focus is on rural highways



Project Summary Reports



0-5113: Improving Intersection Safety and Operations Using Advance Warning of End of Green System (AWEGS)

Background

An advance warning of end of green system (AWEGS) was developed as an earlier project conducted by the Texas Transportation Institute (TTI) for the Texas Department of Transportation (TxDOT). In 2001, Project 0-4240 developed AWEGS and identified numerous improvements that would enhance AWEGS operation and make it more robust for use of implementation. The objective of Project 0-5113 was to improve the AWEGS algorithm, deploy the improved algorithm at existing AWEGS deployments, and install AWEGS at a new location.

AWEGS provides warning to motorists on high-speed approaches to isolated traffic signals about the onset of yellow by using flashing beacons as a "RE-PAVED TO STOP WHEN FLASHING" sign. AWEGS enhances the advance warning procedure at intersections having conventional advance warning signs by providing vehicles moving over the 45th percentile speed up to the 90th percentile speed. The AWEGS technology developed in Project 0-4240 was installed at two locations, one in Waco and one in Brenham. Both locations showed a reduction in mid-right turning of approximately 40 percent.

What the Researchers Did

Researchers identified the following improvements to be made to AWEGS as part of Project 0-5113:

- Reduce false activations.
- Improve track detection and treatment.
- Design and evaluate overhead sign configuration.
- Develop flasher operation due to detector failure.
- Provide warning about the presence of queues.
- Improve AWEGS interface.

False activations occur when vehicles from a particular movement activate detectors for other movements (typically left turns). False activations can result in the beacons flashing unnecessarily. Researchers evaluated countermeasures, such as delay and better detector technology, such as directional detector in video detection, for their effectiveness in reducing false activations.

Safety and signing engineers surveyed the Brenham site and provided comments and suggestions to improve sign visibility. Based on their feedback, a new type of flashing operation known as "strobe" that was designed to improve the attention value of the sign. TTI researchers worked with TxDOT engineers to design an overhead sign. This overhead sign was installed on one approach in Brenham. The overhead sign in Brenham was evaluated by collecting speed profiles on the approach. Subsequently, the same sign design was implemented at the new AWEGS location in College Station included as part of Project 0-5113.

Research Performed by

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Project Completed:
8-23-06

TTI researchers evaluated the operation of AWEGS in the eventuality of the failure of advance detectors. The algorithm was modified to ensure that AWEGS would operate safely when either of the advance detectors fails. The use of sign for detection was investigated to develop a queue detection module to continue to flash the beacons at the beginning of green till the queue clears. This mode of operation improves intersection safety during high-volume conditions.

Numerous improvements were made to the AWEGS algorithm and its interface to make it easier to implement at future locations. Improvements to AWEGS included accounting for all types of full-time movements, a standardized algorithm for all locations, and the development of a future notification system in case of AWEGS failure.

What They Found

TTI researchers found that the AWEGS technology installed in Project 0-4240 continues to provide significant benefits by improving the advance warning procedure on high-speed approaches. As a result of studies performed as part of Project 0-5113, researchers found that incorporating delay for detection in the signal controller proves to be an easy means to minimize false activations. If false activation persists, use of atmospheric video detection to provide directional detection is a good way to minimize false activations. TTI researchers also found that an overhead sign combined with strobe flash has a significant impact on the approach speed. Studies revealed that there was an average of 10 mph reduction in the approach speed at the advance detectors. This clearly reduces the number of high-speed vehicles on the approach.

The development of queue detection using stop bar detectors has improved safety by continuing to flash the beacons at the beginning of green when a queue is present. This feature was implemented in Waco and is operating satisfactorily. The enhancement to the algorithm and the interface made as part of Project 0-5113 make it much easier to implement AWEGS at other locations across the state. The AWEGS location in College Station has been well-received and has shown a 40 percent reduction in mid-right turning on one approach and about 40 percent reduction on the other approach. This is a significant improvement in intersection safety.

The College Station location has higher average daily traffic (ADT) counts (greater than 30,000) compared to the remaining AWEGS locations. This results in a slightly higher advance warning being provided. For efficient and consistent AWEGS operation, AWEGS should be deployed at locations having an ADT of 17,000 or less.

What This Means

AWEGS is a technology proven to improve safety on high-speed approaches to signalized intersections. Significant improvements have been made under Project 0-5113, resulting in an updated and modified algorithm running at all the AWEGS deployments in the state. The system is now ready for further implementation at other locations in Texas.

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Transportation Research Board (TRB)

- National Cooperative Highway Research Program
- 3-79 Measuring and Predicting the Performance of Automobile Traffic on Urban Streets
- 3-80 Traffic Enforcement Strategies for Work Zones
- Transit Cooperative Research Program
- <http://gulliver.trb.org/>



Federal Highway Administration

- Turner-Fairbank Highway Research Center
- Safety and Operations Related Research (plus much more)
- <http://www.fhwa.dot.gov/fhwaweb.htm>



Helpful Websites and Phone Numbers

- <http://www.dot.state.tx.us/services>
Click on [Research and Technology Implementation](#)
- <http://library.ctr.utexas.edu/index.htm>
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