



Work Zone Lane Closure Warning Light System

Tests of a prototype work zone lane closure flashing warning light system indicate that it may improve traffic safety by encouraging drivers to exit the closed lane farther upstream. This system helps draw attention to the location of the actual lane closure, and indicates the direction to which drivers need to move. The warning light system is composed of a series of interconnected, synchronized individual flashing warning lights that are attached to drums that form the lane closure taper. This causes a flash of light to “move” from the beginning to the end of the lane closure taper, as illustrated in Figure 1. This sequence is then repeated at a rate determined by the user.

What We Did . . .

Researchers first conducted nighttime proving ground studies at the Texas A&M University Riverside Campus. Researchers surveyed motorists to investigate their

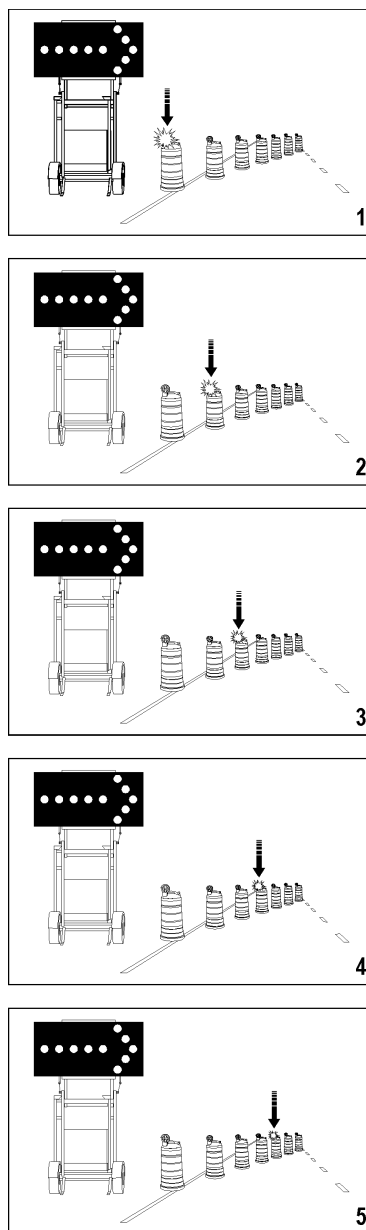


Figure 1. Warning light system

understanding and perceptions of two designs of the warning light system, and compared them to the nighttime lane closure setups currently used by the Texas Department of Transportation (TxDOT). The first design continually displays steady-burn warning lights with higher-intensity synchronized flashes that move down the taper over the steady-burn lights (the higher-intensity synchronized flashes are produced on top of the steady-burn warning lights). The second design only produces the synchronized flashes of the warning lights (it does not continually display steady-burn warning lights).

Researchers then performed nighttime field studies at actual work zone lane closures to determine if the system actually affects driver behavior. Based on the results of the proving ground studies, researchers evaluated the steady-burn



lights/synchronized flash design and compared it to a standard work zone lane closure setup without any warning lights. Researchers measured vehicle speeds, driver lane choice, and erratic maneuvers upstream of the lane closures. The field studies were conducted at night on a rural FM road and on an urban freeway.

What We Found . . .

As shown in [Figure 2](#), a majority (a combined 62%) of the drivers participating in the proving ground studies preferred the “moving” flash of light produced by the two system designs over the steady-burn only lights (i.e., no synchronized flashes) and the no warning lights at all (i.e., a standard lane closure

setup). Also, most drivers ranked the steady-burn/synchronized flash design of the warning lights significantly better than the synchronized flash only design. Therefore, researchers moved forward with testing of the steady-burn/synchronized flash configuration in the field.

In the field studies, the prototype warning light system did not significantly affect the speed of vehicles at either test site. Researchers also did not observe any erratic maneuvers at either test site that were attributable to the warning light system. With respect to driver lane choice, the system did not significantly affect driver behavior at the FM road test site.

However, the lane closure had been installed at that location for six months prior to the test, and so motorists in the area were probably already familiar with the closure.

In contrast, the warning light system did significantly affect the lane choice of both passenger vehicles and trucks at the urban freeway test site (which was a relatively new closure). As shown in [Figure 3](#), the warning light system significantly reduced the percentage of vehicles in the closed lane 1000 ft upstream of the closure. As the figure further shows, the effect was much more pronounced for trucks. This effect was deemed particularly beneficial for work zone safety by the researchers.

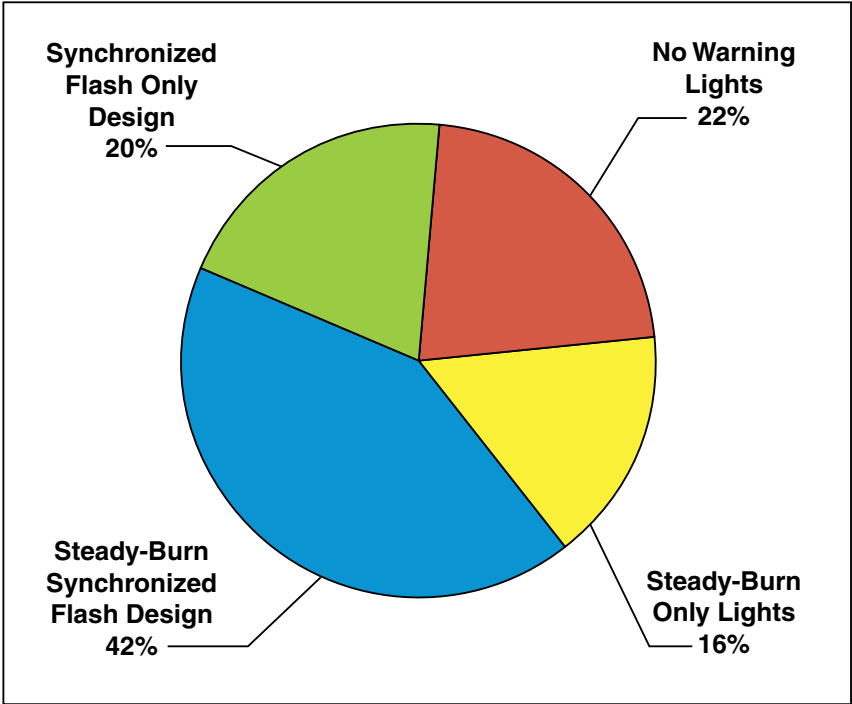


Figure 2. Ranking



The Researchers Recommend . . .

Based on the positive effect on traffic behavior at one site, researchers recommend that TxDOT obtain a modified version of the warning light system for a demonstration evaluation where TxDOT and contractor personnel would be responsible for installation, operation, and maintenance of the system. Researchers recommend that the modified warning light system should include the following revisions to the current design:

- The system needs to operate through a wireless interconnect for the synchronized warning lights (the prototype system utilized cables that required extensive manpower to set up and maintain).
- The system needs to utilize warning lights that have a wider cone of vision than currently provided by the unidirectional LED lights.

As part of the research project, TxDOT submitted and received

approval for an official request-to-experiment with this device from the Federal Highway Administration. Any future demonstration evaluations by TxDOT and contractor personnel need to comply with the evaluation plan and reporting requirements of that request.

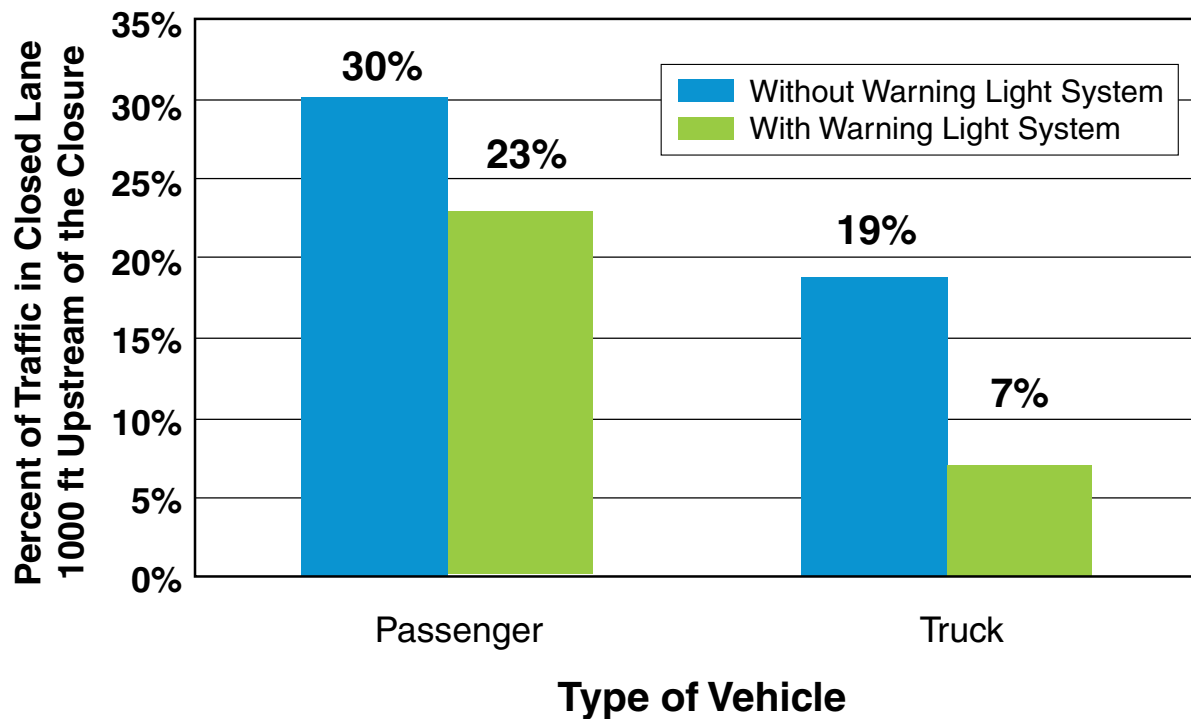


Figure 3. Lane choice 1000 ft upstream of the lane closure at I-10 test site



For More Details . . .

The research is documented in Report 3983-1, *Work Zone Lane Closure Warning Light System*.

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To obtain copies of the report, contact Dolores Hott at the Information & Technology Exchange Center, (979) 845-4853, or e-mail d-hott@tamu.edu. Online catalog available at <http://tti.tamu.edu>.

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Contact: John Bassett, P.E., CSTR Research Engineer, jbassett@dot.state.tx.us, (512) 465-7922.

The Traffic Operations Division is in the process of identifying a suitable location(s) to do further evaluation of this system.

YOUR INVOLVEMENT IS WELCOME!

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