WIDER LANE LINES

A. DESCRIPTION

Wider Lane Lines are intended to affect the driver's perception of a narrow lane. This is intended to cause the drivers to reduce their speeds.

B. LITERATURE REVIEW SUMMARY

- Could not find any research on the use of wider lane lines in work zones.
- States have experimented with permanent applications of 5" to 8" lane lines.
- Most states have not measured benefits for permanent applications.

C. SURVEY ON THE USE OF WIDER LANE LINES IN WORK ZONES

To learn more about other states' practices regarding the use of wider lane line widths in work zones, a survey was conducted during August 2004. The survey questionnaire (see section C.1) was electronically distributed (e-mailed) to every state DOT with the assistance of The National Work Zone Safety Information Clearinghouse.

C.1. SURVEY QUESTIONNAIRE

See next page.

SURVEY QUESTIONNAIRE
USE OF WIDER LANE LINES IN WORK ZONES

We are conducting a short survey (as part of a wider project) on the use of wider lane lines in work zones and we would be very grateful if you would take a few minutes to answer to this questionnaire. Please provide the following information for our records of survey respondents:

State _____

Name of person(s) completing the survey _____

Title _____

Phone _____

e-mail adress_____

1. For standard applications, what is your agency's typical lane line width _____ in.
2. Does your agency implement lane lines wider than your typical width? _____.
3. If Yes, in what instances do you use the wider lane lines?

   _____

   _____

4. Do you implement wider lane lines in work zones? _____
5. What lane line width does your agency use for work zone applications? _____ in.
6. How did your agency make the decision to implement wider lane lines?

   _____

   _____

7. Did your agency complete an evaluation of the use of wider lane lines? _____
8. What were your measures of effectiveness?

   _____

9. Was the evaluation a success? _____

10. Will your agency continue to use wider lane lines in work zones? _____

11. Are there any specific guidelines that your agency has developed for the implementation of wider lane lines in work zones?

    _____

    _____

Thank you very much for completing the questionnaire. If you require further information about our study please contact us at the address below.

C.2. SURVEY RESULTS

Twenty-two responses were received for a 44 percent response rate. The responses by state are presented at the end of this section.

Question 1: For standard applications, what's your agency's typical lane line width?

- The vast majority of DOTs (77 percent) use a 4 in. lane line for standard applications.
- Depending on the highway type, New York, North Carolina, and Kentucky use 4 and 6 inches wide lane lines. Six inches lines are used on Interstate and Freeway facilities.
- Arizona, Florida, and Rhode Island use 6 in. lane lines on all types of highways.
- Indiana uses a standard 5 in. lane line on all Interstate Highways.
- Michigan DOT uses 4 in. for lane lines and 6 in. for edge lines.
- Georgia uses a 5 in. lane line for standard applications.

Question 2: Does your agency implement lane lines wider than your typical width?

- About one-quarter (27 percent) of the respondent DOTs indicated using lane lines wider than their typical width.

Question 3: If yes, in what instances do you use the wider lane lines?

- Arizona DOT reported using 12 in. wide lines on gore areas.
- Georgia and North Dakota use wider lanes for turn lanes (line width was not specified).
- Illinois and Virginia use wider lanes according to their district's preference (line width was not specified).
- Iowa DOT uses 8 in. wide lane lines in work zones.
- Missouri reported experimenting with 6 in. wide lane lines.
- An ongoing study is being conducted by Maine DOT to assess the effectiveness of 8 in. wide edge lines as a visual cue to alert drivers about the presence of a large animal (i.e., moose) on the roadway. If there is a break in the line at night, drivers should suspect an animal is present. Also, truckers reported liking the wider lanes because of its better definition which allows them to go faster.

Question 4: Do you implement wider lane lines in work zones?

- Only one of the 22 DOTs surveyed reported using wider lanes in work zones on a permanent basis. Iowa DOT uses wider lane and edge lines (8 in.) in merge and shift areas in order to provide a better level of markings to passing motorists.
- North Carolina has used 6 in. lanes lines in few construction projects.
- Nevada DOT reported use of work zone wider lines in the past, this practice was recently changed to allow use of standard width lines.

Question 5: What lane line width does your agency use for work zone applications?

- Most agencies (68 percent) reported using 4 in. wide lanes for work zone applications.
- Depending on the highway type, Maine and Kentucky use 4 and 6 inches wide lane lines.
- Florida uses a 6 in. wide lane line.
- Iowa uses an 8 in. wide lane line.

Question 6: How did your agency make the decision to implement wider lane lines?

- Decisions for wider lane line implementation were made on the basis of pilot studies, subjective evaluations, experience, policy and intuition.

Question 7: Did your agency complete an evaluation of the use of wider lane lines?

- The results indicate that none of the agencies conducted a formal evaluation on the effectiveness of wider lane lines.

Question 8: What were your measures of effectiveness?

- Not applicable (refer to question 7).

Question 9: Was the evaluation a success?

- Not applicable (refer to question 7).

Question 10: Will your agency continue to use wider lane lines in work zones?

- Iowa DOT was the only agency that indicated using wider lanes in work zones and reported that they will continue its use in the future.

Question 11: Are there any specific guidelines that your agency has developed for the implementation of wider lane lines in work zones?

- No guidelines for the implementation of wider lane lines in work zones were provided by any of the surveyed agencies.

D. DEPLOYMENT GUIDELINES

- When deploying wider lane lines, 10-inch wide lines should be used.
- The reflectivity of the wider lines should match all SHA standards for reflectivity.
- Wider lane lines should not be used next to temporary or permanent concrete barrier.
- All wider lane lines should be solid.
- Wider lane lines should be deployed prior to a lane shift to allow motorists to become accustomed with the wider lane lines.

Disclaimer

The information provided in Maryland State Highway Administration's Work Zone Safety Tool Box is only to provide guidance. The Work Zone Safety Tool Box supplements current practices and standards provided in the current edition of the following documents:

1) The Manual on Uniform Traffic Control Devices (MUTCD)
2) The Maryland Supplement to the Manual on Uniform Traffic Control Devices
3) Maryland State Highway Administration Standard Sign Book
4) Maryland State Highway Administration Book of Standards for Highway and Incidental Structures
5) Maryland Department of Transportation State Highway Administration Standard Specifications for Construction and Materials

Table 1. Survey Results

STATE	Q1	Q2			Q3	Q4			Q5	Q6	Q7		Q8	Q9		Q10		Q11	
	[in]	[YES]	[NO]	[Other]		[YES]	[NO]	[Other]	[in]		[YES]	[NO]		[YES]	[NO]	[YES]	[NO]	[YES]	[NO]
Arizona	6"	1	0	0	Gore lines	0	1	0	4"	Intuition	-	-	-	-	-	-	-	-	-
Florida	6"	0	1	0	-	0	1	0	6"	-	-	-	-	-	-	-	-	-	-
Georgia	5"	1	0	0	For turn lanes	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
Illinois	4"	1	0	0	District's preference	0	1	0	4"	Policy based on experience and material resources	0	1	-	-	-	-	-	-	-
Indiana	4"-5"	0	1	0	-	0	1	0	4"	Due to speeds and visibility, in early 80's it was required for Interstates	0	1	-	-	-	-	-	-	-
Iowa	4"	1	0	0	8" in work zones' merge and shift areas	1	0	0	8"	Subjective review by safety staff	0	1	-	-	-	1	-	1	-
Kentucky	4"-6"	0	1	0	-	0	1	0	4"-6"	-	-	-	-	-	-	-	-	-	0
Maine	4"	0	0	1	8" to identify large animal hazards (i.e., moose)	0	1	0	4"-6"	Pilot evaluation	0	1	-	-	-	-	-	-	-
Michigan	4"-6"	0	1	0	-	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
Missouri	4"	0	0	1	Experimenting with 6" lane lines	-	-	-	4"	-	-	-	-	-	-	-	-	-	-
Montana	4"	0	1	0	-	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
Nevada	4"	0	1	0	-	0	0	1	-	-	-	-	-	-	-	-	-	-	-
New Jersey	4"	0	1	0	-	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
New York	4"-6"	0	1	0	6" markings are used on Interstates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Carolina	4"-6"	0	1	0	6" lines are used on Interstate and Freeway facilities	0	0	1	4"	-	-	-	-	-	-	-	-	-	-
North Dakota	4"	1	0	0	For turn lanes	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
Ohio	4"	-	-	-	-	0	1	0	-	-	-	-	-	-	-	-	-	-	-
Rhode Island	6"	-	-	-	-	0	1	0	-	-	-	-	-	-	-	-	-	-	-
Vermont	-	-	-	-	-	0	1	0	-	-	-	-	-	-	-	-	-	-	-
Virginia	4"	1	0	0	According to district's preference	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
Wisconsin	4"	0	1	0	-	0	1	0	4"	-	-	-	-	-	-	-	-	-	-
Wyoming	4"	-	-	-	-	0	1	0	4"	-	-	-	-	-	-	-	-	-	-

E. CASE STUDY: WIDER LANE LINES EVALUATION

E.1. Introduction

A study was performed for the Maryland State Highway Administration Office of Traffic & Safety to determine the effectiveness of implementing Wider Lane Lines through a work zone. The five (5) inch wide pavement markings were replaced with ten (10) inch wide pavement markings as shown in the pictures below. Results showed the wider lane lines were minimally effective measure in reducing average speeds but had an effect on reducing the number of lane changes through the work zone.

5 Inch Paint Lane Lines

10 Inch Paint Lane Lines

E.2. Location

The study was done on the Baltimore Beltway (I-695, Outer-Loop) between I-83 (JFX) southbound and the Falls Road Overpass in Baltimore County, Maryland.

E.3. Data Collection/Reduction Methodology

A speed spot study was performed where the studies were conducted. Most research studies make a great emphasis on analyzing data collected for free-flowing vehicles only, which are commonly defined as those vehicles with more than four seconds of headway. During the selected data collection periods, the Baltimore Beltway (I-695) carried heavy traffic volumes and thus, the application of the four-second rule was not feasible. Instead, to assure uniform and comparable test conditions, the data collected were differentiated in two categories: congested conditions and non-congested conditions. All data in the congested-condition category were

removed from the database. The three (3) measures of effectiveness used for this test: (1) average vehicle speed, (2) percentage of excessive speeding vehicles (i.e. percentage of vehicles traveling 10 mph over the speed limit), (3) number of lane changes. Vehicles were systematically sampled by taking three readings per minute, one per each lane. The studies were conducted before implementation of the wider lane lines, one week, and four weeks after wider lane line implementation. To calculate the number of lane changes, traffic was video taped during each of the data collection periods and the tape was analyzed for the number of vehicles changing lanes inside the work zone.

E.5. Results

The wider lane lines effect on vehicle speeds was inconclusive. The difference in speeds between the upstream and downstream locations after the installation of the wider lane lines ranged from a decrease of 1.5 mph to an increase of 4.4 mph when compared to the speed differentials before the wider lane lines were installed. The wider lane line installation had little effect on the percentage of excessively speeding vehicles. As for the effect on the number of lane changes, the wider lane lines implementation reduced them by about 40%.

In conclusion, although in the present study wider lane lines did not produce the desired speed reduction effect, its use for work zone applications is still highly encouraged. The wider line lines provide a better delineation of the work zone area, thus reducing the number of lane changes and the potential for accidents due to motorists changing lanes.