A REPORT ON THE

STATE-OF-THE-PRACTICE ON

NO-PASSING ZONE SIGNING AND MARKING

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A Report on the State-of-the-Practice on
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The findings and conclusions contained in this report are those of the authors and do not necessarily represent those of the sponsoring agencies.

Introduction

The Michigan Department of Transportation has been among the most conservative states in their policies regarding the marking and signing of no-passing zones. The Department currently uses an eye height of 3.5 ft. in determining the passing sight distance, and uses both a "DO NOT PASS" (R4-1) sign and a "NO PASSING ZONE" (W14-3) pennant at the beginning of each zone.

Since the average driver eye height continues to decrease with the increase in small automobiles, the Department contracted with Michigan State University to conduct a survey of the state-of-the-practice in no-passing zone policies as an input to their review of current practice. This report is based on a review of the literature concerning driver eye height and the results of a questionnaire sent to each of the 50 State Departments of Transportation (or equivalent agency).

The first section of the report presents information on trends in driver eye height, signing and marking practice over the past 40 years, and a discussion of the literature related to tort liability. Appendix "A" presents the results of the survey questions, with a tabulation of the responses from 42 states. Appendix "B" contains the results of some correlations between responses to certain questions contained in the survey and a comparison of the results of the survey with a similar survey conducted by the New York Department of Transportation in 1982.

In reviewing the results of the survey, it appears that the wording in question number 8 is subject to more than one interpretation, and therefore the response may not be valid. The question posed was "What is the minimum length of no-passing zone that should be marked (ft.)?" The ambiguity arises from not knowing how the individual responding to the question markes zones shorter than their response. For example, if a state response to the question was 500' (the most frequent response), this could mean: a) that a vertical curve which results in a 400' section of highway in which the passing sight distance is less than the allowable distance is <u>not</u> marked because it is less than 500', or b) the section <u>is</u> marked, but the length of the no passing zone marking is increased to 500' by extending the beginning of the zone, the end of the zone or both.

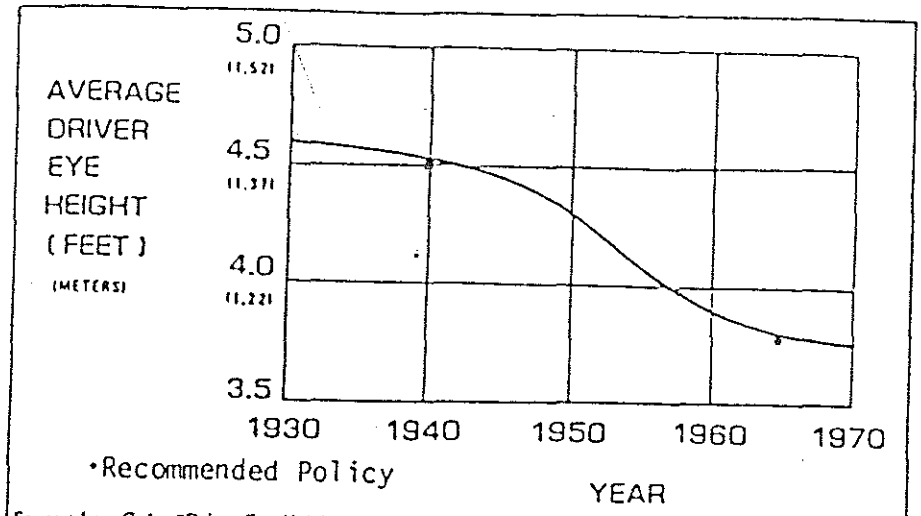
Trends in driver eye height

The average eye height of drivers, a parameter critical to both passing sight distance and stopping sight distance, has decreased substantially over the years. The recommended design value for eye height has decreased from 4.5 ft., which was the standard used in the 1940 policy on passing sight distance, through 3.75 ft., which was used in the 1971 Manual on Uniform Traffic Control Devices, to the present value of 3.5 ft. adopted (as of March 1, 1984) by the Federal Highway Administration (FHWA) for implementation over the next five years.

Studies indicate these standards have tracked the actual eye height, and support the most recent reduction of the 3.75 ft. standard. In 1960 "15 percent of passenger cars had a (driver) eye height of less than 3.75 ft." (Lee; 1960.) Between 1960 and 1971; "The average eye height above the ground decreased 1.5 inches to 43.9 inches (3.66 ft.); while the minimum eye height decreased 3.0 inches to 39.3 inches (3.28 ft.)." (Seger and Brink; 1979.) A 1978 study showed "the mean eye height of the sample cars to be 3.69 ft. and the 15th percentile to be 3.49 ft. A 3.45 ft. height of eye was recommended for highway design." (Boyd, et al; 1978). By 1979 Lee's findings had been completely reversed with "83% of the compact and smaller cars and 73% of the intermediate and full size passenger cars having (driver) eye heights less than the 3.75 ft. standard." (Cunagin and Abrahamson; 1979).

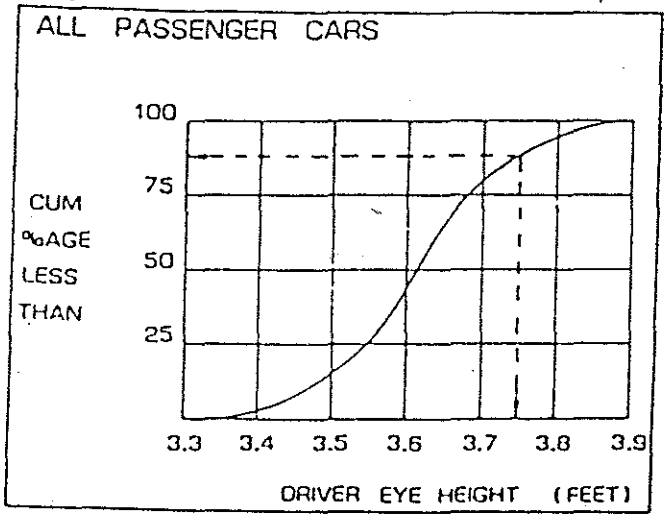
Figure 1 shows the change in the average eye height from

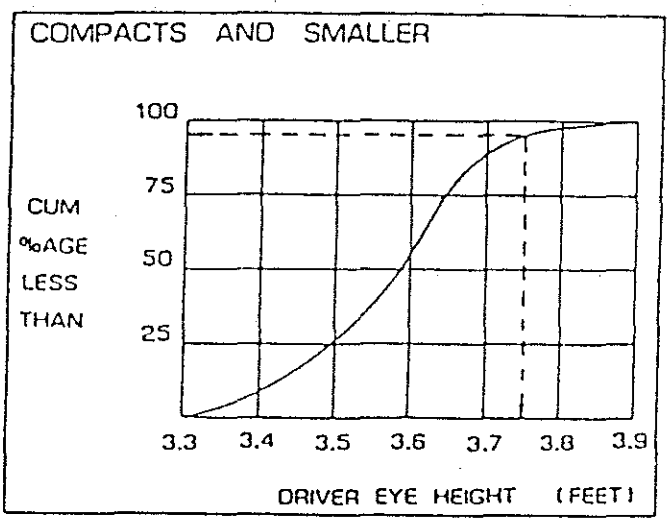
Figure 1



Source: Lee, C. L., "Driver Eye Height and Related Highway Design Features", Proceedings, Highway Research Board 39, 1960.
Seger, E. E., and Brink, R. S., "Trends of Vehicle Dimensions and Performance Characteristics from 1960 through 1970," General Motors Proving Ground, Milford, Michigan.

Figure 2





1930 - 1970. The recommended policy for determining sight distances have been very close to this mean, as shown on the figure. Since the average height of eye is now about 3.6 ft., a reduction in the recommended policy to 3.5 ft. is consistent with past practice.

As shown in Figure 2, the use of a 3.5 ft. standard would include 85% of all passenger cars and 75% of all compacts and smaller cars. This, too, is consistent with past practice, where 15% of the vehicles had eye heights lower than the design standard.

The significance of the eye height reduction on highway design and safety has had limited discussion in the literature. "Sight distance was found to be relatively insensitive to eye height. On a given hill crest, the sight distance for a driver, whose eye height is 6 in. lower than the 3.75 ft. standard, is only 5% less than the design sight distance," (Farber; 1982); and "vehicles with driver eye height of new cars have been around for years, and they seem to have operated well in the system." (Martin; 1982). However, the author goes on to say "Nevertheless, it makes good sense to consider the lower eye heights in such aspects of future highway design as the selection of speed signs and the length of no passing zones."

The effect on design, while not numerically large, would change the number and length of no passing zones. "It is shown that the adoption of the 3.5 ft. eye height standard would result in a 2 1/2 % reduction in design sight distance on vertical curves." (Gordon; 1979.) The FHWA projected a 3%

increase in the length of no passing zones.

We found no reference to studies on the affects of the reduced eye height on accidents, nor any direct comparison of accident rates by vehicle type on vertical curves. Without this type of study, no conclusions can be drawn as to how the range of eye heights in the traffic stream influences driver safety. Accident rates and severities, as they are affected by eye height, should be part of the evaluation of the 3.5 ft. eye height standard. We believe we now have the capability to do these studies using the exposure index developed in our study of accidents by vehicle size.

Signing

Signing of no-passing zones, in addition to pavement markings, is apparently beneficial to driver understanding and safety: "The addition of any sign sequence to pavement markings results in motorists being appreciably more observant of the passing and no-passing zones and spending less time in the passing (opposing) lane." (Lyles; 1982). This results not only in increased safety, but increased capacity as capacity of a given road is lowered by driver uncertainty concerning passing and no-passing zones. "(Drivers) tend not to pass where legality or distance is questionable." (Case, Hulbert; 1970).

While the presence or absence of signs is important, studies comparing the alternative signs allowed to mark "no passing" zones were inconclusive. In 1966 the Michigan Department of Highways concluded there was no significant difference between the square, black on white "do not pass" sign and the pennant, black on yellow, "no passing zone" sign in their effects on driver behavior.

Not only is driver behavior altered by the presence of signs, but their effect on accidents has also been reported. In 1968 another Michigan study found "there was a relative improvement in the accident rate in passing zones when compared with the rate of all accidents on the highways and an actual decrease in the number of passing accidents in the no-passing zones" when the pennant sign is applied. Indiana (19) reported similar results based on a before and after study conducted by

the Indiana State Highway Commission. The study measured "the effectiveness of the installation of the no-passing zone sign on the left side of the road, opposite a standard do-not-pass sign." In this study "it was found that there were no significant differences in motorists" passing maneuvers "before" and "after" installation of these signs. However, there were significantly fewer aborted pass attempts "after" the installation of the no-passig zone sign than "before." This sign is beneficial to the motoring public, since its use does not induce any detrimental changes in passing maneuvers and it signficantly reduces the presence of erratic behavior." (Petty; 1969).

Motorists surveys have shown these signs to be popular. Driver interviews conducted in Iowa and Michigan reveal conclusively that motorists favor the use of this sign.

While the over use of signing may result in drivers disregard for all signs, the addition of the "Iowa Pennant" to reinforce existing signs and pavement markings seems warranted based on the Michigan report of a decrease in accidents when this sign is used. The majority of states are now using the Iowa no-passing zone sign.

Pavement Marking

Two types of no-passing zones are identified and examined in the literature; the long zones which allow the passing maneuver to be completed on the solid yellow line, and the short zone which requires the manuever be completed before the solid yellow stripe. In practice, the majority of states use the short zone (see survey question 1, Appendix A).

A modification of the no-passing zone types for crest vertical curves was proposed in 1970. "The marking system comprises a warning line equal in length to the passing sight distance, indicating nearness of a zone of reduced overtaking visibility. In this zone the driver is allowed to complete an overtaking move begun earlier but is not allowed to attempt a new one once he/she has passed the initial point of the warning line in the right hand lane." (Prashker, et. al; 1970). A hybrid of this system was examined in 1979 for its cost benefit value. "The system under consideration consisted of a dotted yellow line adjacent to the roadway centerline throughout the downstream end of the passing zone in conjunction with the standard "no-passing zone" pennant sign at the beginning of the no-passing zone's solid yellow stripe." (Woods, Weaver; 1979). If this system was adopted nationally, the authors "estimated that between 5646 and 7700 accidents (involving 198 to 270 deaths) a year would be prevented at a cost savings (based on NHTSA cost values) of between 77 million and 105 million dollars." Neither of these systems are supported by results of field studies.

Other items covered in the literature concern the color

and applicability of striping. On low volume (less than 400 vehicles per day) rural roads "striping of no-passing zones was found to be very inefficient in most instances, as the probability of conflict in these situations is almost nil." (Walton, et. al; 1976). However, the severity of accidents resulting from such a conflict is great and most states stripe all roads.

In the area of stripe color "there is a lack of research to support the use of yellow lines to delineate the separation of traffic flows in opposing directions. The reflectivity of white paint is 53% higher than yellow and 107% higher after exposure to chemical and water conditions." (Rural and Urban Roads, Vol II; 1973). However, other studies have shown that driver understanding of the yellow line compensates for this lowered visibility.

There does not appear to be sufficient reason to consider any change in the pavement marking based on the literature or the current use survey.

Tort Liability

Limited references to tort liability resulting from no-passing zone policies were found in the literature, or reported by the states in the current practices survey. However, the cases that were reported confirm the court rulings that the application of these policies does subject states to possible liability. For example, the state of Nevada which does not use "no passing" signs (only solid yellow lines) was sued in a wrongful death action stemming from driver confusion over a passing zone. Testimony showed that the area where passing was allowed exceeded the MUTCD requirement for 55 mph. The court specifically found no liability on the part of the state.

On the other hand, the State of Michigan recently lost two cases on the basis of operations and maintenance. In one case a "pass with care" sign was improperly placed 50' in advance of the beginning of a passing zone; while in the other implementation of changes in the location of the beginning of a no passing zone following a resurvey were not fast enough to please the court.

"The general view is that the state is not liable for negligence in the performance of functions which involve a high degree of discretion but is liable to negligence in the performance of minesterial or operational level tasks." (Thomas; 1978). It has been New York's experience that most of these types of cases center on the lack of markings or reduced visibility of markings and do not address the policy behind

them.

It would appear from these precedence, that the decision to modify the eye height (from 3.5 to 3.3) or to retain the current standard would not alter the states liability. However, if the policy is revised, changes in both pavement marking and signing would have to be made expeditiously and carefully to avoid incurred liability.

BIBLIOGAPHY

1. Boyd, et. al, "Determination of Motor Vehicle Eye Height for Highway Design. Final Report." Urban Behavioral Resource Associates, St. Louis, 1978.

2. Brink, R.S. and Seger, E.E., Trends of Vehicle Dimensions and Performance Characteristics 1960 through 1970." Milford Michigan General Motors Proving Ground, 1971.

3. Case, H.W. and Hulbert S.F., "Judgment of Vehicle Speeds and Traffic Patterns: Phase 3." California University, Los Angeles Institute of Transportation, 1970.

4. Cunagin, W. and Abrahamson, T., "Driver Eye Height: A Field Study." ITE Journal, May 1979.

5. Farber, E.I., "Driver Eye Height Trends and Sight Distance on Vertical Curves." TRR No. 855 1982.

6. Gordon, D.A., Highway Sight Distance Requirements: Truck Applications." FHWA 1979.

7. Harwood, D.W. and Glennon, J.C., "Framework for Design and Operation of Passing Zones on Two Lane Highways." TRR No. 601, 1976.

8. Loutzenheizer, D.W. and Haile, E.R., "Driver Eye Height and Vehicle Performance in Relation to Sight Distance and Length of No Passing Zones: II. Vertical Curve Design." Highway Research Board No. 195, 1958.

9. Lyles, R.W., Comparisons of Signs and Markings for Passing and No-Passing Zones." TRB No. 881, 1982.

10. Martin, D.E., "Enhancing Highway Safety Through Engineering Mangement in an Age of Lmited Resources." TRB Unpublished Report No. 25, 1982.

11. Petty, D.F., "An Evaluation of the Iowa "No-Passing-Zone" Sign." ITE Journal, July 1969.

12. Prashker, et. al, "Visibility Problems in Crest Vertical Curves." Highway Research Record No. 312, 1970.

13. Saito, M., "Evaluation of the Adequacy of the MUTCD Minimum Passing Sight Distance Requirement for Aborting the Passing Maneuver." ITE Journal, January 1984.

14. Thomas, L.W., "Liability for Improper Traffic Signaling, Signing, and Pavement Markings." TRR No. 693, 1978.

15. Vanvalkenberg, G.W., "No Passing Zones: Criteria, Legislation and Location." Purdue University.

16. Walton, et. al, "Guidelines for Signing and Marking Low Volume Rural Roads," Texas Transportation Institute, March 1976.

17. Weaver, G.D. and Woods, D.L., "Passing and No Passing Zones: Signs, Markings, and Warrants." Texas Transportation Institute, 1978.

18. Woods, D.L. and Weaver, G.D., "Benefit-cost Analysis of Advanced Treatment for No-Passing Zones." TRR No. 737, 1979.

19. Michigan Department of State Highways, "Accident Analysis and Cost Justification for Left Side Pennant Sign Applications." 1968.

20. Michigan Department of State Highways, "A Study of No Passing Zone Signing." 1966.

21. Rural and Urban Roads, Vol II, No. 4, April 1973, "Yellow vs. White: Debate Grows Over True Value of Centerline Markings."

APPENDIX A

SURVEY

State _____ Name _____

1. Do you use long or short passing zones? (Long: passing manuever may be completed on the solid yellow line; short: passing manuever must be completed before solid yellow line.)

   Long: Short:

   Comments:

   *36 states use short zones definition (86%)
   6 states use long zones definition (14%)

   Figure 1 shows the change in the percentage of states using the "short" zone since the N.Y. survey of 1982.

2. What type of markers are used at the beginning of a no-passing zone:
   a. Post mounted
      1. Black on yellow pennant "no passing zone" (W-14-3)
      2. Black on white square "do not pass" (R4-1)
      3. Other, specify.
   b. On pavement
      1. Solid yellow markings
      2. Other, specify
   c. Other signing or marking

      Comments:

   *23 states use the black on yellow pennant (55%)
   *18 states use the black on white square (43%)
   *All 42 states use solid yellow centerlines (100%)
   13 states use no signs (31%)

   Figure 2 shows these results

3. Is a Pass With Care sign used at the end of the no-passing zone?

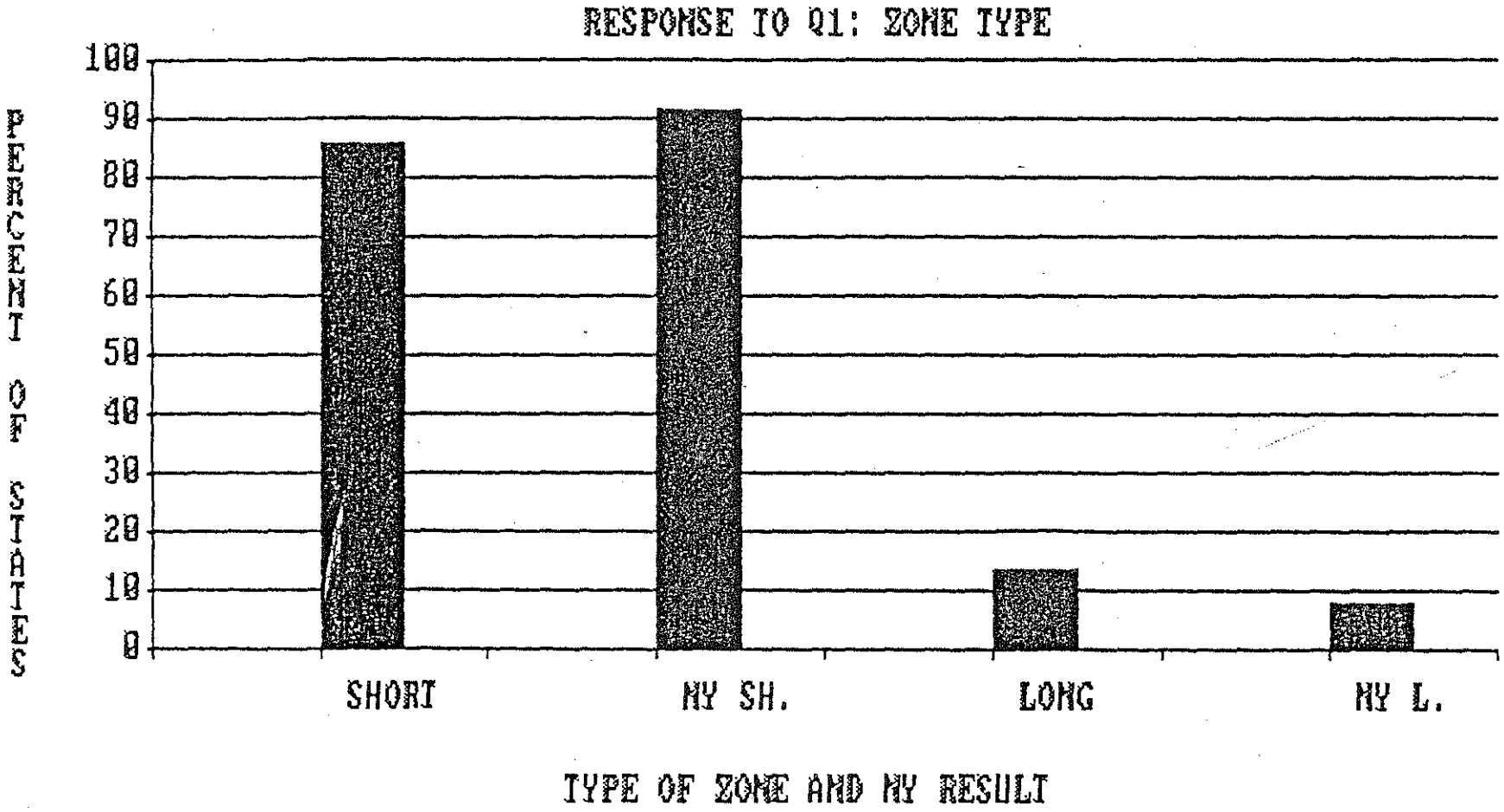
   Yes:
   No:

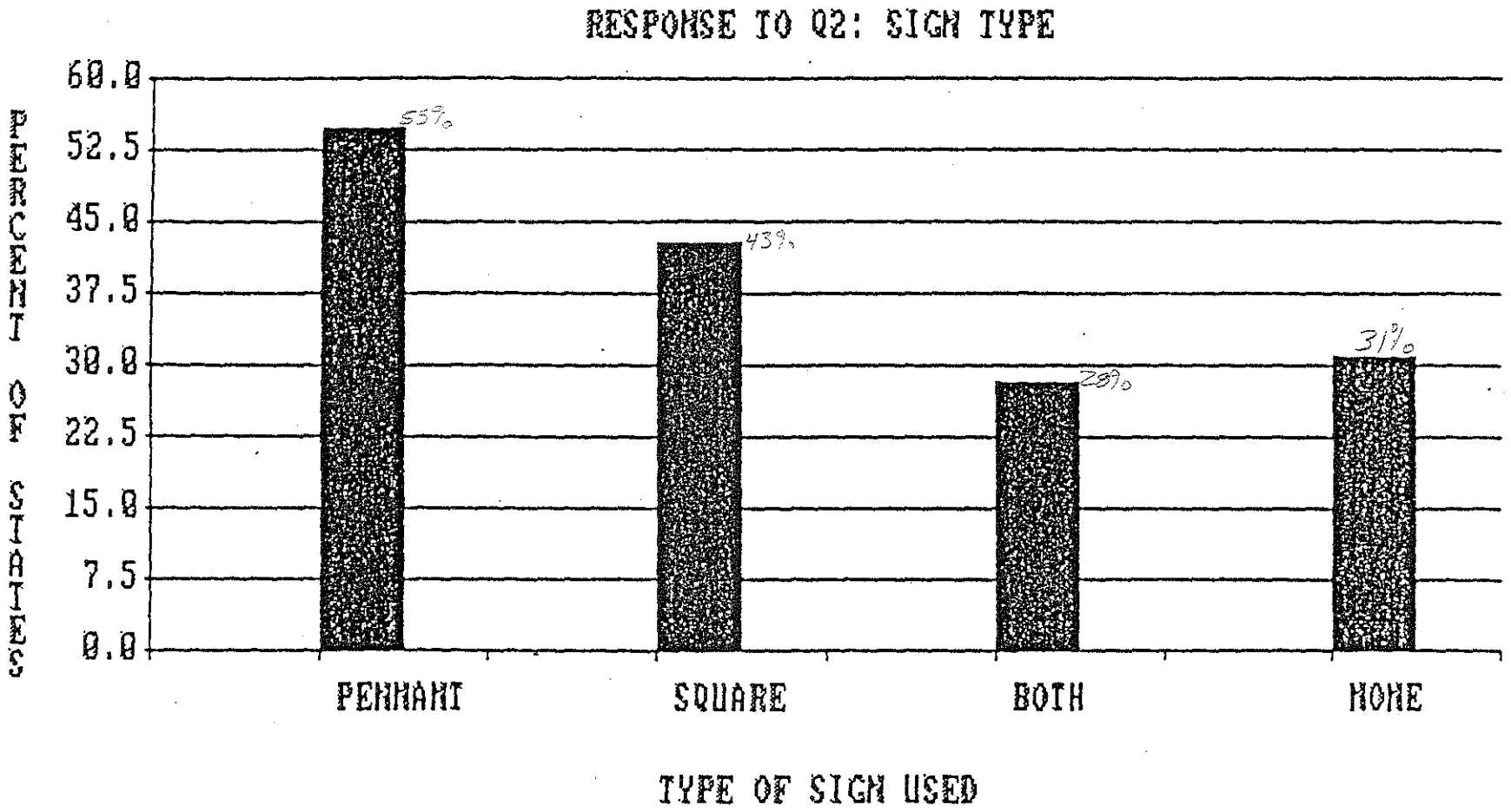
   Comments:

   *12 states use a Pass With Care sign (29%)
   30 states do not use Pass With Care sign (71%)

   Comment: 4 states using the Pass With Care sign only use them in special cases based on engineering judgment.

*indicates Michigan D.O.T. response


RESPONSE TO Q1: ZONE TYPE
PERCENT OF STATES
100
90
80
70
60
50
40
30
20
10
0
SHORT
NY SH.
LONG
NY L.
TYPE OF ZONE AND NY RESULT



28% use Both @ each zone

[55+43] − 28 = 70%* use Pennant or Square or Both @ each zone

70 − 28 = 42% use Pennant or Square @ Each zone

31%* use No Signing @ Each zone

?

*70% + *31% ≈ 100%

4. If Do Not Pass/No Passing Zone signs are used at intervals within the no-passing zone, what is the distance between signs?

Not Used 200 400 600 800 1000 Other

*36 states do not use intermediate zone signs.
Of the 6 states using the intermediate signs, there is no standard spacing.
New York uses the following:

MPH	First Intermediate	Subsequent Intermediate Sign
25	1100′	2500′
30	1100′	3000′
35	1100′	3500′
40	1100′	4000′
45	1100′	4500′
50	1100′	5000′

5. On vertical curves what is the height of object and height of eye used in determining passing sight distance?
Height of object (ft): 2.75, 3.0, 3.25, 3.50, 3.75, 4.0, Other
Height of eye (ft): 2.75, 3.0, 3.25, 3.50, 3.75, 4.0, Other
(1971 NMUTCD value is 3.75 ft. for both)

Comments:

The States** use same height of object and height of eye.
1 uses 2.75′ (Arkansas) (2%)
*15 use 3.50′ (36%)
24 use 3.75′ (57%)

**Connecticut uses 12" - 14" for height of object which corresponds to the height of bumper.
**Washington uses 4.5′ for height of object and 3.25 for H.O.E.

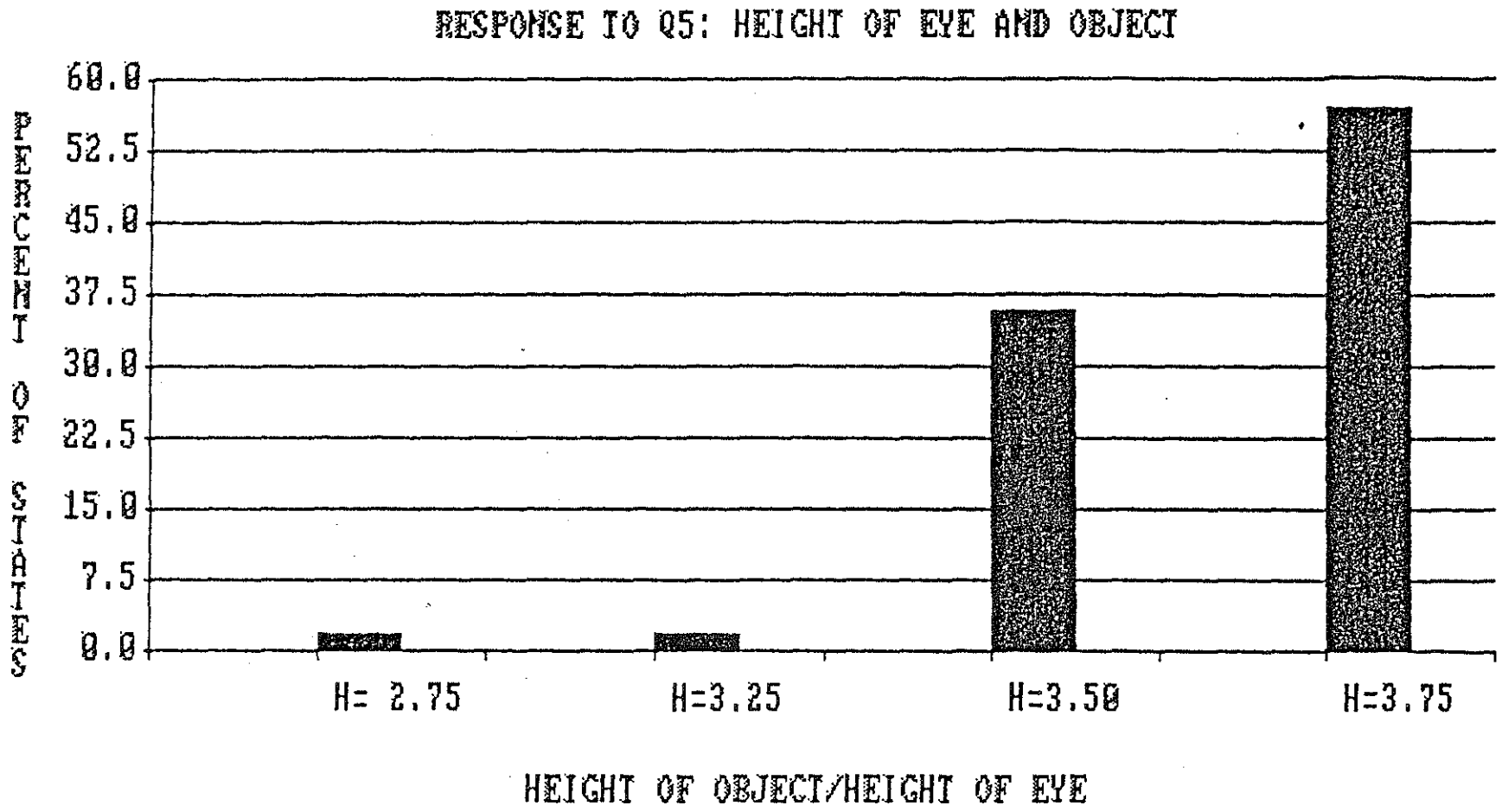
Figure 3 shows the distribution of eye height used in marking no-passing zones.

6. On vertical curves, what is the height of object used in your state in determining stopping sight distance?
Height of object (ft): 0., .5, 1.0, other.

Comments:

3 use 0′ (7%)
*37 use .5′ (88%)
2 use other criteria** (5.0%)

**New Mexico uses AASHTO design guidelines
North Carolina uses 3.5′


RESPONSE TO Q5: HEIGHT OF EYE AND OBJECT
60.0
52.5
45.0
37.5
30.0
22.5
15.0
7.5
0.0
PERCENT OF STATES
H= 2.75
H=3.25
H=3.50
H=3.75
HEIGHT OF OBJECT/HEIGHT OF EYE

7. What is the minimum passing sight distance used as a warrant for no-passing zones?

A.

85th percentile speed (mph)	Minimum passing sight distance (ft)			
30	400	(500)	600	other ____
40	500	(600)	700	other ____
50	700	(800)	900	other ____
60	900	(1000)	1100	other ____

(1971 NMUTCD values are shown in Parenthesis)

Comments:

Speed (MPH)

30	*30	use	500′	(71%)
	12	use	other	(28.5%)
40	*31	use	600′	(74%)
	11	use	other	(26%)
50	*32	use	800′	(76%)
	10	use	other	(24%)
60	*33	use	1000′	(79%)
	9	use	other	(21%)

Comments: Arkansas uses 900′ for all speeds.
Illinois and Minnesota both use 1100′ on state highways posted for 55 mph as their 85th percentile speeds are in excess of 55 mph.

B. Basis other than 85th percentile speed used (please specify).

Comments:

No significant responses to this question.

8. What is the minimum length of no-passing zone that should be marked (ft.)?

All Zones 50 100 150 Other

*9 states mark all zones (21.5%)
5 states use 100' (12%)
4 states use 150' (9.5%)
3 states use 200' (7%)
1 state uses 300' (2.5%)
1 state uses 400' (2.5%)
14 states use 500' (33%)
5 states use other lengths (12%)

Comments: Tennessee does not use a standard length. Connecticut's length varies with 85th percentile speed. Massachusetts uses 10 times the design speed.

For explanation see introduction.

9. What is the minimum allowable distance between no-passing zones (ft.):

300 400 500 600
(1971 NMUTCD value is 400 ft.)

Comments:

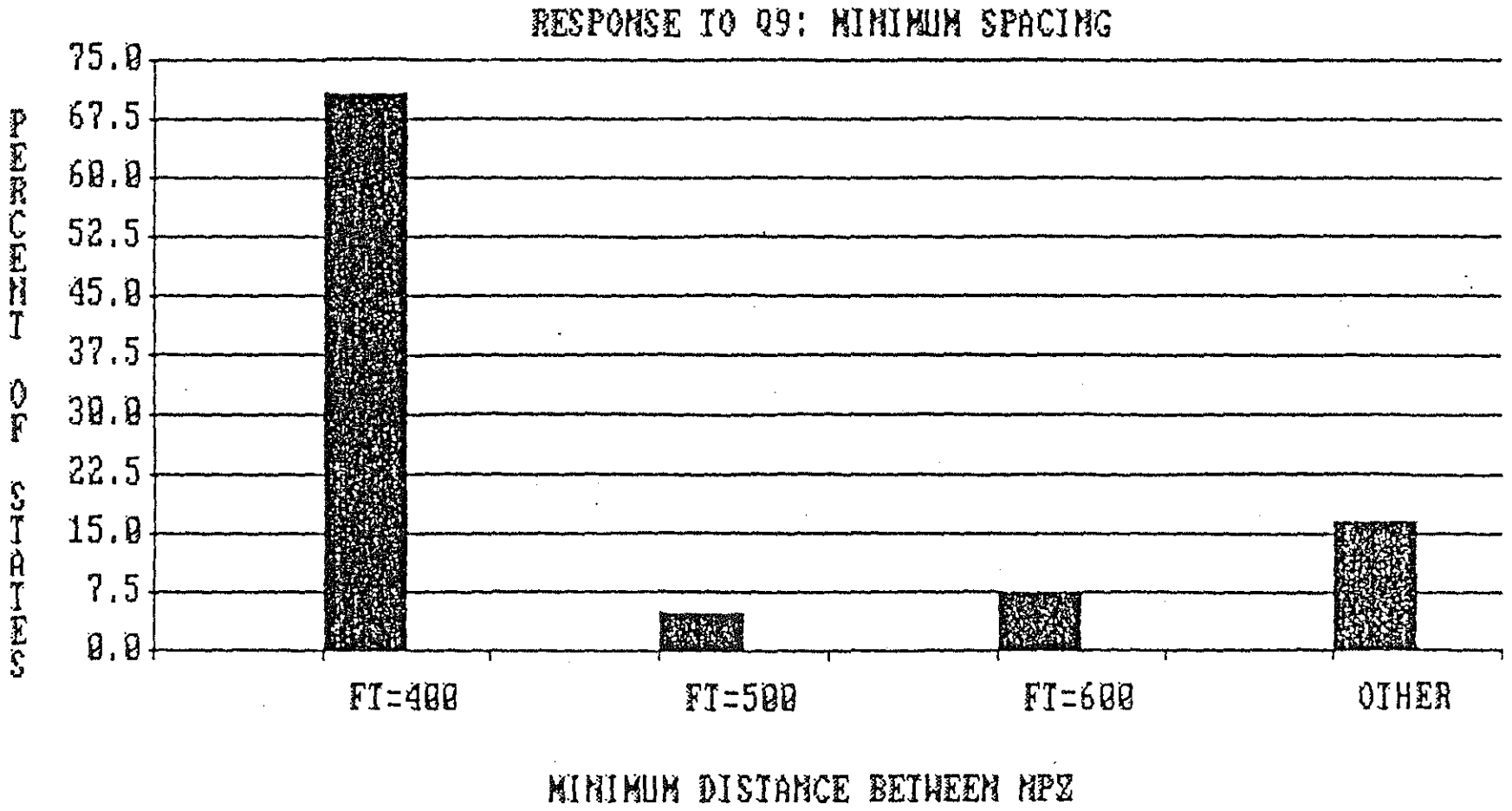
*29 use 400' (71%)
2 use 500' (5%)
3 use 600' (7%)
7 use other lengths (17%)

Comments: Nebraska uses 750'.
Indiana variable based on 85th percentile speed.
Ohio uses 400' for speeds less than 50 mph and 600' for speeds greater than 50 mph.
Tennessee comments "It appears this distance should be larger especially at higher speeds since it does not appear the passing manuver can be completed in accordance with short zone concept at higher running speeds."
Alaska requires a minimum gap of 10 seconds at posted travel speeds.
California "If the gap between successive no passing zones is less than the sight distance for the prevailing speed used to establish the speed zone, the no-passing zone shall be continuous."
Georgia varies from 400' - 600'.

Figure 4 shows the distribution of minimum spacing between zones.

10. On horizontal curves what is the height of object and height of eye used in determining passing sight distance?

Same as on verticle curves


RESPONSE TO Q9: MINIMUM SPACING
75.0
67.5
60.0
52.5
45.0
37.5
30.0
22.5
15.0
7.5
0.0
PERCENT OF STATES
FT=400
FT=500
FT=600
OTHER
MINIMUM DISTANCE BETWEEN MPZ

Other (please specify)

All states use the same values for height of eye and object used on vertical curves for horizontal curves. A partial exception is Oregon which does not establish no passing zones on horizontal curves.

11. On horizontal curves what is the height of object used in your state in determining stopping sight distances?

Same as on verticle curves
Other (please specify)

All states use the same height of object used on vertical curves for horizontal curves.

12. Has your state had an automated No Passing Zone survey conducted and what was the accuracy level?

Horizontal: 18 states have conducted surveys. (43%)
*24 states have not conducted surveys. (57%)

Vertical: 18 states have conducted surveys. (43%)
*24 states have not conducted surveys. (57%)

The accuracy level is variable from 15'/mile to completely unreliable results.

13. On horizontal curves, is the line of sight for No Passing Zones restricted to:
1. Artificial obstructions at shoulder point.
2. Artificial obstructions at right-of-way line.

Comments:

*7 states use artificial obstructions at shoulder point. (17%)
13 states use artificial obstructions at right-of-way line. (31%)
22 states use other criteria. (52%)

Comments: North Carolina uses the ditch line.
Ohio uses a line tangent to the embankment or other obstruction that cuts off the view on the inside of the curve.
Alaska and Nebraska use any obstruction.
West Virginia uses any artificial obstruction as the control regardless of location.
Texas uses any obstruction that cuts off the view on the inside of the curve.
California uses obstructions anywhere within the sight distance line of sight.

14. Describe any studies that have been conducted in your state on the adequacy of existing policies and practices and/or are any changes in standards being considered? (Please include results of studies, dates of most recent or planned changes, type of changes made.)

Comment:

The following are the responses received to question 14.

Illinois: "Changes in standards are being considered to conform with the reduced eye height and object height (3.75′ to 3.50′) in section 3B-5 of the Federal Manual on Uniform Traffic Control Devices.

Indiana: "Changes in criteria being considered are: (1) Reduction of eye/object height to 3.5 feet. (2) Change in minimum length for No Passing Zones at special situations."

Iowa: "We have compared 3.75′ standard with new proposed 3.50′ standard being considered. There will be little change because we now add 100′ to the beginning of a line and continue the line until the forward tangent can be seen from a 3.75′ height."

Kansas: The W14-3 no passing pennant sign was installed on all rural no passing zones by contract in 1982. This was a change in our standard no passing zone signing treatment."

Michigan: Lowering the eye-height criterion for no-passing zones is being considered. (Recent studies by others have indicated that at least 18 percent of all passenger cars on the highway have driver eye-heights of 42 inches or less).

Minnesota: "(1) Plan change from 3.75′ to 3.5′ HI. (2) Will contact FHWA to determine if sight distance criteria will or will not change (NAT′L Standard). (3) Also, plan to contact FHWA on increasing minimum distance between zones, considering increase from 500′ to 800′."

Nebraska: "At the beginning of 1983, the height of eye dimension was changed from 3.75′ to 3.50′, and the passing sight to determine if sight distance criteria will or will not change (NAT′L Standard). (3) Also, plan to contact FHWA on increasing minimum distance between zones, considering increase from 500′ to 800′."

Nebraska: "At the beginning o 1983, the height of eye dimension was changed from 3.75′ to 3.50′, and the passing sight distance was changed from 1100′ to 1000′. The 85th percentile speed in Nebraska is approximately 59 mph."

New York: "We did a literature review and survey of the states in early 1982 considering eliminating all zones less than 500′. Considering lowering eye/object height to 3.50′/3.50′. Considering lengthening minimum passing zone to correspond with minimum sight distance for 85th percentile speed. The study is still in draft form and there is no date of planned changes." (See Appendix B).

Tennessee: "Changes to field markings are planned when FHWA change to MUTCD eye height is made. The method of establishing no passing zones needs

to be uniform. National guidelines need to be established for such items as narrow bridges, dips, intersections and other site specific locations."

Virginia: Study by our research council in 1983, re: sight distance and passing zone requirements. Recommendations under consideration at this time."

15. Have any studies been completed on the changing height of eye for the current vehicle mix.

There were no significant responses to this question.

16. What has been your states experience with regard to tort liability losses from no passing zone policies and practices? (Case citations are not necessary.)

Comments:

The following are the responses received to question 16.

Connecticut: "As far as the records indicate, there have been no claims against the state because of existing no passing zone policies and practice."

Michigan: "Recently, the state has experienced two liability losses involving no-passing zones. In one case, a Pass With Care sign was placed in advance (about 50') of the actual ending of the no-passing zone. In the other case, implemenation of changes after a resurvey was not soon enough to satisfy the court."

Montana: We have experienced some suits and to date. Our position has been defendable in the court room."

Nevada: "There is only one recent case involving no passing zones. Nevada does not use "No Passing" signs; only solid yellow lines. The allegation was that a "passing zone" was not needed at the location in question, and that it created a "trap" for the unwary motorist. This action was actually litigated in the federal court, with expert testimony on both sides. Testimony showed that the area where passing was allowed was 1165' in length, and exceeded the MUTCD requirement for 55 mph. The court specifically found no liability on the part of the state in this wrongful death action."

New York: "Most cases center on the lack of markings. Most cases do not address the policy behind pavement markings."

Ohio: Cases pertaining to no-passing lines in advance of intersection - no citations since it is an engineering judgment application."

Alabama, Mississippi and North Dakota practice sovereign immunity.

17. What are the state policies and practices relating to pavement marking and/or signing responsibilities on county or other local roads?

a) Counties must follow state policies.
b) Counties may adopt their own policies.

Comments:

*34 report counties follow state policies (81%)
8 report counties adopt their own policies (19%)

18. Describe any differences and reasons therefore between policies and practices on those roads under the states jurisdiction and those under the jurisdiction of local governmental units.

The following are the responses received to question 18.

Illinois: "Some local government units may use the Do Not Pass/Pass With Care combination of signs instead of the pennant No Passing Zone sign, which is used on state highways."

Kansas: "The primary reason of differences would be due to lack of funding available to the unit of government. All the signing and pavement marking standards are the same, as they come from the MUTCD."

Michigan: "Counties seldom use all of the signs (W14-3, R4-1, and R4-2) with their no-passing zones. Some only use markings on the pavement."

New Hampshire: "By statute municipalities must follow state policy (1971 MUTCD). Compliance is fairly good since state forces do most of the pavement markings on a force account basis."

Ohio: "Monies available to local governmental units vary considerably due to population and miles of roadway."

Pennsylvania: "Very few local roads have any passing zones or passing/no-passing type signs."

Vermont: "Most of our towns do not have the capability to do pavement marking and therefore much of the paved local mileage which the state does not mark has no pavement markings."

West Virginia: "There is no county road system in West Virginia. All roads belong to the state or city. Both state and city must follow state code which has adopted the MUTCD as the state sign and marking manual."

19. Other experiences or comments which may be beneficial to this review?

Comments:

Kentucky: "Given the requirement of the MUTCD under title 23 U.S. code how do other governmental units get by with other policies?"

Michigan: "Should the decrease in vehicle horsepower over the past few years influence the minimum passing sight distances as shown in the MUTCD?"

Minnesota: "It would be beneficial for all concerned that the FHWA should implement its research and issue a final rule to amend the MUTCD on: (1) sight distance warrants for no passing zones, (2) minimum distances between zones."

Vermont: "Starting last year (1983) we increased the length of barrier line markings on approaches to side road intersections from 100' to 400'.

Tennessee: "Nationwide consensus on guidelines and method of establishing no passing zones has not been obtained. Research data is contradictory. We previously relied on judgment of field marking crews in laying out no passing zones. We sought to use more objective survey criteria; but have encountered substantial problems in obtaining a reliable survey which can be implemented with confidence."

APPENDIX B

CORRELATION QUESTIONS

1. How many states use different eye height and height of object than the NMUTCD's specified 3.75'?

Total less:	17	(41.5%)	2.75:	1	(2%)	3.25:	1 (2%)
Total greater:	0		3.50:	15	(37%)	3.75:	24 (58.5%)

Washington uses 3.75' height of eye and 4.5' height of object

2. How many states using the NMUTCD's 3.75' height of object and height of eye are using the listed height of object in stopping sight distance?

0.0': 3
0.5': 3
1.0': 0

New Mexico uses AASHTO guidelines.

3. How many states using the NMUTCD's 400' minimum between no-passing zones mark a minimum zone length of:

All Zones: 9 (31%)

100: 4 (14%)
150: 4 (14%)
200: 2 (7%)
300: 1 (3%)
400: 1 (3%)
500: 8 (28%)

4. How many states using the "short" zone definition permit spacing between no passing zones as short as

400: 27 (75%)
500: 2 (5.5%)

Nebraska uses 750'
Massachusetts uses 600'
Indiana uses an 85th percentile basis
California uses a gap equal to the line of sight
Alaska uses a minimum gap of 10 seconds
Utah bases length on speed limit
Georgia varies from 400' to 600'

Comparison of 1982 New York study to 1984 study.

State	1982 Results Eye Height/ Object Height	1982 Results Zone Concept	1984 Results Eye Height/ Object Height	1984 Results Zone Concept
Alabama	MUTCD	short	MUTCD	long
Alaska	MUTCD	short	MUTCD	short
Arizona	MUTCD	short	3.5/3.5	short
Arkansas	DID NOT RESPOND		2.75/2.75	short
California	MUTCD	short	MUTCD	short
Colorado	MUTCD	short	3.5/3.5	short
Connecticut	MUTCD	short	3.75/1.0	short
Georgia	DID NOT RESPOND		3.5/3.5	short
Idaho	3.5/3.5	long	MUTCD*	long
Illinois	MUTCD	long	MUTCD	long
Indiana	MUTCD	short	MUTCD	short
Iowa	MUTCD	short	MUTCD	short
Kansas	3.5/3.5	short	MUTCD*	short
Kentucky	MUTCD	short	MUTCD	short
Louisiana	MUTCD	short	MUTCD	short
Maine	3.5/3.5	short	3.5/3.5	long
Massachusetts	MUTCD	short	3.5/3.5	short
Michigan	3.5/3.5	short	3.5/3.5	short
Minnesota	DID NOT RESPOND		MUTCD	short
Mississippi	MUTCD	short	3.5/3.5	short
Missouri	MUTCD	long	MUTCD	short
Montana	MUTCD	long	MUTCD	short
Nebraska	MUTCD	short	3.5/3.5	short
Nevada	MUTCD	short	MUTCD	short
New Hampshire	MUTCD	short	MUTCD	short
New Mexico	4.0/4.0	short	MUTCD	short
New York	MUTCD	short	MUTCD	short
North Carolina	MUTCD	short	3.5/3.5	short
North Dakota	MUTCD	short	3.5/3.5	short
Ohio	MUTCD	short	MUTCD	long
Oklahoma	MUTCD	short	MUTCD	short
Oregon	MUTCD	short	MUTCD	short
Pennsylvania	3.5/3.5	short	3.5/3.5	short
South Dakota	3.45/3.45	short	3.5/3.5*	short
Tennessee	MUTCD	short	MUTCD	short
Texas	MUTCD	short	MUTCD	short
Utah	MUTCD	short	3.25/3.5	short