

FINAL REPORT
MOTORIST UNDERSTANDING OF DIRECTIONAL MESSAGES

by

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(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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ABSTRACT

The report presents the findings of a study of motorists' perceptions of messages on interstate advance and supplemental guide signs. Approximately 5,100 questionnaires were distributed to motorists at eight rest areas on interstate highways in Virginia to determine the degree to which those motorists are confused by or misunderstand messages on guide signs.

The study showed that motorists are somewhat confused by some messages on guide signs. The difficulty of interpreting the messages was found to be inversely related to driving experience. Wording of the messages on certain guide signs was determined to be the most important element relating to driver confusion. The messages most frequently misunderstood were those containing the word "next".

The sign containing the term "this exit" was favored by motorists for an exit ramp in full view. For references to two ramps, they favored the wordings "first" and "second". They decried the use of "next" for these situations. Almost three-fourths favored the numbering of exits. Deficiencies in signing for exits from the left side of the road were also noted. The need for more use of signs on the left side of the road and for diagrammatic signs was frequently mentioned by respondents.

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SUMMARY AND CONCLUSIONS

The study showed that motorists are somewhat confused by some messages on guide signs. One-third of those queried said that they had at some time been confused by a guide sign or had been led to make a wrong turn. The difficulty of interpreting the messages was found to be inversely related to driving experience, thus indicating that more emphasis on guide signs in driver training courses may be necessary.

That motorists who were familiar with a road more often said they were confused by guide signs than those who were unfamiliar implies that even a motorist familiar with a road can be led astray by a confusing guide sign. The placement and frequency of signs were not found to create any significant confusion. Suffice it to say that the wording of the messages on certain interstate guide signs is the most important element relating to driver confusion.

The messages most frequently misunderstood were those containing the word "next", especially when the sign was placed near a visible exit ramp. It appears that the words "this" and "first" in messages on exit signs placed within sight of the exit ramp are more satisfactory than next, because the proper interpretation of next is so dependent upon the placement of the sign.

The sign containing the term "this exit" was favored by motorists for an exit ramp in full view. For references to two ramps, they favored the words "first" and "second", but voiced no preference between "right" and "exit". They decried the use of "next" for these situations. Almost three-fourths of them favored the numbering of exits.

Motorists often perceived deficiencies in the signing for exits from the left side of the road. The time needed to change lanes and "move to the left" was seen as being insufficient. Several cited a need for more use of signs on the left side of the road and for diagrammatic signs. Such signs were seen as useful in cases where large trucks block signs on the right side of the road from the view of motorists in the passing lane.

RECOMMENDATIONS

The findings from the study have led to the following recommendations.

1. For major and intermediate interchanges, the first advance guide sign should denote mileage and the word "next" should not be used. The guidelines presented in Section 2E-26 of the MUTCD should be followed.
2. The word "next" should not be used on supplemental guide signs, unless the supplemental panel is mounted below an advance guide sign. In essence, Section 2E-27 of the MUTCD should be followed when using the word "next."
3. The word "first" should be used on advance and supplemental guide signs in lieu of the word "next." It may also be acceptable to use the word "this," but only when the exit is in full view. It is recommended that the MUTCD be changed to this effect.
4. Where alphanumeric designations are used to signify exits, they should be used such that they denote the direction of travel. For example, an exit carrying eastbound traffic from an interchange numbered 4 would be designated Exit 4E rather than Exit 4ABCD, etc., as noted in the MUTCD.
5. Where interchanges containing several ramps are not numbered, exits should be denoted by the terms "first," "second," "third," etc.
6. Interchange numbers should be given on the official state highway map.
7. Each rest area should contain a sign denoting the distance to the next rest area.
8. Where interchanges contain several exit ramps or exits from the left side of the roadway, diagrammatic signs are preferred by the motorists and should be used in accordance with Section 2F-24 of the MUTCD. Continued experimentation with diagrammatic signing is recommended.
9. Advance and supplemental guide signs duplicated on the left shoulder of the highway would be helpful as the signs on the right shoulder are often shielded from motorists by large trucks. In lieu of left shoulder signs, overhead signs are acceptable but they should be placed so that they can be seen by motorists in either lane.

10. Driver education courses and manuals should include a section on signing. Special emphasis should be placed on the types and functions of interstate guide signs.
11. When new types of signs are introduced or considered for implementation public input should be used to determine whether they are comprehensible. Also, when new signs or sign messages are introduced publicity programs should be instituted to inform the public of them.
12. As sign standards in the MUTCD are changed, signs should be changed to conform to these standards and thus keep inconsistency in sign configurations to a minimum.

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BACKGROUND

The Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) provides a basis for the standardization of traffic control devices, and a high level of uniformity has been reached in recent years.⁽¹⁾ Unfortunately, motorists often do not understand the changes made to improve the devices and to achieve uniformity, and thus do not benefit from them. For example, in the eastern states, including Virginia, only 18% of drivers asked to give the meaning of the sign bearing the school zone symbol gave a correct answer and only 56% knew the meaning of orange colored warning signs.⁽²⁾ In Texas, only 35% of a total sample of drivers knew the correct meaning of a solid white line.⁽³⁾

On the interstate system, the guide sign is very important to the driver's proper navigation of the system. Failure of a guide sign to convey a clear, concise message to the motorist can result in erratic driver response leading to accidents, injuries, and fatalities. Failure of the system of signs also may increase trip time and cause driver frustration.⁽⁴⁾ A questionnaire survey on the road users' need for guidance and the problems they perceive, conducted by King and Lunenfeld, revealed that more than half of all respondents had felt lost at some stage during their most recent trip and that approximately half actually had been lost.⁽⁵⁾

Another study noted that in the opinion of traffic engineers, motorists continue to experience difficulty with the word "next" as used on guide signs such as "next exit", "next right", etc.⁽⁶⁾ Depending somewhat on the placement of such signs, some drivers interpret "next exit" to mean the exit immediately before them, whereas others believe it refers to the one after the one immediately before them. This problem apparently exists in Virginia, since a large variety of directional messages are being used. Because of complaints from drivers missing exits designated by the word "next", use of the term "this exit" or "this right" was initiated several years ago at locations where the exit was in plain view of the driver. Recognizing, however, that driver confusion is still present in the interstate system, this study was undertaken to verify the degree to which motorists are confused by or misunderstand directional messages used on interstate guide signs. Figure 1 shows four interstate signs which have different, and perhaps contradictory and confusing, directional messages.



Figure 1. Directional messages on interstate guide signs.

PURPOSE AND SCOPE

The purpose of this study was to determine the degree to which motorists are confused by or misunderstand messages on interstate guide signs. Although the study was designed to obtain information on advance and supplemental guide signs only, data were taken on other types of signs and sign messages encountered by motorists traversing the interstate system.

It should be noted that there are two distinct sections of a guide sign. The principal legend includes place names, route numbers, or highway and street names. The other part of the message is called "exit instructions" and consists of either words or arrows. The interpretation of these instructions was the subject of this study. The study did not examine other messages, sign legibility, nor the effects of related roadway conditions. Specifically, the study sought to —

1. identify any deficiencies in directional guidance as perceived by the motorists;
2. identify the needs and desire of the motorist for directional guidance; and
3. provide insight as to the value of a process whereby motorist input could be used in the design and placement of signs.

The study was limited to a questionnaire survey of motorists traversing Virginia's interstate system at eight points.

METHODOLOGY

A self-addressed, pre-stamped, mail-back questionnaire was developed (see Appendix) and distributed to motorists at eight rest areas on interstate highways in Virginia. The questionnaires were distributed at each of the rest areas for 3 to 5 successive days, the number of days for each rest area being dependent upon the number of respondents stopping daily. The distribution was made from a table manned by one or two technicians or graduate students who encouraged motorists stopping at the rest area to participate in the survey. A large sign (Figure 2) was located near the table to call attention to the survey.

A total of 5,100 questionnaires were distributed from July 1980 to October 1980 and from April 1, 1981, to May 15, 1981. Of this total, 1,006 completed questionnaires were returned for a response rate of roughly 20%. Each highway district in Virginia, with the exception of the Lynchburg District which contains no rest areas, was represented in the survey.

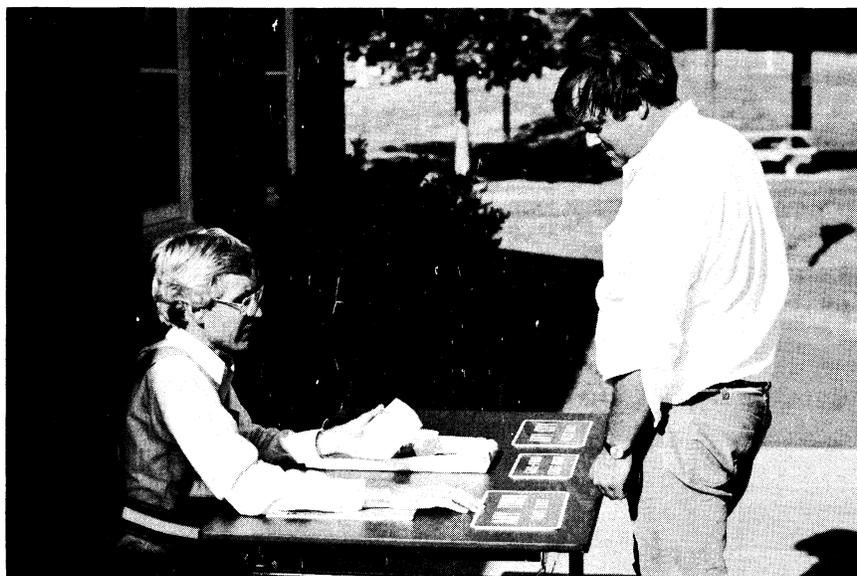


Figure 2. Typical survey table at rest area.

CHARACTERISTICS OF THE SAMPLE

As stated earlier, the sample was limited to motorists stopping at the rest areas. Since the sites were chosen at random in a manner to get statewide representation in the survey, it is safe to say that the respondents represent a random sample of motorists travelling Virginia's interstates. Of the 1,006 respondents, 61.6% were out-of-state and are classified as non-local drivers, about 87% were driving automobiles, and only 25% travelled the section of interstate where the survey was being made with any regularity. For the most part, then, the respondents were not familiar with the road they were on. Seventy-three percent of the respondents were male, their median age was somewhere between 51 and 60, and 66% had attended one or more years of college (Table 1).

Table 1
 Characteristics of Respondents
 (N=1,006)

<u>Sex</u>	<u>Percentage of Respondents</u>
Male	72.9
Female	25.5
No Response	1.6
<u>Age</u>	
Under 21	1.7
21-30	12.0
31-40	14.1
41-50	17.1
51-60	24.5
61-70	23.3
over 70	6.1
No Response	1.2
<u>Education</u>	
6th grade or less.	.1
7-12th grade	4.9
High school graduate	18.4
1-4 years of college	21.3
College graduate	45.5
Other	7.2
No Response	2.6
TOTAL FOR ALL CATEGORIES	100.0

PERCEPTION OF GUIDE SIGNS AND FAMILIARITY
 WITH ROADWAY

Motorists were first asked if any of the guide sign messages in Figure 3 had ever caused them to make a wrong turn. Of those who responded, roughly one-third answered yes to this question. Table 2 shows the frequency of respondents' choices when asked which of the messages in Figure 3 were confusing at times. As can be seen in the table, signs containing the word "next" created the most frequent confusion. Signs causing the least confusion were those displaying the message "first right."

Any City
THIS EXIT

A

Any City
THIS RIGHT

B

Any City
NEXT EXIT

C

Any City
NEXT RIGHT

D

Any City
FIRST RIGHT

E

Any City
SECOND RIGHT

F

Any City
FIRST EXIT

G

Any City
SECOND EXIT

H

Figure 3. Examples of sign messages used in questionnaire (questions 4-12).

In fact, the words "this" and "first" were much less confusing than the alternatives "next" and "second". Cross tabulations revealed little about the relationship between confusion over these messages and such items as the sex and educational level of the respondents. Cross tabs did reveal, however, that as the age of the respondent increased there was decreasing likelihood of difficulty in interpreting the "next exit" and "next right" messages. This finding seems to indicate that familiarity with interstate signs increases with driving experience and that experienced drivers have little difficulty with even the most confusing of the guide signs. The fact that young drivers are more confused by the word "next" than their older counterparts seems to suggest that if the word is to continue to be used in sign messages, then driver training courses should give additional attention to interpreting interstate guide signs.

Table 2

Frequency of Confusion with Specific Messages
(N=1,006)

<u>Message</u>	<u>Percentage of Respondents Confused*</u>
Next exit	23.5
Next right	18.2
Second exit	18.1
Second right	17.1
This right	13.8
First exit	12.8
This exit	12.7
First right	10.2

*Percentages total more than 100% due to multiple responses.

An important consideration in the design of this research was the motorists' familiarity with the particular segment of the interstate at which the survey station was located. Drivers were categorized as familiar, partly familiar, and unfamiliar with the road. It was assumed that the more familiar driver would be less confused and thus less dependent upon guide signs. To give the reader some idea of the respondents' familiarity with the road, Table 3 is presented. (As noted previously, 61% of the respondents were from out of state, but not all of these were classified as being unfamiliar with the road.) The scale used for level of familiarity was as follows: familiar — those who travelled the road daily, or at least once a month; partly familiar — those who travelled the road less than once a month; unfamiliar — those who hardly ever travelled the road or who said they were travelling it for the first time. Cross tabulations revealed that there was a relationship between the respondents' familiarity with the road and confusion. Of those who reported being confused by certain guide signs, 41% were familiar with the road, 30% were partly familiar, and 30% were unfamiliar. The distribution of responses among the three categories indicates that those who were familiar with the roadway were more often confused by guide signs than those who were partly familiar and those who were unfamiliar. This relationship was significant at the 99% level of confidence.

Table 3

Familiarity With Road
(N=1,006)

<u>Category</u>	<u>Percentage of Respondents</u>
Familiar	25.0
Partly familiar	38.5
Unfamiliar	36.5

With respect to the placement and number of guide signs, 84% felt there was enough distance between signs and exit ramps. Seventy-six percent felt that the number or frequency of guide signs was adequate. Of those who stated that they were often confused by the placement or frequency of guide signs, an insignificant number felt that the placement and frequency were less than adequate.

WORDING OF SIGN MESSAGES — THE PUBLIC'S VIEW

The MUTCD states that freeway guide signs have several functions. First, they are to give direction to destinations, streets, or highway routes at interchanges; second, they are to furnish advance notice of the approach to intersections and interchanges; third, they are to direct drivers into the appropriate lanes in advance of diverging or merging movements; fourth, fifth, and sixth they are to identify routes, show distances to destinations, and indicate access to motorist services. While the scope of this study was limited to signs having the first three functions, the respondents' comments concerning those having the latter three functions were received and will be discussed later in this report. The messages shown in Figure 3 come under the three former functional categories and are known as either advance guide or supplemental guide signs, depending upon the message displayed. This section of the report deals with the messages imprinted in these signs.

Respondents were asked which of the words "first", "next", and "this" mean the same when used in sign messages. Table 4 displays the responses to this question. The table is self-explanatory. It shows no agreement among the drivers queried as to which of these words are interchangeable. The point here is that in certain situations all of these words can be taken to have the same meaning dependent upon the composition of the interchange. Indeed, there

Table 4

Similarity of Next, First and This

<u>Category</u>	<u>Percentage of Respondents</u>
All mean the same	44.5
Next and first mean the same	16.7
Next and this mean the same	6.7
First and this mean the same	14.2
All are different	13.8
No response	4.1
	<hr/>
TOTAL	100.0

is no right answer to this question. The results are presented here to further acquaint the reader with the apparent confusion of motorists concerning these sign messages. Further proof was discovered when respondents were asked if "next" and "second" had the same meaning. While about 85% said they did have the same meaning, 11% said that they did not. The reader will remember that "next", "first", and "this" were thought to mean the same by 44.5% of the respondents. Is this to be taken to mean that the word "second" has the same meaning as "first" and "this"?

Approximately 75% of the additional volunteered comments regarding confusion with sign messages related to use of the word "next". Many stated that next was confusing, especially when the exit ramp was visible. (The reader will remember that respondents most frequently misinterpreted "next exit" and "next right.") The confusion appears to lie in the placement of the "next exit" sign. Based on the responses, it appears that a "this" or "first" (exit) sign placed a short distance in advance of an exit would refer to that immediate exit; however, a "next" (exit) sign causes confusion because unlike "this" and "first", the "next" sign is dependent upon its placement to convey its message. The problem is that at certain locations the guide sign containing the word "next" is within sight of the exit ramp, and many drivers become confused thinking "next" to mean the second exit and not the immediate one. To help remedy this problem, the Department for some time has used the supplemental guide sign denoting "this" exit at certain locations where the exit is visible. This application is not standard procedure—"this" is used at some exits not visible to the motorist and "next" continues to be used at locations where the exit ramp is visible (Figure 4). This lack of standardization probably contributes to the confusion experienced by the driver.



Figure 4. Visible exit ramps designated by "next exit" message.

The questionnaire queried motorists regarding their preferences in sign messages referring to one and to more than one ramp. For a single exit ramp in full view, "this exit" was chosen by 42% of the respondents. It should be noted that "exit" was preferred over "right", despite the fact that the illustration on the questionnaire showed a ramp on the right. This finding is corroborated by the fact that the second preference for a single ramp in full view was "next exit" (19% of the respondents).

It was thought that out-of-state motorists would not be familiar with the "this exit" message and would be confused by its appearance on the questionnaire. From the responses, one can only surmise whether they were used to seeing it in their state or whether it was new to them and they were in favor of it. Table 5 shows the expressed preferences by place of residence.

For signs referring to two ramps, the respondents overwhelmingly chose "first right" or "first exit" for the initial sign (51%) and "second exit" or "second right" for the second one (78%). For these messages, the noun did not appear to be important. Drivers seem more concerned with the adjectives which should dictate the appropriate response. For this application, the motorists objected to use of the word "next", and it was found that this word most often confused motorists when used on signs designating two exits. These findings will be discussed further in the last section of this report.

Table 5

Sign Preference by Place of Residence
(N=967)

<u>Category</u>	<u>In-state Percentage</u>	<u>Out-of-State Percentage</u>
This exit	39.5	42.5
This right	8.2	6.9
Next exit	17.8	21.2
Next right	19.6	16.8
First right	10.9	8.3
Second right	0	0.2
First exit	3.7	3.1
Second exit	0	0.2
Exit numbers	0.3	0.8
TOTAL	100.0	100.0

Finally, respondents were asked if they felt that exit signs would be easier to understand if the ramps were numbered. Seventy-two percent of the motorists favored this idea. They noted that the numbers would be an excellent idea, but only if they appeared on the state highway map. Several respondents felt, on the other hand, that motorists are "too busy to keep up with numbers" and preferred current practices. There was, however, sufficient interest in numbering exits to warrant an examination of the feasibility of doing so.

MOTORISTS' COMMENTS

Respondents were provided space on the questionnaire for any comments they cared to make about interstate guide signs. It is these types of responses that often provide much more insight into motorists' perception and attitude than simple, close-ended questions, for it is here that the respondent can "get it off his chest." Of the 1,006 respondents, 762, or almost 76%, entered a comment of some type. While certainly not all were pertinent to the research, many supported much of the earlier reported data and provided needed information about the motorists' perception of both efficiencies and deficiencies of interstate signing. These comments were broken down into the five categories shown in Table 6, and each of these is discussed under the following subheads.

Table 6

Data of Motorist Comments

<u>Category</u>	<u>Number of Comments</u>	<u>Percentage</u>
Sign placement	222	29.1
Sign wording	199	26.1
Sign context (additions, deletions, etc.)	124	16.3
Gas, food, lodging signs	74	9.7
Miscellaneous	143	18.8
TOTAL	762	100.0

Sign Placement

The most common concern expressed by motorists was that oftentimes not enough advance warning of exits is given to allow time to move into the proper exit lane. This was the concern of almost half of those commenting on sign placement. Similar comments by 10% of these 222 respondents expressed a need for two signs for each exit — one "a good distance away" from the exit and one right at the exit. While the MUTCD states that for major and intermediate interchanges two, and preferably three, advance guide signs should be used, a substantial number of motorists saw a deficiency here. The use of supplemental signs midway between the two major advance guide signs may rectify the situation. It also might improve the situation where the guide signs for a given exit bear completely different messages. Indeed, if the Department follows the mandates of the MUTCD this item will likely cease to be a problem. In any case, it is noted here that the motorists did perceive a deficiency.

Almost 20% of the comments on sign placement related to exits from the left side of the highway. These exits were seen to be a problem in that there often was insufficient time for the motorist to change lanes and make his exit. Another 10% felt a need for additional signs on the left-hand side of the road, since oftentimes signs mounted on the right side were obscured from the view of the motorist in the passing lane by trucks.

Sign Wording

Almost 43% of those commenting on sign wording were confused by the term "next." These comments support the data reported earlier concerning the confusion with "next." An additional 14% were confused by both "next" and "this." The problem with "next" may be one of sight distance. While the MUTCD states that next exit supplemental guide signs should be erected midway between the two major advance guide signs, this treatment often results in the "next exit" sign being within sight distance of the exit. The motorist's confusion lies in the fact that he is not sure if "next" means immediate or "the one after this one." Perhaps the MUTCD should include a qualifying statement to the effect that, where feasible, "next exit" signs should be used only if the ramp is not in full view. Typical of the comments on this point were the following:

- Sometimes this is next and sometimes it isn't.
- When "next exit" sign is placed just before an exit, I'm not sure if it's this exit or the next one.

- The word "this" means "that is present now."
The word "next" means "the first time after this."
- You should never use the word "next" when you have more than one ramp.
- There will always be difficulty using "this" and "next" as they are subject to interpretation.

Perhaps the epitome of confusion was expressed in the following comment:

- I wanted next (second exit) but the sign was right at the first exit.

About 15% of the respondents' comments on sign wording proposed that exits should be numbered or that all messages shown in Figure 3 should be eliminated. The numbering of interchanges might help the problem with "next exit" wording, since the MUTCD prescribes that the "next exit" sign is not to be used in cases where interchanges are numbered.

Sign Context and Configuration

Many of the comments on this subject were not relevant to guide signs but some are, nevertheless, worthy of mention. The greatest number (18%) desired better consistency in the way exits are treated. This was taken to mean that repeated use of limited types of sign messages was favored over the use of a wide variety of sign types and messages. Several (11%) suggested that mileposts and exit numbers be the same, and another 16% felt that sign messages could be simplified by showing route numbers rather than place names and using directional notations rather than the letters A & B at interchanges with two ramps. (It should be noted that most of the suggestions on the use of mileposts were made by out-of-state motorists.)

Ten percent of the respondents commenting on this subject preferred "illustrated signs" (diagrammatics), especially for exits on the left. This type of sign, if mounted above or on the left side of the roadway, was also seen as being a remedy for the problem cited earlier where large trucks obscure signs mounted on the right side of the roadway. The MUTCD states that the diagrammatic sign has proven to be superior to conventional guide signs for some interchanges, especially at the advance guide sign location for left exits. Since left exits were noted to be a problem by many respondents, warrants for the feasibility of diagrammatic signs should be continuously scrutinized by the Department.

Logo Signs

Since these signs are relatively new to Virginia, comments received concerning them are being reported on here even though their examination was not within the scope of the study. Of the 74 respondents mentioning these types of signs, 78% were very impressed by them and less than 7% disliked them. The remainder pointed out that such signs were useless unless the distance to the place of business and the hours of operation were listed on the sign. It is standard practice in Virginia to show the distance to food and lodging on logo signs placed on ramps only. Hours of operation currently are not displayed on these signs.

Miscellaneous

This category represents a potpourri of motorist concerns and thoughts, and even though most don't pertain to guide signs, they should not be passed over lightly as many offer helpful suggestions. First, 80% of these respondents praised the Department for having the best interstate signing that they had encountered. These were largely out-of-state motorists and represented better than 11% of all respondents.

Two additional comments are worthy of mention. First, several respondents suggested that in each rest area a sign be posted giving the mileage to the next one. This comment was noted both on the questionnaire and in conversation with respondents. It appears that a great many interstate travelers are quite dependent upon rest areas for services they otherwise would have to leave the interstate to obtain. This issue was of especial concern to elderly and retired travellers. Secondly, several respondents remarked that exit numbers should be included on the state highway map.

REFERENCES

1. Manual on Uniform Traffic Control Devices for Streets and Highways, Federal Highway Administration, U. S. Department of Transportation, 1978.
2. Hulbert, Slade, Beers, J., and Fowler, P., "Motorists' Understanding of Traffic Control Devices", AAA Foundation for Traffic Safety, Falls Church, Virginia, March 1979.
3. Koppa, Rodger J., and Guseman, P. K., "Public Understanding of Traffic Control Devices in Texas", Texas Transportation Institute, College Station, Texas, November 1978.
4. Dean, J. Paul, Reid, Crowther and Partners Ltd., Calgary, Alberta, Canada, "Highway Guide Signs: A Framework for Design and Evaluation", Traffic Control Devices, Geometrics, Visibility, and Route Guidance, Transportation Research Record 737, Transportation Research Board, National Academy of Sciences, 1979.
5. King, G. F., and Lunenfeld, H., "Urban Area Highway Guide Signing", Final report prepared for NCHRP Project 3-12(2), 1972.
6. Capa, Thomas L., and Pennock, Herbert A., Direction Finding from Arterials to Destinations, National Cooperative Highway Research Program Report 71, Transportation Research Board, 1980.

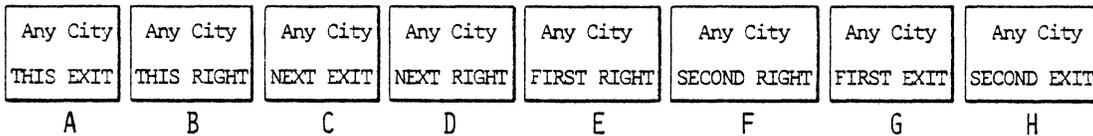
APPENDIX

Dear Motorist:

To help make driving easier, the Virginia Department of Highways and Transportation is conducting a study of interstate guide signs. Please take a few minutes to answer all of the questions on this questionnaire and return it at your earliest convenience.

1. Where do you live? _____ city _____ state 1
2. What type of vehicle were you riding in when you received this questionnaire?
 Car Truck Motorcycle Bus Other _____ 2
3. How often do you travel this segment of the interstate?
 Daily Less than once a month
 1-5 times per week Hardly ever
 Several times per month This is my first time 3
 Once a month

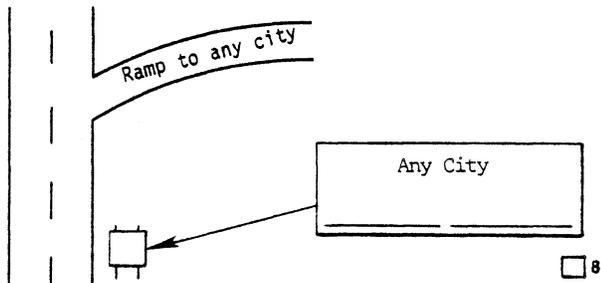
Questions 4 through 12 concern the adequacy of messages on the guide signs you see on interstate highways. These signs look like this:



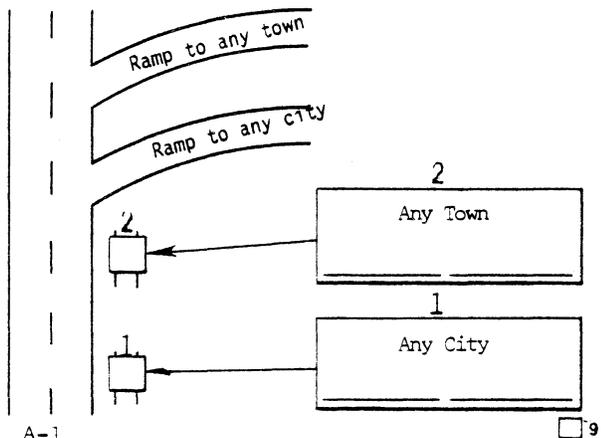
4. Have any of the above guide signs ever caused you to take a wrong turn?
 Yes No 4
 If yes, can you describe your confusion? _____

5. Of the signs pictured above, which ones are confusing at times? A B C
 D E F G H None are confusing 5
6. Of the words "next", "first" and "this" which mean the same to you when used in sign messages?
 all mean the same first/this 6
 next/first they are all different
 next/this
7. Do the words "next" and "second" mean the same? Yes No 7

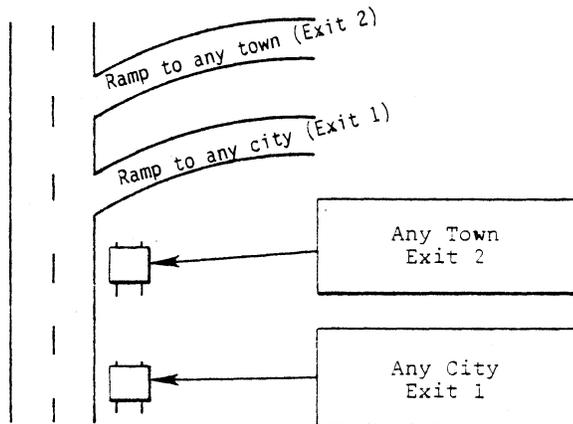
8. At the right is a sketch of a typical interstate ramp interchange. If you were approaching the ramp, which of the guide messages illustrated in A through H above would you prefer to see on the sign? Please write your choice on the sign.



9. You are now a little further down the interstate. What messages would you prefer to see on Signs 1 and 2? Choose from the A through H messages above and write your choices on Signs 1 and 2.



10. Would signs be easier for you to understand if all ramps were numbered such as in the sketch at the right? Yes No



- 10
11. Do you feel we have (a) too many, (b) too few, or (c) the right amount of these signs directing you to your destination? (circle one) 11
12. Is there usually enough distance between the sign directing you to your destination and the ramp that will take you there? Yes No 12
13. We would like to have any comments you care to make concerning interstate guide signs. Feel free to draw an illustration at the bottom of this page.
-
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We would now like a few facts about you.

14. What is your sex? male female 14
15. What is your age? under 21 21-30 31-40 41-50 51-60 15
 61-70 over 70
16. What is your occupation? _____ 16
17. What is the last year of school you completed? 17
 6th grade or less 1-4 years of college
 7-12 grades College graduate
 High school graduate Other (specify) _____

Please fold and mail

THANK YOU VERY MUCH FOR YOUR PARTICIPATION