

Executive Summary 957-1ES
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**EXECUTIVE SUMMARY OF HIGHWAY USER OPERATIONAL
INFORMATION SURVEY**

by

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Purpose and Conclusions

The guidance information system on urban freeways in ten Texas cities* was studied using interviews with drivers, written surveys of drivers, a statewide telephone survey of drivers, and analyses of field data. The study was conducted to determine if, and how well, guidance information was working.

The results of the research suggested that, by and large, the urban guide sign information system in Texas is functioning as it was intended. The most common deficiencies noted were those related to inadequate lane assignment and lack of advance information.

Recommendations

The following recommendations are presented in the form of guidelines for identifying locations where guide sign deficiencies might exist, diagnosing the deficiencies, and remediating conditions.

I. Recommendations for Identifying Problem Locations. Problem locations can be discovered; it is a matter of knowing when and where to look.

A. When to Look - Locations with possible guide signing problems can be identified in conjunction with at least four events:

1. at the time of reports by citizens, department personnel, police, or others;
2. during a periodic review of the signing system;

*Abilene, Amarillo, Austin, Corpus Christi, Dallas, Fort Worth, Houston, Lubbock, San Antonio, and Waco

3. when there has been a major construction or reconstruction project; or
4. during routine sign maintenance activities.

B. Where to Look - The study illustrated that there are a number of sources for identifying problem locations. These include:

1. complaint logs,
2. incident or accident reports,
3. optional exit lanes, and
4. complex geometries where multiple exits occur in a short distance.

II. Recommendations for Problem Diagnosis. Freeway guide signs can fail to communicate because the information sought by a motorist is not available, is present but either the sign or sign message is visually inadequate, is present but temporally inadequate, or because the information presented is misleading.

A. Information Unavailable - Information can be absent or obscured.

1. absent--sign or sign message does not exist or motorist does not recognize it in form presented; and
2. obscured--hidden from view by a permanent obstruction.

B. Message Visually Inadequate

1. Letters and symbols may be too small to be seen from the available viewing distance.
2. Letters and symbols may not have sufficient contrast to be easily read at night.
3. Sign might not have sufficient contrast to be located in a cluttered visual environment or in the presence of glare.

C. Information Temporally Inadequate - Temporal inadequacy results when the information is present and visually adequate but is not received in time for appropriate action. Reasons for inadequacy include:

1. A critical sign is physically located too close to the necessary decision point.
2. Some characteristic of the sign requires more processing time than is available for a decision.
3. A temporary obscuration of a sign caused by traffic (large trucks) or other obstacles.
4. A lack of confirmation of a correct choice after a decision point.

D. Misleading Information - Guide signs can present information that is misinterpreted by the motorist. The process of lane assignment is one that can cause such misinterpretation. Examples are:

1. lane designation does not match the geometry of the roadway and
2. confusing designation of optional through and exit lanes.

III. Recommendations for Remediation. Remedial techniques follow directly from the problems diagnosed.

A. General Considerations - Guide signs should be present and provide necessary information. The information presented should be visually and temporally adequate and should not mislead. For some failures, no additional criteria are needed. If, for example, a sign or message is not present in the system, then the solution is to install a sign or present a message. Failures that involve visually inadequate messages can be easily remedied. Sign material and lettering should be up to standard and in compliance with the manual (MUTCD). A glare or visual clutter problem can require reorientation of the sign or increased background size. If necessary information is available, visually adequate, received in a timely fashion, and correctly interpreted, the motorist will be in the appropriate lane at the decision point. Consequently, lane assignment is a characteristic of guide signs that is salient.

B. Lane Assignment - Lane assignment information is presently being conveyed using a variety of techniques, symbols, and colors. Lane assignment messages consist of white down arrows, black down arrows with a written message on a yellow panel, a written message on a yellow panel, and various combinations of each. Lane assignment is also conveyed with white on green written messages such as, "next right". Lane assignment can be implied by using no written or symbolic message at all. Although there is movement underway to standardize the presentation of this information, it has not been clearly established what motorists' interpretations will be. By way of general guidance, some suggestions are provided.

Lane assignment arrows on signs should be equal to the number of lanes on the freeway. This problem usually occurs at bifurcations or forks where one lane is used as an optional lane for either leg. The difficulty arises from signing for the lane geometry after the fork using a sign located at or before the fork. One solution might be to move the lane assignment information to a position in advance of the fork. This solution does not allow for designation of an optional lane. An alternative that holds some promise is the use of a supplemental diagrammatic or modified diagrammatic sign at the choice point because it describes the appropriate number of lanes as well as the option.

Lane assignments should be made as soon as possible prior to the decision point and assignment arrows should be on all signs referring to the same exit. Spatial separation and proper clustering of information should be maintained on signs that

assign lanes for complex or unusual route divisions. Spatial association between path arrows and geometry should also be maintained.

Study Method

The basic methodology selected for the initial data collection was patterned after the "critical incident technique," which involved asking drivers to recall recent instances wherein they had been confused or "lost" when using guide signs to reach a destination. The critical incident survey was a screening tool for establishing priorities for further in-depth diagnostic study.

Urban freeway locations identified most frequently by motorists responding to the critical incident survey were further studied in the field. The field studies were conducted to validate problem locations identified by the public, and to develop a visual record of the highway signing system, pavement markings, roadway configuration, and so forth, for use during diagnostic evaluation of the system.

The diagnostic evaluation consisted of a review of driver comments, photographic data, appropriate drawings, and field crew assessments of the most frequently reported problem locations by a panel of traffic and human factors engineers and other experienced professionals. The diagnostic evaluation was undertaken to identify generic guide signing deficiencies and consider possible remedies.

A statewide telephone survey of motorists was undertaken also. This random survey of motorists within telephone households throughout Texas was conducted to yield a more representative overview of motorists' opinions of freeway guide signs in urban areas and to assess the accuracy of the findings of the diagnostic evaluation.

To confirm the results of the diagnostic evaluation and the telephone survey and to assess the viability of some suggestions for possible guide sign improvements, another study was conducted. This study consisted of a presentation of stylized drawings of guide signs followed by questions concerning appropriate route and lane selection to reach specified destinations. This study was conducted at the Houston Auto Show using volunteer drivers.

Results

- 0 The critical incident approach yielded 654 incidents, which produced 393 potential problem locations and elicited 870 comments. Forty-one percent of the comments were either favorable statements about Texas highways, or reports of never having been lost or confused. Three percent of the motorist respondents had negative comments.
- 0 A detailed examination of a sample of 219 driver complaints concluded that the most common complaints were:
 - 1. The driver could not find needed information;
 - 2. The information came too close to the exit for the driver to change lanes;

3. The information was misleading regarding which lanes to be in;
 4. Unexpected geometric configurations, such as left exits, were not always preceded by advanced signs and lane assignments;
 5. Signs did not always convey a change in the facility name or route number;
 6. Sign format and information layout were sometimes inconsistent.
- 0 Eighty-two sites were analyzed in the diagnostic evaluation. This analysis revealed 93 deficiencies at 71 sites. Lane assignment and lack of advanced information for lane assignment dominated the deficiencies noted. Over one-third (35.4%) of the problems were directly identified as lane assignment problems. Further, geometric features associated with problem locations indicated that lane assignment was the problem issue.
- 0 The statewide telephone survey indicated that the guide sign system in Texas is effective as far as most drivers are concerned. When asked, the majority of drivers expressed a sense of confidence in the overall system. However, 55% admitted that they had at least one experience in which they had been lost, confused, or misdirected in a Texas city. In general, the results of the survey supported the diagnosis of lane assignment and advanced information deficiencies.
- 0 The results of the study conducted at the Houston Auto Show substantiated previous study findings regarding specific information deficiencies pertaining to lane assignment and advance information for routes and exits. Several of the remediation alternatives tested resulted in a measurable improvement in conveying information to the motorists surveyed.

The information described in this executive summary is reported in Research Report 957-1.