

OVERHEAD SIGNING AND TRAFFIC OPERATIONS

By

S. N. Van Winkle
and
H. H. Bartel, Jr.

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OVERHEAD SIGNING AND TRAFFIC OPERATIONS

INTRODUCTION

The effect of signing on vehicle operation is of major importance on complex high-speed roadways. Signing is one of the carefully considered features in roadway design. An important problem is signing existing facilities to enable traffic using them to operate safely and efficiently.

Before large sums of money are spent to improve a roadway, it should be determined if the changes proposed are likely to improve the operation of the facility. One factor in the service provided by a roadway is uniform speed. Another factor is the over-all average speed. Increasing speed within the design limits of the roadway contributes to a higher level of service.

Little research of this type has been reported in the literature, therefore the Texas Transportation Institute partially supported a study by Herbert H. Bartel, Jr. to measure changes in operations at a major arterial intersection resulting from the use of overhead illuminated and unlit guide signs.

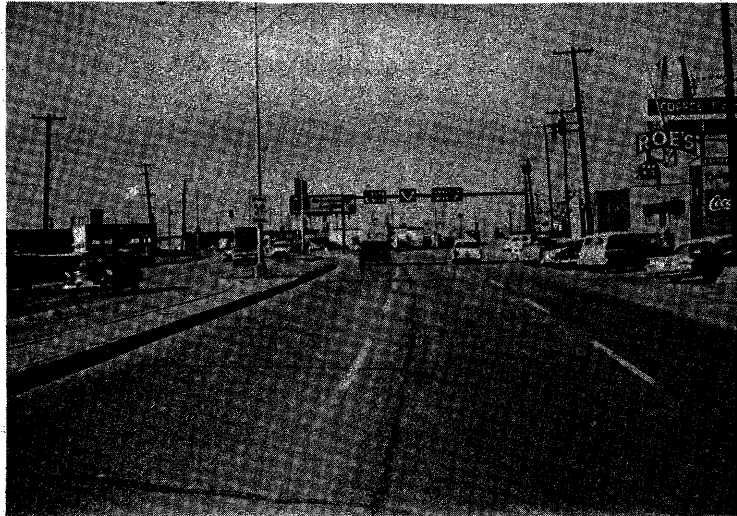
THE STUDY

The study of overhead signing and traffic operations was conducted at the intersection of Irving and Industrial Boulevards in the Trinity Industrial District of Dallas. The City of Dallas installed large specially lighted overhead signs with 10-inch Stimsonite letters on green reflective Scotchlite background (Figures 1 and 2). Prior to erection of the overhead signs, traffic was directed by two small roadside signs as shown in Figure 3. It was the purpose of this study to compare the operational characteristics of traffic under the following sign conditions:

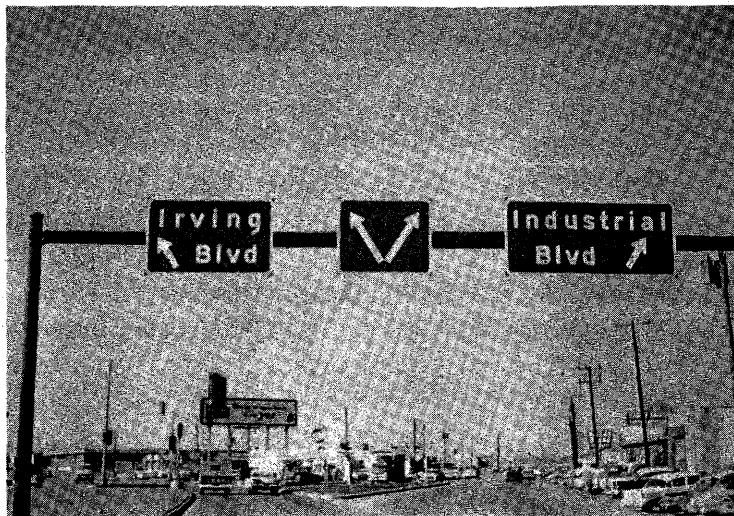
1. Small roadside signs.
2. Large overhead signs unlighted.
3. Large overhead signs lighted.

IRVING AND INDUSTRIAL BOULEVARDS
DALLAS

As Seen by Driver



Beginning of Test Site



Under Overhead Signs
Prior To Installation of Lights

FIGURE 1

IRVING AND INDUSTRIAL BOULEVARDS
DALLAS

Overhead Signs Showing Attached
Fluorescent Lights

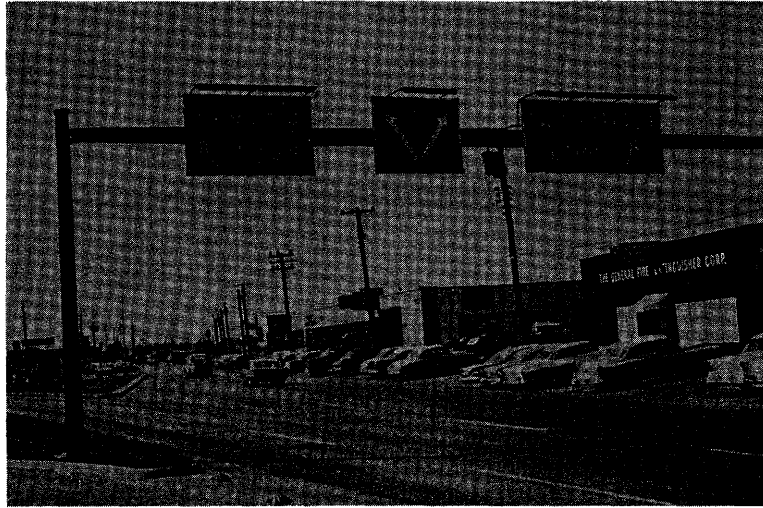
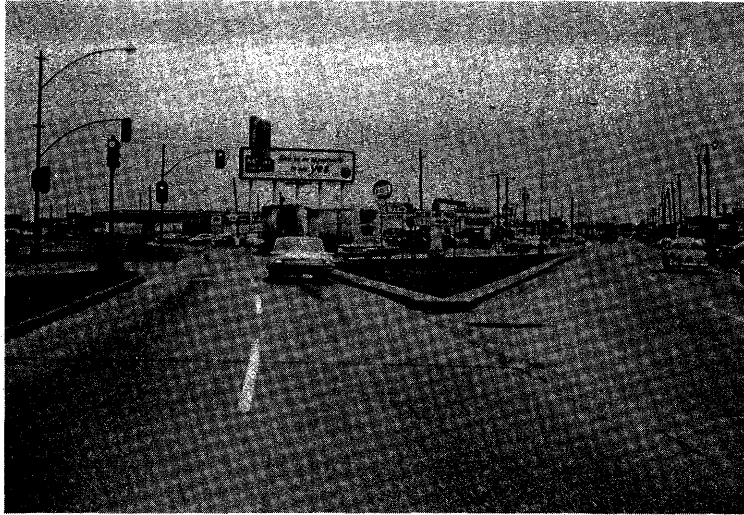


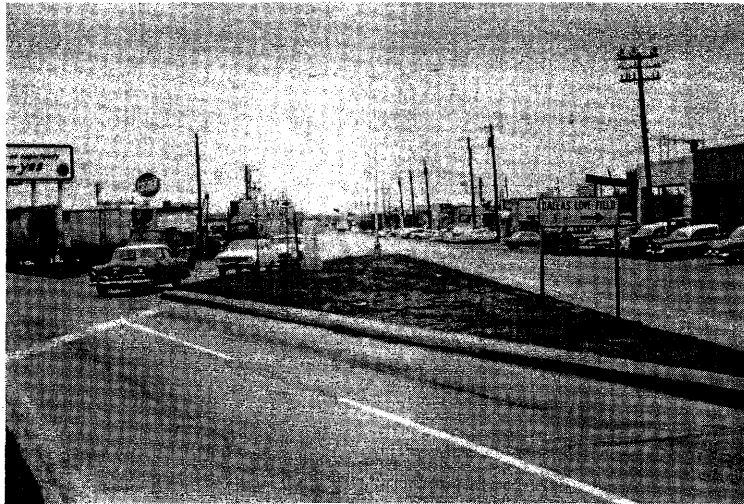
FIGURE 2

IRVING AND INDUSTRIAL BOULEVARDS
DALLAS

As Seen by Driver



Approach to Nose and Small Signs



Small Signs Detail

FIGURE 3

The operational characteristics studied were the over-all average speed of the vehicles and the variation in speed as a vehicle passes through the intersection to Industrial Boulevard.

The speed of the vehicles was determined from motion pictures taken at ten frames per second from the top of a tower truck located in the island of the intersection. Twelve transverse lines were established at a spacing of 44 feet. These twelve lines delineated eleven zones through the roadway and it is the variation in these zone speeds that indicates the driver's uncertainty in operating his vehicle. The study was conducted at night so that the illumination effect on the overhead signs could be studied. Figure 4 shows the details of the study area.

No attempt was made to separate the local drivers from the nonlocal drivers since the required filming technique for speeds did not permit the flexibility of recording license plates which could be used to locate the county wherein the vehicle was registered. It was also felt that the license plate method would not produce the desired results because of migration.

RESULTS

The study interval for each of the two nights displays a reasonably uniform traffic flow with no noticeable difference in volume, see Table 1.

The Thursday data, using the large signs lighted, gave an opportunity for observing whether or not time of transit of the intersection has any bearing on vehicle speed. There was no statistical evidence of an association between average speed and time of transit. The Friday data exhibited no significant variation in average speed resulting from the imposition of these different sign conditions, see Table 2. The evidence presented indicates no change in the level of service due to variations in average speed induced by the three sign conditions tested.

Speed Variation Through Intersections

The acceleration and deceleration of a vehicle travelling through an intersection should be minimized. Such speed variations are indicative of driver uncertainty and may be associated with higher accident risks at intersections. For this reason the variation in speed was observed as a measure of the effect of different sign conditions on driver uncertainty.

The analysis of variance procedure was employed to examine the variation between zones (differences in average speeds observed for the eleven zones) and the variation between drivers within zones; for each of the three sign conditions. If sign condition had no influence upon driver variation then one

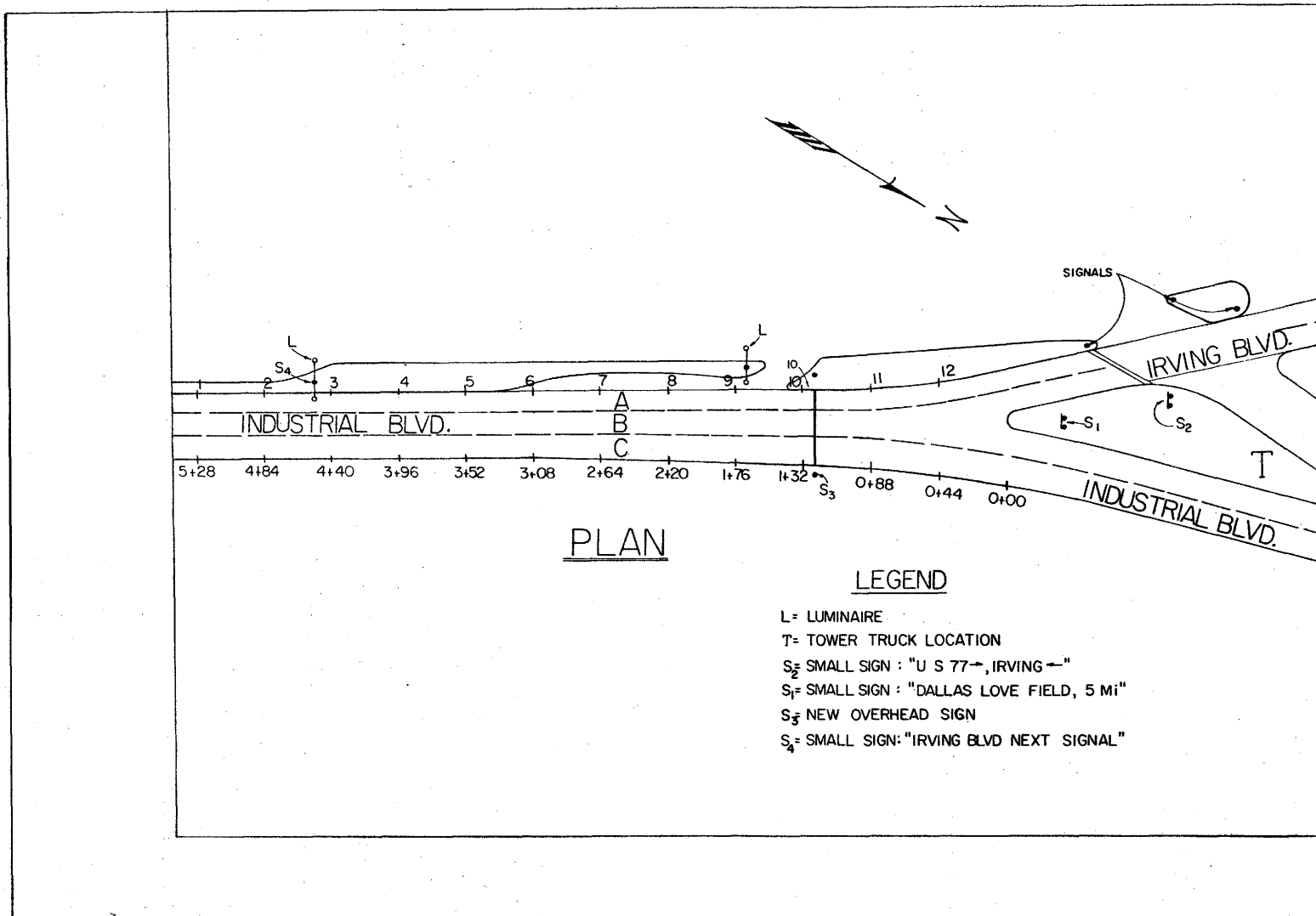


FIGURE 4

TABLE 1

Time, Traffic Volumes, and Vehicles Observed Under Three Sign Conditions

SIGNS	DATE 1961	TIME PM	VEHICLES	VEHICLES STUDIED
Small	Friday April 28	7:45-8:12	139	98
Large Lighted	Thursday April 27	7:45-8:12	112	72
Large Unlighted	Friday April 28	8:12-8:39	116	83
Large Lighted	Thursday April 27	8:12-8:39	112	72
Large Lighted	Friday April 28	8:39-9:05	102	63
Large Lighted	Thursday April 27	8:39-9:05	105	62

TABLE 2

A Summary of Mean Speeds for Time Periods and/or Sign Conditions

Time Period P. M.	<u>Thursday, April 27, 1961</u>		<u>Friday, April 28, 1961</u>	
	Sign Condition	Average Speed mph	Sign Condition	Average Speed mph
7:45-8:12	OL	33.2	SR	32.0
8:12-8:39	OL	31.3	ONL	31.5
8:39-9:05	OL	31.4	OL	31.6

SR - small roadside, ONL - overhead not lighted, OL - overhead lighted

would expect the ratio of the measures of variation to approach one. Only one significant departure from this ratio was noted; when the small roadside sign was in use. The mean zone speeds for this sign condition are presented in Table 3. The significance is largely attributed to the approximately straight-line reduction in speed as the drivers approached the intersection, this reduction accounting for 84 percent of the variation between zones.

The use of overhead signs, lighted or unlighted, resulted in no significant changes in speed as vehicles approached the intersection. This is presumably associated with better sign visibility.

TABLE 3

Mean Zone Speeds With a Small Roadside Sign in Use

Zone	11	10	9	8	7	6	5	4	3	2	1
Mean Speed, mph	28.9	30.2	31.3	31.8	32.3	32.1	32.5	33.1	33.1	33.0	33.5

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Note: Zone 1 is farthest from the intersection.

CONCLUSIONS

1. At the study site selected there was no significant change in the average speed of traffic resulting from changing the signing from roadside signs to overhead lighted and unlighted signs.
2. Drivers using the intersection when the small roadside signs were installed had a significant speed variation through the area. The large overhead sign under both lighted and unlighted conditions produced no significant speed variation. On this basis the large overhead signs replacing the small roadside signs have definitely improved the level of service at the intersection.
3. There is no evidence, in terms of mean speed or variation in approach speed, to indicate that there was an additional benefit resulting from the use of illumination with the overhead sign.

PUBLICATIONS

Project 2-8-57-5 Intersection Illumination

1. Research Report 5-1, "Roadside Sign Legibility and Roadway Illumination" by Donald E. Cleveland.
2. Research Report 5-2, "Lighting Studies at the Texas City Wye" by D. M. Finch.
3. Research Report 5-3, "Rural Intersection Illumination and Driver Tension Responses" by Donald E. Cleveland and Weldon C. Franklin.
4. Research Report 5-4, "Overhead Signing and Traffic Operations" by S. N. Van Winkle and H. H. Bartel, Jr.