S2629-A

Mr. Conner

# The Manual on Uniform Traffic Control Devices

Paper by

H. E. Hilts, Deputy Commissioner
Public Roads Administration

18th Annual Meeting
Institute of Traffic Engineers
Detroit, Michigan
October 2, 1947

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Under the subheading "Laws and Ordinances," the conference recommends that there be uniformity in traffic signs, signals and markings in conformity with the "Manual on Uniform Traffic Control Devices," and that this uniformity be attained by cooperative action of local, State, and Federal street and highway authorities.

Under the subheading "Engineering," the conference recommends the application of modern planning and engineering techniques through the establishment by all States and cities of properly staffed divisions or departments having the authority and facilities needed to perform these functions, and the utilization of factual data on traffic operations in the design of new roadways and as the basis for other improvements, such as channelization, one-way street routing, loading islands, the identification and elimination of special hazards, and the provision of off-street parking facilities.

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The new manual introduces an "Advisory Speed" sign, a square yellow plate that may be mounted below any standard warning sign, suggesting a suitable speed through the area. Such signs have been successfully used in many States.

The "rounded" lettering for highway signs, approved by all the sponsoring agencies in 1945, is specified for all signs. Tests of these letters made by the Ohio Department of Highways and the Public Roads Administration have shown them to be more legible than the former more angular letters.

In the new manual considerable emphasis is given to the size of signs. The size recommended for the standard stop sign has been increased from 24 inches to 30 inches. Destination signs on major roads should have lettering at least 6 inches in height. For most of the standard signs the old minimum dimensions remain unchanged, but alternate oversize designs are provided for many of them and the use of special enlarged signs is recommended wherever effectiveness is required.

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Past Developments

The original manual was prepared by a joint committee of seven members representing the American Association of State Highway Officials and eight members representing the National Conference on Street and Highway Safety, appointed in 1931. The work of this joint committee resulted in the publication in 1935 of the original manual, to which were added some supplemental revisions in 1938. In 1942 the Institute of Traffic Engineers was given equal representation.

In 1942 a war edition of the manual was issued in condensed form. It included added advice and specifications needed under black-out conditions. A constant endeavor has been made to keep the manual in step with the times, and many States and cities have issued manuals based either wholly or in part on the recommendations presented in the manual.

From critical articles that have appeared from time to time in magazines, weekly publications and in the press, there appear to be valid grounds for criticism of the present nonuniformity of traffic control devices. The seriousness of the situation was verified by three experienced highway engineers who gave me their impressions on returning from trips involving 22,300 miles of travel. These were transregional and transcontinental trips. Their impressions accentuate the compelling traffic-control needs of the average long or short trip motorist.

One engineer reported an urgent need for standard signs at the end of speed zones. This absence of signs delayed and irritated him. He reported a pronounced absence of speed-limit signs at many State

lines. In many instances signs of all types were obscured by trees, others had been knocked down, apparently for a considerable time. Cardinal direction signs were needed at major rural intersections. He reported following two large wheat threshing outfits through the heart of the business district of a capital city during the noon hour. He also reported the need of a "co-pilot" to pick out directional signs through many cities, and he commented on the low visability of signs and the absence of adequate signs on detours.

Another observer back from a 6,300-mile trip through 15 States reported an irritating lack of adequate directional signs, particularly at street intersections; improper orientation which confuses travelers at intersecting streets; omission of individual route markers on multinumbered routes, and inadequate indication of direction in advance of route turn.

Another observer back from a 10,000-mile trip reported difficulty in following U S route markers through Y intersections, especially in urban areas; the frequent obscure and low mounting of route markers; and a decided lack of advance turn markers, as well as the irregular distances of confirming markers from intersections. He reports critical nonuniformity between States in pavement markings, both with respect to lane lines, center lines and transition lines in areas of limited sight distance on three-lane highways, on hills, and on curves. He stated that on some narrow pavements center lines were not used, and pointed out that they would have been comforting and

reassuring in night driving, particularly when meeting truck traffic. He further stated that in discussions with those responsible for erecting and maintaining signs, the indications were that inspections as to adequacy were generally made by local personnel. Night inspections convinced him that many caution and warning signs needed for safe night driving did not appear to be necessary during the day. He recommended night inspections as to further needs for conservative adequacy both as to number, reflectorization and general maintenance. He commented that while only one-third of all travel is performed at night, three out of five traffic deaths occur at night.

These comments emphasize the need for the adoption of the uniform standards recommended in the new manual, and for the use of the proper devices on all new highway construction and road replacements.

The Work of the Committee

The committee carefully considered and acted on needs as they have developed in the field of traffic engineering since the last revision of the manual was made in 1939.

In order to give proper consideration to all present and future developments, the continuing committee work is being handled by six subcommittees respectively on Signs, Signals, Markings, Islands, Special Problems, and on Research. Activities of these subcommittees are closely correlated with the work of committees of other organizations which have a direct interest in the subjects assigned.

In revising the manual, the joint committee took full advantage

of the opportunity to improve the editorial arrangement of previous editions. In the new edition each control device, so far as is practicable, is completely dealt with in one place, with illustrations as required. All standards and specifications have been thoroughly reviewed and changed wherever necessary, in accordance with the dictates of experience and research.

A preliminary mimeographed edition of the new manual was issued under the date of January, 1947. This draft, which was approved by the committee and its sponsoring agencies, has been given wide circulation. It has been well received and, as was to be expected, has evoked some protests on particular details. These protests have been scattered and, in practically all cases, represent viewpoints that had been given prior and full consideration by the joint committee. Many excellent suggestions for editorial improvements were received and were gladly accepted.

The new manual will be printed by the Government Printing Office. At first glance, it may appear but little changed from the old. To you who are familiar with traffic control standards and techniques, a close study will disclose a major number of refinements and a considerable number of changes in basic principles.

Signs

The new manual, for example, has simplified sign messages wherever possible. "Stop Sign Ahead" becomes "Stop Ahead," thus permitting a considerable increase in letter size for the same size of sign. The "Winding Road" sign now carries a twisted arrow instead of the old

message in words. Changes of this kind are too numerous to cite in this paper.

All warning signs, with a few exceptions like the railroad crossing sign, are now diamond shaped. The old square "caution type" signs have never been clearly understood. The committee agreed upon the diamond primarily because of the definite advantage of having a distinctive and unmistakable design characteristic for all warning signs.

For large or oversize destination signs, distance signs and information signs - exclusive of route markers and their auxiliaries - a black background with white lettering may be used. Black signs have been used successfully in a number of States and cities. Legibility tests recently conducted by the Ohio Department of Highways and the Public Roads Administration showed, however, that while a black sign with white lettering has greater legibility than a black on white sign, it is not of high target value unless it is of relatively large size. The committee accordingly agreed to make the white lettering on black background optional, but only for enlarged signs of the types specified in the manual.

The "Advance Turn Marker" has been changed. Instead of an "R" or an "L" on a small shield, to be mounted beneath a standard route marker in advance of an intersection, the new manual substitutes a rectangular plate showing an arrow with its shaft extending vertically upward and then bent appropriately to right or left. This symbol gives a sense of direction. Many States have previously rejected the

"R" or "L" markers in favor of a straight horizontal arrow. The horizontal arrow should be reserved for use only where the turn is to be made. The bent arrow indicates the direction of the turn and also suggests that the turn is still a little distance ahead.

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Pavement Markings

The design of pavement markings, both as to form and color, evoked considerable discussion. Final decisions were reached only

after extended debate and two special polls of all State highway departments.

In pavement markings new specifications have been established for center lines and no-passing zone markings. The new manual specifies that the center line of a two-lane highway shall be a broken white line, and that the barrier lines may be either white or yellow, the latter being preferred.

The use of a solid longitudinal lane line on urban and rural pavements should designate mandatory single lane traffic movements, and the use of a broken line should denote acceptable weaving of traffic from lane to lane when traffic conditions warrant safety in this maneuver.

Signals

On the basis of a special survey of present practices, the "warrants" for the justification of traffic signal installations have been revised. Different vehicular and pedestrian traffic volume warrants are proposed for urban and rural areas, since experience has shown that intersection hazards vary with prevailing speeds and other conditions not directly related to traffic volume.

In the specifications for the location of traffic signals at intersections, the manual has retreated a step from strict uniformity. The advantages of far-side, near-side, mast-arm and center-suspended locations have all been sufficiently important in given situations to prevent uniform acceptance of the far right-corner standard set up in the former manual. The new manual specifies only that signals shall

be placed where they will be clearly visible, and that in urban installations there shall be two signal faces visible to traffic at each approach to the intersection. This provides assurance that at least one of the faces can be seen under almost all circumstances. It also aids pedestrian control by placing a signal face within reasonable range of the normal line of sight of persons on all crosswalks.

Considerable discussion is given to the relative merits of fixed-time and traffic-actuated signals, as to cost and efficiency. This discussion in the manual can serve as a guide in the choice of the right kind of equipment for any particular location. Except at intersections where traffic volumes remain reasonably uniform, and in coordinated systems extending over a number of intersections, it is believed that the traffic-actuated control can do a better job in keeping traffic moving with a minimum of delay.

Islands

In the new treatment of islands as traffic control devices, the former term "safety zone" becomes the more explicit term "pedestrian island." Rotary traffic islands and continuous median strips on divided roadways are regarded as elements of highway design and are no longer treated as traffic control devices. Generally speaking, the new manual does not attempt to go into any great detail on specific design standards, but it contains numerous photographs showing what has been done and pointing out what is believed to be good or bad practice. Where appropriate the manual makes specific

reference to the design policies of the American Association of State Highway Officials dealing with the design of intersections and traffic islands.

Lack of Research Data

The manual has been based largely upon the experience and opinions of experts rather than on scientific engineering or factual data. One of the major difficulties under which the joint committee has had to work has been the general lack of reliable research data.

There is a great need for more facts, particularly as to the effect of different types of traffic control devices on driver behavior. The subcommittee on research has prepared a list of urgently needed studies which, it is hoped, can be made the basis of active field investigations. With the cooperation of the Highway Research Board it should be possible to eliminate hit-and-miss duplication or competition in the selection and advancement of research projects that have a direct bearing on the subjects covered in the manual. The subcommittee on research is ready to advise with graduate students and with organizations interested in projects which will give answers to the many questions that will be developed and discussed in the continuing revision of an authoritative and practical manual.

Through these coordinated efforts, and the cooperation of the traffic operating officials of all governmental agencies and that part of industry whose business is in the traffic field, many improvements will be accomplished. When the joint committee starts work on

the next edition these new developments will form a sound basis for new recommendations.

Many programs involving uniform traffic control devices have been carried out by States and cities. Among the forward looking States Michigan has for many years taken a leading place. The studies conducted by the State Highway Department's Planning and Traffic Division in the field of operational traffic engineering represent a valuable contribution to highway transport. I understand that among other achievements the State has completed an exhaustive study of an adequate sign program for its Federal-aid systems. The completion of a study of this kind is of material importance to the Michigan highway user. Commissioner Thomas H. MacDonald of the Public Roads Administration strongly urges studies of this nature by all States, and these studies might well include all types of traffic control devices dealt with in the manual. Broad, well-planned programs based on sound operational traffic engineering studies will result in more efficient and safer use of our highways.

These projected Federal-aid programs are in the public interest, and very definitely are in accord with Section 12 of the Highway Act of 1944, which deals with uniform traffic control devices.

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