



U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
WASHINGTON, D.C. 20235

August 1, 1966

INSTRUCTIONAL MEMORANDUM 21-6-66
47-01

SUBJECT: Safety Provisions for Roadside Features and Appurtenances

In support of the President's Message of March 2, 1966, urging all Federal agencies to increase highway safety wherever possible, the Bureau of Public Roads is making a thorough review of all engineering items of the Federal-aid program.

The circular memorandum dated December 22, 1965, contained suggestions for minimizing the number and effect of collisions with sign and lighting supports, guardrails, and other roadside features. On January 22, 1964, and again on June 22, 1964, the Office of Highway Safety issued circular memoranda on safety demonstration projects with a similar emphasis. The Office of Engineering and Operations prepared and distributed a circular memorandum on November 29, 1963, on "Grade Separations, Economy, Aesthetics and Safety."

These memoranda are sound guides for action but the factors affecting safety in design and operation are sufficiently complex to warrant still further discussion on how to make them applicable to both existing and future Federal-aid projects.

As a general policy, all aspects of location, design, traffic control, drainage features, and roadside appurtenances are to be examined during all phases of the development of the PS & E beginning with the location survey, and to the maximum extent possible in the construction and post-construction stages, to insure that hazards arising from vehicles leaving the roadway out of control will receive primary consideration. Four objectives are of major importance.

The first is the provision of a roadside as clear and as safe as is feasible for any vehicle that may leave the road surface. In addition to what can be accomplished by use of flat slopes, the elimination of all unnecessary sign supports, light standards, drainage structure obstructions, and other appurtenances should be sought.

Second, where sign and lighting supports and other roadside appurtenances are necessary, they should be so located (longitudinal and lateral) as to create the least practicable hazard. Necessity for each item must be carefully evaluated against the hazard which it may create.

(more)

Third, supports and appurtenances which cannot be eliminated or relocated should be so designed as to inflict minimum damage to highway users when and if they are struck by vehicles out of control.

Fourth, where supports and appurtenances are necessarily of a design that is massive and unyielding, and these cannot be eliminated or relocated so that they are unlikely to be struck, appropriate guard-rail installations should be considered for the protection of highway users.

The following items are elaborations of the foregoing, but the review should not be limited to this list:

A. Clear roadside cross-sections and elimination of non-essential supports and appurtenances

The desired roadside is one that is clear of all non-essential obstacles (sign supports, guardrail, drainage structures, trees, utility poles, lighting standards, etc.), for at least 20 feet (preferably more) beyond the shoulder, has full-rounded ditch sections, 6:1 or flatter side slopes, and an obstacle-free area for an out of control vehicle leaving the roadway. In mountainous terrain as flat a slope as practicable is to be obtained. Such a roadside will permit many drivers to recover partial control of their vehicles and thereby minimize severe accidents. In addition, clear roadsides of this kind augment our current programs to increase the attractiveness of the highway.

The safety of the roadside area can be seriously impaired by excessive use of sign and lighting supports, guardrail, and other appurtenances. Any such items that are not essential to the direct control or protection of traffic and not required by current standards should be avoided. Such signs as MERGE (MERGING TRAFFIC), YIELD, KEEP OFF MEDIAN, NO U TURN, SPEED LIMIT __, EMERGENCY PARKING ONLY, route markers, destination and distance signs, and guide signs in the "Other guide signs series" should be used only where a true need exists and the likely hazard they create is comparatively small. The latter signs are commonly used to satisfy requests but frequently add nothing to the necessary guidance and control of traffic, while creating collision hazards.

Roadside delineation and edge lining are highly desirable as aids to night driving, and should be used in conformance with the applicable standards.

B. Placement of necessary supports and appurtenances

The lateral positioning of sign supports, light standards, guardrail, drainage facilities, trees, utility poles, and similar substantial appurtenances is particularly critical. Established standards set minimum clearances for signs from the pavement or shoulder edge, (2 ft.)

(more)

but these may and should be exceeded so long as the viewing conditions are favorable. When distances greater than 12 feet, as provided in the MUTCD are involved, special attention to angle of viewing and other criteria need study. A greater clearance reduces the possibility of vehicles striking roadside objects.

Wherever practicable, guide signs should be mounted on existing overcrossing structures to eliminate the hazard of a support adjacent to the shoulder. This practice will frequently provide a better positioning of the sign for traffic guidance. Due attention should be given to sign composition and the amount of sign copy so that the sign depth will not be excessive. When it is not possible to locate signs on structures over the roadway, they can often be placed in protected positions on top of or just beyond bridge rails or behind essential guardrail. Obstructive sign supports should not be located in a gore or other likely path of a vehicle.

Placement of highway lighting standards also should be adjusted in a similar way. Study also should be given to the design of lighting systems with a greater mounting height of luminaires and longer mast arms, so that there will be fewer units and the light standards themselves can be placed farther away from the roadway.

Conditions will often permit guide signs to be placed back of the ditch line with a single post and horizontal cantilever support which can provide ample clearance from the outer edge of shoulder to the support, so long as the viewing conditions are otherwise favorable.

More thought should be given to the advantages of developing designs for cable supports for luminaires or even for large guide signs. Cable supports and anchorages might be aesthetically designed and placed well back of the ditch line or at the top of the slope on depressed sections.

Careful attention must be given to placement of drainage structures such as headwalls adjacent to roadway and median drains. The extension, elimination or adequate protection thereof are necessary. Slopes on cross drains, intercepting ditches are likewise a hazard. Utility poles are to be placed at the right-of-way line or eliminated where possible.

C. Design of supports and protection for out-of-control vehicles

When it is necessary to locate sign supports or lighting standards adjacent to the shoulder a breakaway or a yielding support should be used. Pending the development of generally accepted criteria on breakaway sign supports, a preliminary design for sign supports developed jointly by the Texas Highway Department and Texas A & M University will be accepted if the States so request. Design and installation details can be obtained from the Washington office.

(more)

Experimentation with other breakaway designs based on new ideas is encouraged. Approval of their installation will be in accord with PFM 60-2 and PFM 60-2(1).

When lighting standards are closely adjacent to the curb or shoulder edge, consideration must be given to the use of a breakaway design, frangible base, or other designs. This is an area in which more research is needed to develop more adequate designs for safety purposes.

Consideration should be given to the use of all kinds of materials of special designs that can be fabricated for sign and lighting supports. Frangible materials that might be used could include aluminum, plastic, glass, new metals, and others which have characteristics tending to reduce the severity of a collision.

Signs which are about 30 square feet in area, such as the EXIT signs for the Interstate System, can be supported on small or notched wood posts or other material that will yield upon impact.

The top of gravity footings to support signs and other roadside obstacles should never extend above the ground level.

Sign support design requirements can be reduced through decreases in sign area so long as the needed legend and arrangement is not adversely affected. Wind loadings can also be very substantially reduced by using an open face (louvered or expanded metal) design. This idea needs further study and experimentation. Careful study should be given to AASHO design criteria, and minimum values used for structural requirements, wherever possible to do so compatible with overall safety considerations.

The design requirements for sign supports are presently covered by the AASHO "Specifications for the Design and Construction of Structural Supports for Highway Signs." These criteria were developed for large guide signs, ground mounted and overhead, and are too severe for the small regulatory and marker signs. Wind pressures in Table I of the Specifications cited are based on a minimum height of 15 feet to 30 feet above general ground level. Since smaller signs and some guide signs are often mounted considerably below this level the more demanding design criteria should not be applied.

D. Provision of protective guardrail

Where it is not possible to eliminate a support or light standard, or other possible roadside hazard, or to use a breakaway or energy-absorbing design, or to locate a sign or luminaire on a highway overcrossing structure or away from the shoulder, or in a position protected by essential guardrail or bridge rails, a suitable length and design of guardrail should be installed on the side or sides

(more)

adjacent to traffic. The criteria stated in HRB Special Report 81 should be followed. A 75-foot guardrail segment in advance of a support or other obstacle near the road edge, and a 25-foot segment beyond (if not anchored) should normally be used. All exposed leading ends of guardrail should be flared and anchored to the ground, or have an equivalent end design which will lessen the hazard created by the guardrail ends themselves.

Application to existing and future Federal-aid projects

On all new work, every PS & E shall be carefully checked prior to approval for the four areas of concern identified in Paragraphs A, B, C, and D above.

Current projects which are not completed shall be similarly examined and field changes made to conform wherever practical.

On existing sections of Federal-aid highways, the same features should be inspected and the needed corrections programed in accord with PFM 21-16.

The importance of increasing highway safety through all engineering processes which are available to us cannot be stressed too strongly. The immediate attention of all responsible Public Roads personnel is directed to prompt pursuit of these objectives.

The American Association of State Highway Officials was requested to study many of the same areas set forth in this memorandum and its Special Committee on Traffic Safety has undertaken such a program. The urgency of immediate attention to safety dictates the issuance of this Instructional Memorandum now. Additions or revisions to these instructions found to be desirable following the completion of the Special Committee's study will be made at that time.



Rex M. Whitton
Federal Highway Administrator