

Survey of State Utility Manual Clear Zone Provisions

DANIEL S. TURNER, JAMES V. WALTERS, JOHNNY M. HUTT, AND
JOSEPH E. PATRICK

This paper outlines the development of the clear zone philosophy, its application to utility offices of state highway agencies, and the findings of a survey of state highway agency utility manuals. A summary is also provided of the many standards and guidelines (prepared by AASHTO, FHWA, and other authoritative bodies) that impact individual utilities in the clear zone.

States have pursued widely divergent paths in developing their independent clear zone policies. Forty state utility manuals were reviewed to assess this divergency, and summaries of each state's policies were prepared in tabular and discussion form. Although there were many differences, several concepts and terms were found to be common in many manuals. Examples included the use of terms such as "as near to the right-of-way as practical," and varying lateral clearances based on (a) the presence of curb and gutter, (b) urban/rural locations, and (c) speed limit differences.

Greater standardization is needed, and a national conference focused on the clear zone could initiate this standardization. At the same time, a training course could be prepared and widely disseminated to increase both understanding and uniformity. The *AASHTO Roadside Design Guide* (in preparation) was identified as the document that will probably be the most influential in future clear zone policy formulation.

The clear zone is the roadside area that has been made as flat, wide, and free of obstructions as practical to allow errant vehicles a chance to recover without having an accident. State highway agency utility offices must include clear zone considerations when establishing policies for accommodation of utilities.

There are divergent points of view on the effectiveness of the roadside clear zone. There is also evidence that the issue is not well understood by users. Consequently, state transportation agencies use divergent criteria in their utility clear zone policies. This paper examines the amount of divergency and discusses the possible explanations.

SAFETY EFFECTIVENESS

A wide, flat shoulder and recovery area provides a safer roadway than former highway design concepts. The exact degree of safety and the price of obtaining this safety through clear roadside treatment is not as obvious.

At least two documents offer an estimate of the effectiveness of the clear zone. *NCHRP Report 247 (1)* documents the effects of roadside safety treatments. It compares three types of roadways:

1. Reasonably full safety treatment and 6:1 side slopes,
2. Partial clear zones and 4:1 side slopes, and
3. Nonclear zone roadways.

The analysis indicated that accident rates were significantly tied to clear zone treatments. For single-vehicle off-road accidents on two-lane roads, rates of 0.254, 0.403, and 0.680 accidents/million vehicle miles were found for the three types of roads. A methodology was prepared that can be used to examine the cost/benefit ratio of adopting the clear zone.

A report prepared for Congress (2) examined the safety effects of many geometric roadway features. This report indicated a strong correlation between accidents and the width of the clear zone. Estimates also were prepared for cost per accident prevented.

LIABILITY

Highway agencies have experienced a dramatic proliferation of liability suits that usually allege negligence in construction or maintenance of the roadway. The clear zone is an area of considerable liability because a large percentage of fatal and severe injury accidents occur from vehicles striking obstacles off the roadway.

PURPOSE OF THIS PAPER

Increased safety for the motoring public and decreased legal liability are two reasons why highway agencies and utility owners should be interested in adhering to clear zone principles. This paper provides a review of the applicable standards, a summary of the current clear zone practices by the states, and recommendations for future actions to promote uniformity. Several of the more difficult clear zone issues for utilities are identified and reviewed as the first step in the search for solutions. Perhaps the most important contribution of this paper is its attempt to focus attention upon existing problem areas in the implementation of the clear zone concept.

HISTORY OF THE CLEAR ZONE

The concept of a roadside clear zone emerged in a 1967 AASHTO report. The report was referred to as the "Yellow Book" (3) and stated "For adequate safety, it is desirable to provide an unencumbered recovery area up to 30 ft from the edge of the

Civil Engineering Department, The University of Alabama, Tuscaloosa, Ala. 35487-0205.

traveled way; studies have shown that 80 percent of the vehicles in run-off-road accidents did not travel beyond this limit.”

As state highway agencies began to implement the clear zone concept, it became apparent that 30 ft was not wide enough for some situations (such as the outside of horizontal curves on high fill slopes) and too wide in other instances (low speed, low volume, urban streets). Through subsequent research, the clear zone concept was modified to represent local conditions of traffic and geometry more accurately. Unfortunately, no single organization or agency took the lead; many organizations developed independent concepts of the clear zone, and various standards were developed for different types of obstacles in the zone. As a result, utility entities faced a bewildering situation—as new concepts evolved, standards and guidelines changed rapidly and emerged on several fronts simultaneously, sometimes even conflicting with each other.

APPLICABLE STANDARDS AND GUIDELINES

A brief review of several pertinent standards and guidelines may be found in the following paragraphs. This is not a complete list, but it illustrates the types of documents that influence or control the clear zone policies of state utility agencies.

U.S. Department of Transportation Documents

The policies that most directly affect state utility agencies and utility owners are those of FHWA. Restrictions in these documents must be met if utilities are to occupy right-of-way on federal-aid highways, and if the agencies or owners are to be reimbursed for relocating utilities.

23 CFR 645

The *Code of Federal Regulations* (CFR) (4), Title 23, Sections 645.201 through 645.215, describes rules and regulations governing accommodation of utilities. These serve as the framework from which FHWA prepares its own rules (which repeat and amplify the CFR rules).

FHPM 6-6-3-2

FHWA's rules governing the location of utilities within the roadside clear zone may be found in the *Federal-Aid Highway Program Manual* (FHPM) (5). The FHPM repeats two pertinent definitions from the CFR:

1. Clear Recovery Area—that portion of the roadside, within the highway right-of-way as established by the highway agency, free of nontraversable hazards and fixed objects. The purpose of such areas is to provide drivers of errant vehicles which leave the traveled portion of the roadway a reasonable opportunity to stop safely or otherwise regain control of the vehicle. The clear recovery area may vary with the type of highway, terrain traversed, and road geometric and operating conditions. The American Association of State Highway and Transportation Officials (AASHTO), *Guide for Selecting, Locating, and Designing Traffic Barriers*, 1977, should be used as a guide for establishing clear recovery areas for various types of highways and operating conditions.

2. Clear Roadside Policy—that policy employed by a highway agency to provide a clear recovery area in order to increase safety, improve traffic operations, and enhance the aesthetic quality of highways by designing, constructing, and maintaining highway roadsides as wide, flat, and rounded as practical and as free as practical from natural or manufactured hazards such as trees, drainage structures, nonyielding sign supports, highway lighting supports, and utility poles and other ground-mounted structures. The policy should address the removal of roadside obstacles which are likely to be associated with accident or injury to the highway user, or when such obstacles are essential, the policy should provide for appropriate countermeasures to reduce hazards. Countermeasures include placing utility facilities at locations which protect out-of-control vehicles, using breakaway features, using impact attenuation devices, or shielding. In all cases full consideration shall be given to sound engineering principles and economic factors.

The FHPM indicates that clear recovery area varies with local conditions, and the AASHTO Barrier Guide (6) is designated as the way to establish clear zone widths. The FHPM calls for removal or treatment of roadside obstacles, and utility poles are specifically covered by the policy.

Paragraph 7 of the FHPM indicates that the adequacy of utility accommodation policies will be measured against the AASHTO Barrier Guide and the AASHTO Accommodation Guide (7). This paragraph requires that state policies must not impair traffic safety, must give consideration to the effect of utility installations on safety, and that “the horizontal and vertical location requirements and clearances for the various types of utilities must be clearly stated. These must be adequate to ensure compliance with the clear roadside policies for the particular highway involved.” Thus, the FHPM relies heavily upon AASHTO publications, especially the Barrier Guide.

FHWA Program Guide

The FHWA Program Guide (8) supplies comments, background information, and explanations for the states' use in applying the FHPM. The Program Guide indicates that the clear recovery area should be viewed as an essential and intrinsic design feature of a highway project, and the clear zone widths should be evaluated in the same manner.

The Program Guide repeats that new, above-ground utility installations should be placed as far from the travel way as possible, preferably along the right-of-way line. No such installation should be within the clear zone, except in special situations where appropriate countermeasures are used to reduce hazards.

The Program Guide does not establish specific widths of clear recovery areas. It calls for each state highway agency to establish its own procedures, and for use of the AASHTO Barrier Guide and the AASHTO Green Book (9) for these purposes.

AASHTO Publications

AASHTO has adopted a series of manuals, guides, and standards dealing with various features of highway design, operation, and maintenance. These documents are generally regarded as authoritative and are frequently adopted by FHWA and, thus, state transportation agencies, as the basis for operations.

AASHTO Accommodation Guide

In 1981, AASHTO published *A Guide for Accommodating Utilities Within the Highway Right-of-Way* (7). This document contains definitions and statements that affect the location of utilities within the clear zone. Sample statements regarding general location of utilities include the following:

- Longitudinal installations should be located on uniform alignment as near as practicable to the right-of-way line so as to provide a safe environment for traffic operation and preserve space for future highway improvements or other utility installations.

- The horizontal and vertical location of utility lines within the highway right-of-way limits should conform with the clear zone policies applicable for the system, type of highway, and specific conditions for the particular highway section involved. The location of above-ground utility facilities should be consistent with the clearances applicable to all roadside obstacles for the type of highway involved.

- In all cases full consideration should be given to the measures, reflecting sound engineering principles and economic factors, necessary to preserve and protect the safety of highway traffic, its maintenance efficiency, and the integrity and visual quality of the highway.

- Location of utility installations on urban streets with closely abutting improvements are special cases which must be resolved in a manner consistent with the prevailing limitations and conditions.

The booklet also gives general lateral clearance information for specific types of utilities. One example is that for overhead power and communication lines, poles and guy wires should not be located in a highway median but outside the clear zone.

Policy for Freeway Utilities

This simple, seven-page booklet (10) establishes a general policy of not allowing new utility installations within the control-of-access lines of any freeway except under special, controlled conditions. Utilities already existing at the time this document was adopted were allowed to continue in place as long as they did not adversely affect the safety, design, construction, operation, maintenance, or stability of the freeway. This booklet contains specific guidance for utilities crossing freeways, contained in vehicular tunnels, or otherwise affecting freeway facilities.

AASHTO Barrier Guide

The *Guide for Selecting, Locating and Designing Traffic Barriers* (6) was issued in 1977 and provided major emphasis on the clear zone. It synthesized a large amount of research and for the first time presented detailed criteria for selecting appropriate safety treatments within the clear zone. The height of fill embankments, horizontal curves, vehicular speeds, and other factors were shown to affect the width of the roadside recovery area.

The significance of the Barrier Guide is profound. It provided tables, charts, and formulas for specific evaluations of

specific circumstances and contained example calculations of hypothetical roadside situations. This material provided a giant first step for local individuals who were concerned about certain obstacles at particular locations on their highways.

The Barrier Guide clearly stated that it was a significant change from previous guidelines and that strict adherence to its criteria might be impractical in many situations, due to limited right-of-way or other restricted conditions. The examples and problems contained statements such as "this problem calls for the exercise of additional judgment . . . in the absence of accident experience, a barrier probably should not be installed"; "however, barrier would probably not be warranted if backslope surface is smooth . . ."; and "barrier not warranted by standard criteria; however, a playground near a high speed facility may need to be shielded. Need must be based on judgment. A driveway represents special problems."

Obviously, the authors of the Barrier Guide recognized the profound effect it would have on the highway industry. At the same time, they wished to make clear that they were not issuing rigid criteria that must always be followed. Their work was a guide (by far the best criteria available at the time it was published), and it was to be interpreted and applied with a generous dose of sound engineering judgment.

Barrier Guide Supplement

In 1980, the Texas Transportation Institute (TTI) developed *A Supplement to A Guide for Selecting, Designing and Locating Traffic Barriers* (11), under contract to FHWA. This document contained errata from and amplification for material found in the 1977 Barrier Guide. Of primary interest to the utility industry are the tables that show expansion or contraction of clear zone widths for various speeds and side slopes. For example, at low speed (below 40 mph) and low volume (under 250 veh/day), the clear zone might be as small as 10 ft. For high speeds, high volumes, and steep side slopes, the clear zone might extend to over 100 ft.

AASHTO Purple Book

AASHTO prepared guidance specifically for federal aid resurfacing, restoration, and rehabilitation (RRR) projects (12). This document, published in 1977, was called the "Purple Book." It contained the same type of clear zone information as the Barrier Guide; however, it provided for more exceptions. This document was the subject of controversy almost from the time of its conception. Safety organizations were critical of its relaxed standards and guidelines, and it did not achieve the universally accepted status of almost all other AASHTO publications.

AASHTO Green Book

When AASHTO published *A Policy on Geometric Design of Highways and Streets* (9), known as the "Green Book," it increased the emphasis on safety. Design criteria and guidelines reflected straighter, flatter, wider roadways with more clear recovery area and greater built-in factors of safety. Significant portions were devoted to the clear zone and particular

statements were made on utilities: "longitudinal utility installations should be located on uniform alignment as near as practical to the right-of-way line." Throughout the Green Book, criteria were given for lateral clearances to various obstacles (see Table 1). The horizontal clearances in the table vary with the type of roadway, speed, etc. The Green Book relied heavily on the AASHTO Barrier Guide to determine lateral clearances at each local site.

The general criteria shown in Table 1 serve as a useful set of guidelines for utility agencies. However, these general criteria normally yield to more specific criteria of other guidelines and standards, especially when the specific measures are more restrictive.

Roadside Design Guide

AASHTO is now preparing a guide to give comprehensive treatment to objects located in the clear zone. Draft versions of the *Roadside Design Guide* (13) have already been reviewed

by certain groups and agencies. This comprehensive document will support several other AASHTO publications and will replace the Barrier Guide. This document will undoubtedly have a strong future impact on utilities located in the clear zone.

The guide will continue the variable-width clear zone emphasis based on traffic volumes, speeds, and roadside geometry. It will also state that tables and figures by themselves provide only general approximations of the clear zone. The designer must consider site-specific conditions, speed, the rural-urban nature of the site, practicality, and other considerations to choose a lateral clearance. The guide will provide a dimension that is the approximate center of a range to be explored, not a precise distance to be held as the absolute clear zone width.

The guide will attempt to synthesize the material contained in several previous AASHTO documents and to present a single approach to the clear zone that is harmonious with the guidance in other AASHTO publications (such as the accommodation guide).

TABLE 1 SELECTED HORIZONTAL CLEARANCES FROM AASHTO GREEN BOOK (7)

Type Facility	Horizontal Clearance	References In AASHTO Green Book
1. Fixed Objects or Non Traversable Slopes in the Clear Zone	Design table & charts in "AASHTO Guide for Selecting, Locating and Designing Traffic Barriers" (4), where feasible	(7), page 539
2. Freeways, Rural Arterials, & High Speed Rural Collectors	Zone width related to speed, embankment slope and curvature. See Reference (4) for design details	(7), page 371
3. Low-Speed Rural Collectors & Rural Local Roads	10' minimum	(7), page 371
4. Urban Arterials, Collectors & Local Streets:		
A. <u>With Curb</u>	Minimum of 1.5' behind face of curb	(7), page 371
B. <u>No Curb</u> , but Paved Shoulder	Use commensurate rural clearances	(7), page 371
5. Urban Arterials, Curbed Streets	Minimum of 1.5' behind curb 3.0' desirable (particularly near turning radii)	(7), pages 577-8
6. Rural Collector, with Design Speed of:		
A. At or Below 40 mph	Minimum of 10' from edge of through-traffic lane	(7), page 516
B. At or Above 50 mph	Full treatment of Reference (4)	(7), page 517
C. Between 40 & 50 mph	"B" conditions desirable, "A" conditions permissible under some circumstances	(7), page 517

Other Standards

State and Local Standards

Each state highway agency has been required to develop its own utility manual, including a treatment of the clear zone. There is a great deal of variance from state to state. Some states duplicate the wording in the AASHTO Utility Guide and offer nothing else. Some supplemented this with additional information, while others developed their own independent clear zone philosophy. The common denominator is that FHWA had to review and approve each state's utility manual and, thus, some degree of uniformity was assured. However, there exists differing clear zone criteria from state to state.

TRB Special Report 214

In 1987, at the request of Congress, TRB analyzed and published criteria for safe roads (2). Its recommendations should carry substantial weight because

1. The purpose of the document was to cut across all existing publications including guidelines and standards,
2. It was prepared at the request of Congress, and
3. It was prepared by an independent authoritative body.

The report notes that removal or relocation of isolated roadside obstacles such as trees and utility poles can be highly cost effective, even on low-volume roads. It further states that the safety cost effectiveness of removing a roadside obstacle depends on the distance of the obstacle from the roadway edge, the presence of other obstacles nearby, the steepness of side slopes on which the obstacle is located, and traffic volumes. The report indicates that the clear zone effectively reduces accidents up to 20 ft from the edge of the shoulder and provides cost-effectiveness examples for two-lane roads (see Figures 1 and 2).

Summary of Standards and Guidelines

A few of the documents that affect the presence of utilities within the roadside clear zone have been presented, but the list is not all inclusive; rather a few of the most prominent documents have been discussed as illustrations. Although these documents are generally supportive of each other, their treatment of the clear zone is not identical.

An illustration of the perils associated with multiple standards can be found in Table 2. The data in the table illustrate the **confusing** and occasionally **conflicting** information that must be used by utility entities when locating their physical plant within the right-of-way. Three national documents and three Florida Department of Transportation documents have been grouped for comparative purposes. Six publications give the minimum lateral clearance for 50 mph as 2/10, 18, 20, 30/14, 10, and 30 ft. There are six possible values (from 2 to 30 ft) taken from six books. An obvious dilemma exists in choosing which of these values is the most appropriate. Should utilities that are relocated as part of a RRR project be any different from utilities that are relocated as part of a new roadway construction project, or from new utilities accom-

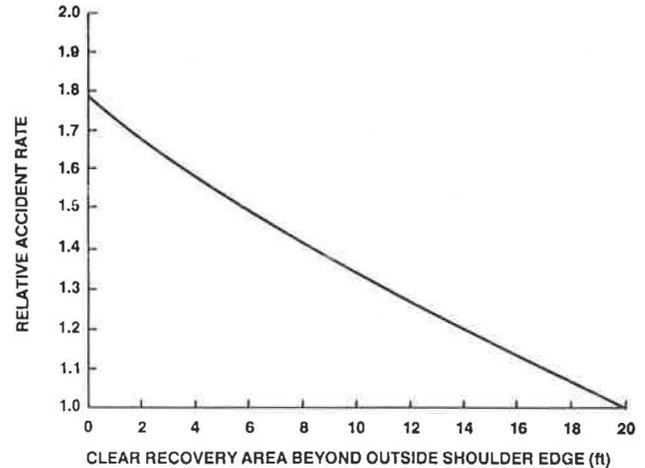


FIGURE 1 Normalized relationship between accidents and the width of the clear recovery zone (2). Accident relationship covers single-vehicle, sideswipe, and opposite-direction accidents on two-lane rural highways. Clear recovery area is measured from the outside shoulder edge to the nearest roadside obstacle or hazard. Relative accident rate is defined as a multiple of the accidents per million vehicle miles for a clear recovery area of 20 ft.

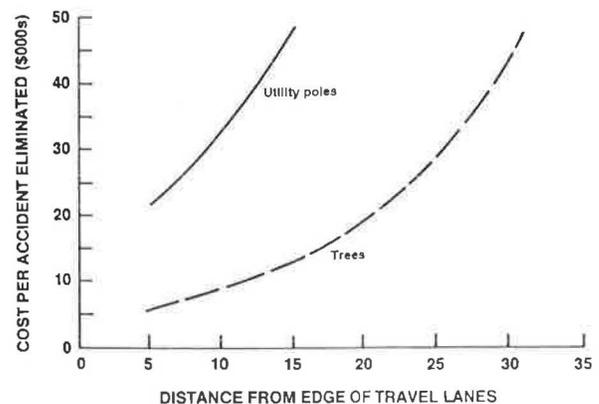


FIGURE 2 Cost effectiveness of removing isolated trees and utility poles as a function of their distance from the edge of travel lanes (2). Example assumes 2,000 ADT, and the area behind the obstacle is a 4:1 fill slope. Costs for removing isolated trees and utility poles are assumed to be \$660 and \$2,580, respectively. Costs are in 1985 dollars and were calculated using a discount rate of 7 percent and a project life of 30 years.

modated on existing right-of-way? This single example illustrates part of the complexity associated with utilities in the clear zone.

CONFUSION AND RESISTANCE TO THE CLEAR ZONE

Even though there was a widely held belief that the clear zone would yield some safety benefits, not all states rushed to embrace and implement the concept. Several of the reasons that some states were slow to take action are outlined in the following paragraphs.

TABLE 2 CONFLICTING LATERAL CLEARANCE GUIDANCE EXPERIENCED BY UTILITY ENTITIES IN FLORIDA

	3-R MANUAL		GREEN BOOK		ACCOM. GUIDE	
	AASHTO 1977 (11)	*FDOT 1977	AASHTO 1984 (9)	*FDOT 1981	AASHTO 1981 (7)	*FDOT 1979
Interstate						
Min.			20'/30'			30'
Pref.	N/A	N/A	R/W	N/A	R/W	R/W
60 MPH						
Min.	2'/10'	18'	30'	30'/14'	R/W	30'
Pref.	30'	30'	R/W	R/W		R/W
50 MPH						
Min.	2'/10'	18'	20'	30'/14'	10'	30'
Pref.	30'	30'	R/W	R/W	R/W	R/W
45 MPH C & G						
Min.	N/S	18'	1½/0	2½/4'	1½	2½/4'
Pref.		30'	R/W	R/W	R/W	R/W
45 MPH NO C & G						
Min.	2'/10'	18'	10'	14'	10'	18'
Pref.	30'	30'	R/W	R/W	R/W	R/W
40 MPH C & G						
Min.	0	2½	1½/0	2½/4'	1½	2½/4'
Pref.	30'	R/W	R/W	R/W	R/W	R/W
40 MPH NO C & G						
Min.	2'/10'	14'	10'	14'	10'	18'
Pref.	30'	20'	R/W	R/W	R/W	R/W

* Florida Department of Transportation versions of AASHTO publications.

Cost

Clear zone projects must compete for funding with other highway projects and functions. Thus, some agencies initially viewed the clear zone as a diversion of sorely needed funds that could be better used for construction or maintenance. Safety projects have always been at a disadvantage when forced to compete for funding in this manner.

Development on Several Fronts

The clear zone premise is not contained in a single book or document. Many agencies, organizations, and committees simultaneously contributed to development of the concept, which resulted in multiple guidelines. There may be as few as 10 or as many as 30 documents that influence the treatment of a single obstacle at a local site. This is bewildering to a user.

Constant Change in Standards

During the approximately 20 years of experience with the clear zone, safety research has caused improvements in the understanding of off-road accidents and how to minimize their effect. Legal issues have raised additional concerns, so, consequently, the policies have been modified several times.

Field employees grow weary of the changes in safety standards and tend to develop a "not again!" attitude. They may become reluctant to implement a new safety standard when they discover that their previous efforts are now viewed as invalid. They may become hardened and feel that the new standard will soon be replaced.

No Detailed Criteria

Even though there are many documents that contain clear zone guidance, few contain specific numerical criteria. They

use general phrases implying "full safety treatment" or some that are even more vague. Instead of a table of dimensions for various situations, the documents require the user to have a full understanding of the clear zone concept, use a series of references, perform a series of calculations, and exercise good judgment. This discourages individuals from mastering and using the concept.

Existing Facilities

One of the major points of resistance has been that there are hundreds of thousands of miles of roadways containing existing objects that are not in compliance with clear zone criteria. State transportation agencies and utility owners have been slow to embrace a concept that would drain their funds to perform corrective work on existing facilities. Although many guidelines provide some distinction between existing and new work, there is not a universal principle that allows existing facilities to meet a lower standard than new ones.

Right-of-Way Already Crowded

Some of the most difficult clear zone problems occur in urban or suburban areas where the roads are old and many utilities are already in place. The clear zone criteria do not seem to fit these sites because there is too little right-of-way and simply no location left for new utilities. Difficult decisions are required at those sites.

Liability

In the 1960s, when the clear zone concept emerged, state transportation agencies were relatively free of legal liability. However, the situation has nearly reversed since then. Suits against transportation agencies are prevalent today, usually alleging negligence in design or maintenance of a facility. The clear zone concept presents a gigantic liability for highway agencies because of the thousands of miles of existing highways that contain obstacles that do not meet the current clear zone criteria.

Clear zone law is emerging on a case-by-case basis. The opinions of the courts are sometimes confusing and contradictory, further complicating the issue and making it more difficult for transportation agencies and utility companies.

Summary

All of the reasons stated in the previous paragraphs have contributed to the reluctance to fully embrace the clear zone concept. Even among knowledgeable individuals, some degree of confusion still exists. Fortunately, there is also a strong desire to resolve the issues that hinder implementation of the clear zone, and there is considerable willingness to move forward if (a) it could be made simple to understand, and (b) it could be implemented in a universal manner so that all sites and agencies were treated in the same manner.

SURVEY OF OTHER STATES

To determine the degree of acceptance of the clear zone philosophy and the types of adopted standards, a survey of all state transportation agencies was conducted. The basis for the survey was a review of state highway agency utility manuals. Letters were written to the utility engineers in each state requesting copies of their manuals, and 41 were received. Each of these documents was carefully reviewed for statements regarding the clear zone.

LIMITATIONS OF THE STUDY

When the states provided copies of their manuals, they were not always aware of the purposes for which they would be used. It is possible that supplementary material regarding the clear zone was available but was not forwarded; thus, the review could have been conducted on incomplete data from any one state. Approximately 20 percent of the states did not respond, and the findings of this survey may have been different had complete materials been received from all states.

The following material represents the point of view of the authors, which may not reflect the philosophy of the individuals who wrote the manuals. The authors were not aware of the degree of rigor with which the states enforce their clear zone policies. It is also possible that omissions or errors have occurred in the review of the reports and preparation of this document.

In spite of the limitations associated with conducting this review, general observations and identification of trends were possible, and the findings noted in this paper should be interpreted in that light.

RESULTS OF THE SURVEY

Individual manuals were reviewed for clear zone provisions, which were normally found in two distinct areas within the utility manuals. The first location was in the general discussion of clear zone criteria. The second location was usually during the discussion of overhead power and communication lines. The research staff chose to first concentrate on general provisions where available and then to refer to the overhead power/communication provisions. To simplify the analysis, references to freeway accommodation provisions have not been included in this paper.

A general comparison of the most pertinent clear zone features from state to state can be found in Table 3. Four items are tabulated: the state name, the date of the utility manual, whether the state relied heavily on the AASHTO Accommodation Guide to describe its clear zone policy, and general comments (probably the most useful item in the table).

Minimum and Maximum Treatments

An initial observation of the table indicates very little consistency from state to state. Approaches range from the minimum effort of restating portions of the AASHTO Guide to exhaustive treatments requiring much effort. At least seven

TABLE 3 SUMMARY OF CLEAR ZONE REQUIREMENTS FROM STATE UTILITY MANUALS

State	AASHTO Date	Wording	Comments
Alabama	1976	xx	-Restate AASHTO Accommodation Guide requirements
Alaska	1986		-Alaska Administrative Code 15.171 & 181 -Urban = 2 ft behind curb -Rural = 30 ft for > 50 MPH, 20 ft for 40--50 MPH 10 ft for 30--39 MPH, 5 ft for < 30 MPH
Arkansas	1970	xx	-No single minimum dimension, but if available 30 ft commonly used as safety guide
Colorado	1987	xx	-Generally use wordings found in AASHTO Green Book -Freeways, rural arterials, high-speed rural collectors, use 1977 AASHTO Barrier Guide -Low-speed rural collectors, local rural, use 10 ft minimum clear zone -Uncurbed urban arterials, collectors & local streets, use 1.5 ft minimum behind curb -Curbed urban arterials, collectors & local streets, use commensurate rural conditions -Where accident history or safety studies show existing... hazards,...(take) corrective action
Connecticut	1977	xx	-Rural = 30 ft from edge pavement (see Arkansas), -Urban = 8 ft from shoulder or 12 ft from edge pavement or 1 ft behind sidewalk
Delaware	1977	xx	-On horizontal curves if ROW < 30 ft no installations on outside of curve -Rural = 30 ft from travelway if ROW available -Urban = as close as possible to ROW -No cable, pipes, etc., within 5 ft of pavement
Florida	1979		-Good table of clear zone dimensions - => 50 MPH = 30 ft thru lanes, 18 ft aux lanes - <= 45 MPH w/o curb = 18 ft if ROW permits, 14 ft min - <= 45 MPH with curb = 4 ft from face curb -Signal strain poles, fire hydrants, phone pedestals, etc, treated as utility poles
Georgia	1982	xx	-Refers to State Geometric Design Standards -Rural = 30 ft commonly used as guide (see Arkansas) -Urban = 12 from face of curb or 6 ft if <= 35 MPH
Idaho	1986	xx	-Rural areas = outside clear zone unless circumstances warrant, not closer than other fixtures, use care if located on outside of horizontal curve -Urban => 35 MPH = controls dictated by roadside development. May not be practical to put too far beyond curb or protect with gaurd rail. If no curb, as far as practical beyond shoulder or parking area
Indiana	1987 Draft		-Fed Aid & new construction = manual entitled "Indiana Dept of Highways Clear Zone Requirements For Design of Highways . . .", (complex details) -Rural/urban collectors, with shoulders & curb: < 50 MPH & ADT < 750 = 10 ft from traffic lane, => 50 MPH or ADT => 750 = 10 ft outside shoulder -Rural/urban arterials, with shoulders & curb: => 45 MPH = min of 20 ft or to ROW line < 45 MPH = min of 10 ft or to ROW line -All roads with curb: Curb => 6" and speed < 45 MPH = 1.5 ft behind curb, Curb < 6" or speed => 45 MPH, use "shoulders" criteria

TABLE 3 (continued on next page)

TABLE 3 (continued)

State	Date	AASHTO Wording	Comments
Illinois	1979	xx	-As near as practical to ROW -Urban = 2 ft min behind curb, or 4 ft min outside outer shoulder line if not curbed -Poles not permitted in any ditch line -For parallel lines, ground-mounted appurtenances must be located within one ft of ROW
Iowa	1985		SLOPE ADT < 800 800-2000 2000-6000 > 6000 > 3:1 59 ft 64 ft 70 ft 80 ft 4:1 32 ft 35 ft 38 ft 42 ft 6:1 24 ft 26 ft 28 ft 32 ft 10:1 22 ft 25 ft 27 ft 30 ft -Rural areas = outside of clear zone (above) -Suburban, rural type road, <= 45 MPH = 15 ft from pavement or beyond roadway slope limit -Urban curbed = 10 ft from travelway
Kansas	1986		-Rural = outside of clear zone (use AASHTO Barrier Guide Nomograph) -Suburban, rural type, => 45 MPH = 15 ft -Urban curbed = 6 ft min, 8 ft desired
Kentucky	1985		-For => 50 MPH, clear zone at least 30 ft and defer to AASHTO Barrier Guide -Poles must be within 1.5 ft of ROW, except may use 5 ft if crossarms on pole -Curbed streets = behind sidewalk area -Not allowed to remain or relocate in clear zone if slope <= 4:1 (except with guardrail or other protection for motorists)
Louisiana	1986		-Speed => 50 MPH: if shoulders = 30 ft, if curb = 6 ft, if curb at parking lane = 2 ft -Speed < 50 MPH: if shoulders = 20 ft, if curb = 6 ft, if curb at parking lane = 2 ft -Light posts min of 15 ft from travel lane, except 6 ft behind barrier curb. Breakaway if within 40 ft.
Maryland	1981	xx	-30 ft commonly used guide (see Arkansas) -Conventional highways = min 30 ft, or 6 ft behind curb, or behind sidewalks -No trenches within 5 ft of pavement
Massachusetts	1972	xx	-Restate AASHTO Accommodation Guide requirements -Poles within 6 ft of travelway must have reflective markers
Minnesota	1987 Draft	xx	-Lighting and above ground structures must be out of clear zone, except: (1) if breakaway poles, (2) poles of less than 50 sq in area, (3) if speed =< 40 MPH use 2 ft min behind curb & 10 ft min otherwise, (4) protected by barrier, and (5) base protrudes < 4 inches -Above ground fixtures controlled by AASHTO Barrier Guide and AASHTO Green Book
Mississippi			-Low speed (< 50 MPH & ADT < 750): 30 ft desirable, 7 ft from curb or shoulder for aux lane, 4.5 ft from curb for outside traffic lane, or 10 ft from edge of through traffic lane -High Speed (=> 50 MPH or ADT => 750): 30 ft, 10 ft for through lanes & 4.5 ft for aux lanes
Missouri			-Parallel lines must be within 2 feet of ROW line -Existing poles, when relocated, within 5 ft of ROW
Montana	1987		-Rural = 30 ft where available, urban = as near as possible to ROW, 2 ft min behind curb

TABLE 3 (continued on next page)

TABLE 3 (continued)

State	Date	AASHTO Wording	Comments
Nebraska	1987		-Rural = at least 30 ft from edge of pavement -Urban/suburban, rural type <=45 MPH = 15 ft from road -City/urban = back of sidewalk or 6 ft min from curb -Poles closer than (above) clearances must be breakaway
Nevada	1987 Draft	xx	-Defer to AASHTO Accommodation Guide and AASHTO Barrier Guide
New Hampshire	1986 Draft	xx	-Good tables. Clear zone expanded or contracted according to modification tables in Barrier Guide. Plenty of example calculations in manual
New York	1974	xx	-Rural/suburban/urban > 35 MPH = min 30 ft from pavement -Rural/suburban/urban <= 35 MPH = at ROW or if not feasible, behind sidewalk, or if not feasible 2 ft min from curb -Poles must be in outer 2 ft of ROW
North Carolina	1976	xx	-No single dimension, but 30 ft used as safety guide (see Arkansas), curbed sections = 6 ft min
North Dakota	1987		-Refers to clear zone table in appendix
Pennsylvania	1987	xx	-Clearances contained in 1982 State Code -Utilities not allowed in clear zone (up to 30 ft) -Allowed beyond ditches, at top of cut slopes, behind guiderail, 8 ft beyond toe of steep (2:1) fill slopes -Urban curbed, > 40 MPH no park lane = behind sidewalk -Urban curbed, < 40 MPH & parking lane = 1.5 ft min -Policy for relocation of existing non-complying poles, locations for poles being replaced, etc. -Above ground utilities not allowed in areas which Dept engineers find to have high accident potential
South Carolina	1987	xx	-No single dimension, but 30 ft used as safety guide (See Arkansas) -Pipelines > 3 ft from edge of pavement
Tennessee	1987 Draft	xx	-Restate AASHTO Accommodation Guide requirements
Vermont		xx	-Restate AASHTO Accommodation Guide requirements
Texas	1975	xx	-Good tables -Rural areas or uncurbed urban areas, poles = 1 to 3 ft from ROW -30 ft from roadway or 20 ft from shoulder -No poles in median -Specific exceptions for existing utilities
Utah		xx	-Restate AASHTO Accommodation Guide requirements
Virginia			-Refers to Section 700 of Department Road & Bridge Stds -Rural = if in clear zone use barrier or guardrail, defers to AASHTO Barrier Guide. Appendix of utility manual has clear zone guidelines -Urban = 8 ft min from pavement, 9.5 ft desired
Washington	1985	xx	-Restate AASHTO Accommodation Guide requirements
West Virginia	1986	xx	-Restate AASHTO Accommodation Guide requirements
Wisconsin	1972	xx	-Rural = Safety Section as defined by "Typical Sections" -Urban = 2 ft behind curb, or outside clear zone if not curbed -Utilities allowed in "Safety Section" only when: (1) no other location is feasible, and (2) breakaway construction or motorist protected by barrier

states (Alabama, Massachusetts, Tennessee, Utah, Vermont, Washington, and Wisconsin) depended entirely on duplicating the AASHTO Accommodation Guide to describe their clear zone and supplied little additional guidance. On the other hand, at least six states (Florida, Iowa, New Hampshire, North Dakota, Texas, and Virginia) have their own elaborate tables or figures to explain their clear zone policy. Examples of these have been included as Figure 3 and Table 4.

The nomograph from Kansas (see Figure 3) has been adopted by several states. It was apparently taken from the Supplement to the Barrier Guide (10) and will be published in the upcoming AASHTO Roadside Design Guide. It is reasonable to assume that the lateral clearances in the figure will be appropriate in the foreseeable future, so other states might consider adopting this same nomograph.

References to State or AASHTO Manuals

At least eight states (Florida, Georgia, Indiana, Minnesota, Mississippi, North Dakota, Virginia, and Wisconsin) have developed their own clear zone standards or have uniquely defined the clear zone in their design manuals. In several cases, portions of these documents were appended to the utility manual to illustrate the clear zone.

Two states (Colorado and Minnesota) included references to the Green Book provisions. Eight states chose to refer to the AASHTO Barrier Guide. These states were Colorado, Kansas, Kentucky, Minnesota, Mississippi, Nevada, New Hampshire, and Virginia.

Clear Zone Treatment Parameters

In reviewing Table 3, it became apparent that several types of common criteria were used by many states:

- Almost all states included a qualifying statement "if right-of-way is available" in describing horizontal clearances.
- Twenty-one states indicated that utilities were to be placed "as near as practical to the right-of-way line."
- Twenty-one states varied the lateral clearance if curb and gutter were present.
- Sixteen states made distinctions between urban and rural locations.
- Fourteen states indicated that their clear zone width was based on categories of speed limits.
- Six states required that utilities be located within "X" feet of the right-of-way line.
- Six states described the clear zone with a statement similar to "no single dimension is always used for the clear zone but 30 feet is a commonly used safety guide . . ."
- Four states had detailed instructions requiring frangible bases or breakaway treatments for utilities within certain locations of the clear zone.

Table 3 should be carefully scanned to determine what criteria the states are using for their clear zones. Unique words or details can be noted from a casual review. State utility engineers may wish to review the table to compare their own policy with that of neighboring states or to glean ideas that may be useful for their own manual.

Useful Ideas

A number of statements or requirements were noted that other states may wish to adopt, and several have been included in this paper. These statements were typically made by various states; however, credit is given to only one in this document.

Idaho and Delaware indicated concern about the outside of horizontal curves. Delaware prohibited poles on the outside of horizontal curves if there were less than 30 ft of available right-of-way. This approach is logical since there are significant utility pole collision accidents on the outside of horizontal curves. Idaho included an interesting requirement that rural area utilities may not be placed closer than other fixtures in the right-of-way. This provided a uniform appearance and a uniform approach to safety.

Delaware and Illinois both disallowed poles in the ditch line. Ditches are also overrepresented in off-road collisions. Once an out-of-control vehicle goes into a ditch, it slides along until it comes to a stop, and any utility pole in the ditch would stand a higher than normal probability of being hit.

Massachusetts required that poles within 6 ft of the pavement have reflective markers affixed. This provided a higher degree of visibility to approaching drivers and diminished the number of accidents.

Pennsylvania and Texas both made it very clear when portions of their provisions dealt only with existing utilities as opposed to new utilities. This helped address one of the major clear zone problems: how to handle existing obstacles without depleting the agency's entire budget.

At least three states have placed clear zone provisions in their state code to provide a strong legal basis for actions.

The statements in this portion of the report are illustrative of the type found in almost every state's manual. They have been presented in hopes that they might prove useful to state transportation utility offices that wish to revise their clear zone utility policies.

FINDINGS AND RECOMMENDATIONS

Findings

This paper outlined the development of the clear zone philosophy, its application to state utility agencies, and the findings of a survey of state transportation agency utility manuals. Several conclusions can be drawn from this research:

- There is no national consensus on the clear zone. It has emerged bit by bit from different agencies and in various publications.
- There are many documents (guidelines or standards) that might pertain to any individual obstacle in the clear zone. These documents are prepared by AASHTO, FHWA, and other authoritative bodies.
- The states have pursued widely divergent paths in developing their independent clear zone policies governing utilities.
- The clear zone has not been strongly and completely embraced by all state utility offices.
- The AASHTO Barrier Guide and the AASHTO Accommodation Guide are currently the most influential documents in shaping states' clear zone policies.

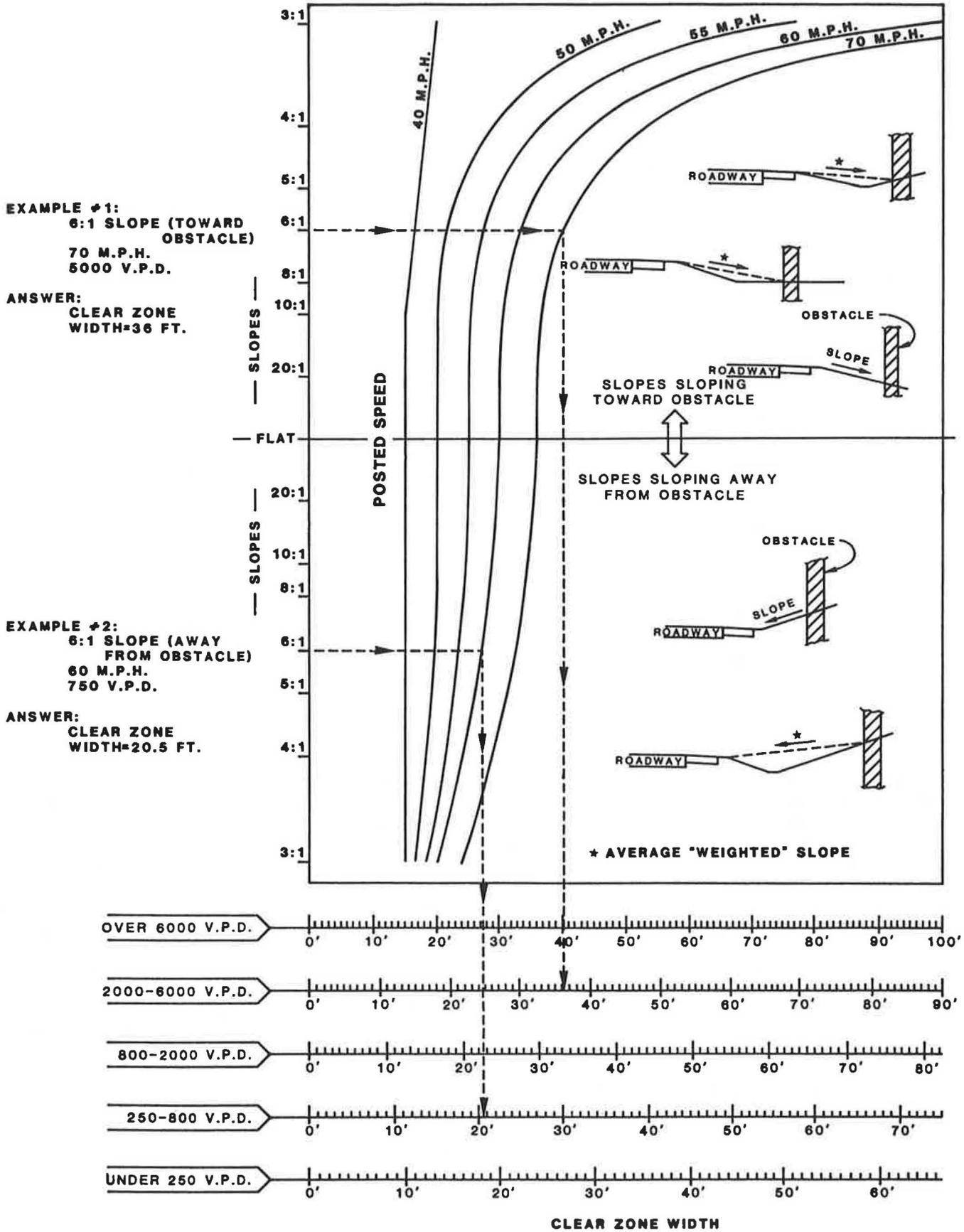


FIGURE 3 Clear zone nomograph (from the Kansas State DOT Utility Accommodation Policy).

TABLE 4 CLEAR ZONE DIMENSIONS

DESIGN SPEEDS	2:1 INSLOPES			3:1 INSLOPES			4:1 INSLOPES			6:1 INSLOPES		
	40 mph	50 mph	60 mph	40 mph	50 mph	60 mph	40 mph	50 mph	60 mph	40 mph	50 mph	60 mph
ADT												
250	18	109	228	15	43	78	14	21	34	12	17	25
500	18	109	228	15	43	78	14	21	34	12	17	25
750	18	109	228	15	43	78	14	21	34	12	17	25
1000	20	118	251	17	46	86	15	23	37	14	18	28
1250	20	118	251	17	46	86	15	23	37	14	18	28
1500	20	118	251	17	46	86	15	23	37	14	18	28
1750	20	118	251	17	46	86	15	23	37	14	18	28
2000	20	118	251	17	46	86	15	23	37	14	18	28
2500	22	132	274	18	51	94	17	25	40	15	20	30
3000	22	132	274	18	51	94	17	25	40	15	20	30
4000	22	132	274	18	51	94	17	25	40	15	20	30
5000	22	132	274	18	51	94	17	25	40	15	20	30
6000	22	132	274	18	51	94	17	25	40	15	20	30

Source: North Dakota Policy for Accommodation Of Utilities on State Highway Right Of Way.

- A survey of the states indicated that the most commonly used provisions were (a) the term “as near to the right-of-way as practical,” (b) varying horizontal clearances, depending on whether a curb was present, (c) varying horizontal clearances, depending on whether the location was urban or rural, and (d) varying horizontal clearances based on speed limits.

- Although many state manuals imply there may be differences, few treat new construction differently from RRR projects or replacement projects. Such a distinction would appear to be necessary to cope with one of the major clear zone difficulties—the presence of many existing obstacles which do not comply with current criteria.

It is certainly possible to draw other conclusions about the clear zone; however, it is felt that those stated are the most obvious and important issues.

Recommendations

There is still a degree of confusion associated with the clear zone application to utilities. There are also incomplete acceptances and applications of the clear zone philosophy. To combat these difficulties, the following are recommended:

- Implementation of the clear zone philosophy would be enhanced if a greater degree of standardization could be obtained from agency to agency, document to document, and among the types of objects located in the clear zone.

- A national conference should be conducted among representatives of the various agencies and technical organizations that promulgate clear zone rules, standards, and guidelines. For example, at least four TRB committees deal with the clear zone and prepare or approve publications. AASHTO has at least 10 publications that contain clear zone guidance, and FHWA also has several.

- To increase both understanding and uniformity, a national organization (U.S. Department of Transportation, AASHTO, International Right-of-Way Association, etc.) should conduct training sessions. To this end, a training manual should be developed and a training course proposed for national use.

- The *AASHTO Roadside Design Guide* (nearing publication) is probably going to be the most important document in influencing utility clear zones in the near future. Utility entities need to participate in the preparation, review, and publication of this document.

- A strong current knowledge of the future development of the clear zone is essential. Part of the reluctance to embrace the clear zone is a disenchantment with an unknown future and a fear that clear zone standards may continue to change.

The national conference may help combat this by adopting a sense of direction or a consensus statement about what the future should hold.

SUMMARY

This paper is an individual effort meant to assist states and utility agencies in examining their current clear zone policies. It was prepared to draw attention to the subject, provide background information, and suggest enhancements that may improve tomorrow's clear zone policy, and thus the safety of the motoring public.

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