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EVALUATION OF FLEXIBLE DELINEATOR POSTS

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16. Abstract

The objective of this study was to install a small number of lightweight metal u-channel posts with a round delineator and a small number of commonly used flexible posts and evaluate their performance. Three types of flexible posts were installed. They included two posts manufactured by Carsonite and one manufactured by Safe-Hit.

The results of the limited field tests does not support widespread use of flexible posts. Substantial durability problems were encountered with the flexible posts. Future use of flexible posts should be limited to potential high-hit areas such as gores at urban interchanges. While the durability of the metal posts was superior to the flexible posts, a maintenance problem exists relating to of maintaining the posts and delineators.

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INTRODUCTION

Post delineators are retroreflecting devices used in a series and mounted along the side of the road to indicate roadway alignment. These delineation devices are effective aids for nighttime driving guidance, especially when fixed-source lighting or raised pavement markers are not present. An advantage of post delineators over surface-mounted delineation devices, in areas where substantial amounts of snowfall occur, is that they remain effective when the surface is snow covered.

Until relatively recently, post delineators had consisted of retroreflective button-type delineators mounted on metal u-channel posts. Several brands of the button-type delineator have been used in Kentucky. The recent use of plastic-backed, rather than metal-backed, delineators has resulted in some durability problems (1). Failure rates, after one year in service, varied from 10 to 60 percent for the plastic-backed delineators compared to 10 to 20 percent for the metal-backed delineators.

The metal u-channel post typically used for post-delineator installations was only recently changed from a three pound per foot post to a lighter post of 1.12 pounds per foot (2). Problems associated with the metal delineator post include safety and maintenance. When impacted by a light-weight vehicle, a metal delineator post has the potential of being sufficiently rigid to present a significant fixed object which could result in an injury accident. This problem has been lessened by the use of the lighter-weight metal posts.

In a previous study of post delineators, the subject of flexible posts was addressed (3). The use of flexible posts, the types of posts used, their cost, and problems associated with their use were discussed. Flexible plastic or fiberglass posts have been used by some states as an alternative to metal posts. It is clear that impacts with flexible posts would be less severe than with metal posts and their ability to return to an upright position after impact would reduce the maintenance replacement problem. However, flexible posts are more expensive than metal posts and their long-term performance and durability warrant additional evaluation.

The objective of this study was to install a small number of lightweight metal u-channel posts with a round delineator and a small number of commonly used flexible posts and evaluate their performance.

INSTALLATION

The test installation was on Interstate 64 (I 64) in Franklin and Shelby Counties. The post delineators were placed both on the mainline and on ramps. The majority of the posts were placed on ramps (72 percent). Both white and yellow delineators were installed. Four types of delineator posts were installed. These included the lightweight metal post and three types of flexible posts. The four types of delineator posts were as follows:

1. standard lightweight metal post as specified by the Kentucky Department of Highways (Figure 1),

2. "Roadmarker" CRM-375 flexible post manufactured by Carsonite International (Figure 2),

3. "Curv-Flex" CFRM-400 flexible post manufactured by Carsonite International (Figure 3), and

4. "Safe-Hit" flexible post manufactured by Safe-Hit Corporation (Figure 4).

A three-inch circular delineator unit was bolted to the metal post to provide reflectivity while the flexible posts used reflective sheeting that was attached to the post.

Daytime and nighttime photographs of the new installations of the four types of delineator posts are shown in Figures 5 through 8. Each of these installations were on ramps.

DATA COLLECTION

The performances of the four types of post delineators were monitoried over a two-year period. Inspections were made periodically to determine the number of posts remaining and to view the condition of the posts and delineators. Both day and night inspections were made. The ability of the flexible posts to return to an upright position was noted.

The following number of posts were included in the survey:

		Mainline	Ramp	Total
1.	metal post	42	145	187
2.	CRM-375 flexible post	13	35	48
3.	CFRM-400 flexible post	22	33	55
4.	Safe-Hit flexible post	16	27	43

The locations along I 64 of the installation of the various types of posts are given in Appendix A.

Contact was made with officials in the seven states that border Kentucky to determine the status of the use of flexible posts in those states.

RESULTS

Test Installations

The conditions of both the post and reflector were noted during the periodic inspections. The percentages of each type of post remaining after one year and two years in service are given in Table 1. The large majority of the metal posts were still present after two years. There were major durability problems observed with all three types of flexible posts. The two Carsonite flexible posts had higher percentages remaining compared to the Safe-Hit post. A factor in the larger percentage of missing Safe-Hit posts may have been that these posts could be easily pulled up by hand. Tables giving the numbers of posts remaining after one year and two years in service are included in Appendix B.

The high percentage of metal posts remaining would be partially related to the fact that most of these posts were installed behind guardrail while the flexible posts were not installed behind guardrail. Of the 148 metal posts counted in the last survey, 74 percent were behind guardrail.

There was also a number of metal posts that had missing or damaged delineators. The survey conducted after two years in service revealed that 22 percent of the metal posts either had no delineator or a substantial portion of the delineator was missing (Figure 9). Considering the percentage of ineffective delineators on the posts, the percentage of the original installation of metal posts remaining that had effective delineators would be lowered to 61 percent. As a result of a previous evaluation (1), a recommendation had been made to discontinue use of plastic-backed delineators. However, both metal-backed and plastic-backed delineators were noted during the inspections.

The survey conducted after two years in service revealed that several of the few remaining flexible posts were damaged. The damage typically consisted of either: 1) the base partially split allowing the post to bend with the wind or fall to the ground (Figure 10) or 2) the top damaged from mowing (Figure 11). It was noted during the inspections that several of the Carsonite posts failed by splitting at the base at ground level.

The flexible posts that remained after two years in service could still be run over and would rebound. Only two of the eight remaining Carsonsite CRM-375 posts were still in good condition. Six of the 14 remaining Carsonite CRM-400 posts were in good condition (Figure 12). The single remaining Safe-hit was in good condition.

Nighttime observations performed after two years in service revealed that the remaining Carsonite flexible posts that did not have significant damage to the top of the post provided a level of reflectivity nearly the same as that of the circular delineator on the metal posts. The single remaining Safe-Hit post did not provide a level of reflectivity as high as the circular delineators on the metal posts.

State Survey

Officials within the seven states that border Kentucky were contacted to learn the status of their use of flexible posts. Three of the states (Ohio, Tennessee, and Missouri) are using flexible posts extensively on their interstate system. Ohio has used flexible posts for several years while Missouri has just finished an installation of flexible posts. Tennessee has not used metal posts for several years. The remaining states had limited use of flexible posts with use typically in high-hit areas. The Carsonite and Safe-hit posts included in this evaluation were the typical posts used. Flexible posts manufactured by Stimsonite were also used. Evaluation of the performance of the posts was varied with the general conclusion that they could be economically justified in high-hit areas.

RECOMMENDATIONS

Performance based upon limited field tests of flexible posts and metal posts would not support widespread use of flexible posts. Substantial durability problems were encountered with the flexible posts. While the durability of the metal posts was superior to the flexible posts, metal posts present maintenance problems resulting from the need to maintain both the posts and the delineators.

Future use of flexible posts should be limited to potential high-hit areas such as gores at urban interchanges. Consideration should be given to limiting the use of post delineators on the interstate and parkway system to only ramps. Section 3D-4 of the Manual on Uniform Traffic Control Devices should be modified to make roadside delineators optional on all mainline sections of expressway and freeway roadways. Snowplowable markers are either currently installed or will be installed all interstates and parkways making the use of post delineators on the mainline unnecessary. This is supported by the problem with maintaining post delineators and the lack of snowfall in Kentucky which would obscure the lane delineation.

The preferable method to determine the types of flexible posts for approval would be to use information from the SASHTO Regional Test Facility. Until such data become available, the results of the limited field tests indicate the Carsonite CFRM-400 provided the best results for the types of flexible posts tested.

When metal posts are used, the circular delineator units attached to the posts should have a metal backing. The use of plastic-backed delineators should be discontinued.

REFERENCES

1. Letter to Mr. John Luttrell, Division of Traffic, Kentucky Transportation Cabinet, January 21, 1987.

2. Standard Specifications for Road and Bridge Construction, Kentucky Transportation Cabinet, 1988.

3. Agent, K. R. and Pigman, J. G.; "Use of Post Delineators on Interstates," University of Kentucky Transportation Research Program, Report UKTRP-86-10, April 1986.

TABLE 1. DURABILITY OF VARIOUS TYPES OF POSTS

TIME IN SERVICE	PERCENT OF POSTS REMAINING — TYPE OF POST: METAL	CARSONITE CRM-375	CARSONITE CFRM-400	SAFE-HIT
One Year	88	63	67	37
Two Years	79	17	25	2

APPENDIX A

LOCATION OF DELINEATOR POSTS

TABLE A-1. LOCATIONS OF DELINEATOR POST INSTALLATIONS

LOCATION	NUMBER OF POSTS							
	METAL		CARSONITE CRM-375		CARSONITE CFRM-400		SAFE-HIT	
	W*	A*	W	A	W	A	W	A
Ramp from US 127 to I 64 WB	8							
I 64 WB - US 127 to KY 151	7							
Ramp from I 64 WB to KY 151	35	10						
Ramp from KY 151 to I 64 WB			22	13				
I 64 WB - KY 151 to KY 395	10		5				10	
Ramp from I 64 WB to KY 395							23	4
Ramp from KY 395 to I 64 EB	26	6						
I 64 EB - KY 395 to KY 151	10		8				6	
Ramp from I 64 EB to KY 151	15	5						
Ramp from KY 151 to I 64 EB					26	7		
I 64 EB - KY 151 to US 127	15				22			
Ramp from I 64 EB to US 127	20	20						
All	146	41	35	13	48	7	39	4

* W - white delineator
Y - yellow delineator

APPENDIX B

NUMBER OF POSTS REMAINING AFTER ONE AND TWO YEARS IN SERVICE

TABLE B-1. NUMBER OF POSTS REMAINING AFTER ONE YEAR IN SERVICE

LOCATION	NUMBER OF POSTS							
	METAL		CARSONITE CRM-375		CARSONITE CFRM-400		SAFE-HIT	
	W*	A*	W	A	W	A	W	A
Ramp from US 127 to I 64 WB	8							
I 64 WB - US 127 to KY 151	7							
Ramp from I 64 WB to KY 151	20	10						
Ramp from KY 151 to I 64 WB			15	7				
I 64 WB - KY 151 to KY 395	9		4				2	
Ramp from I 64 WB to KY 395							8	2
Ramp from KY 395 to I 64 EB	20	6						
I 64 EB - KY 395 to KY 151	10		4				4	
Ramp from I 64 EB to KY 151	15	5						
Ramp from KY 151 to I 64 EB					23	7		
I 64 EB - KY 151 to US 127	14				7			
Ramp from I 64 EB to US 127	20	20						
All	123	41	23	7	30	7	14	2

* W - white delineator
Y - yellow delineator

TABLE B-2. NUMBER OF POSTS REMAINING AFTER TWO YEARS IN SERVICE

	NUMBER OF POSTS							
	METAL		CARSONITE CRM-375		CARSONITE CFRM-400		SAFE-HIT	
LOCATION	W*	A*	W	A	W	A	W	A
Ramp from US 127 to I 64 WB	8							
I 64 WB - US 127 to KY 151	5							
Ramp from I 64 WB to KY 151	14	9						
Ramp from KY 151 to I 64 WB			6	1				
I 64 WB - KY 151 to KY 395	9							
Ramp from I 64 WB to KY 395							1	
Ramp from KY 395 to I 64 EB	19	6						
I 64 EB - KY 395 to KY 151	10		1					
Ramp from I 64 EB to KY 151	15	5						
Ramp from KY 151 to I 64 EB					6	4		
I 64 EB - KY 151 to US 127	14				4			
Ramp from I 64 EB to US 127	15	19						
All	109	39	7	1	10	4	1	

* W - white delineator
Y - yellow delineator

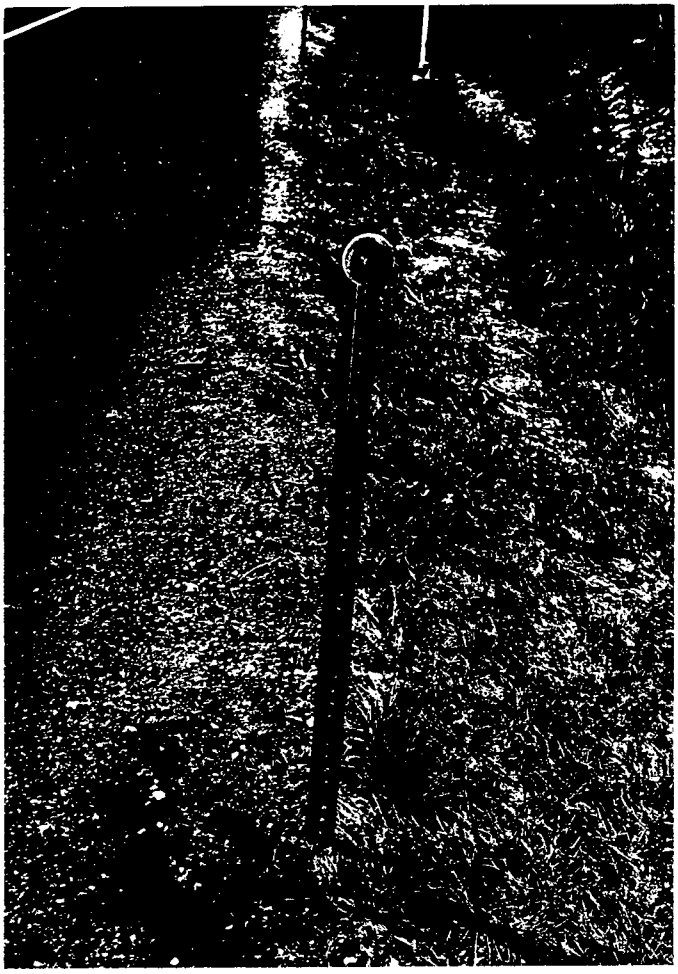

Figure 1. Standard Lightweight Metal Post.

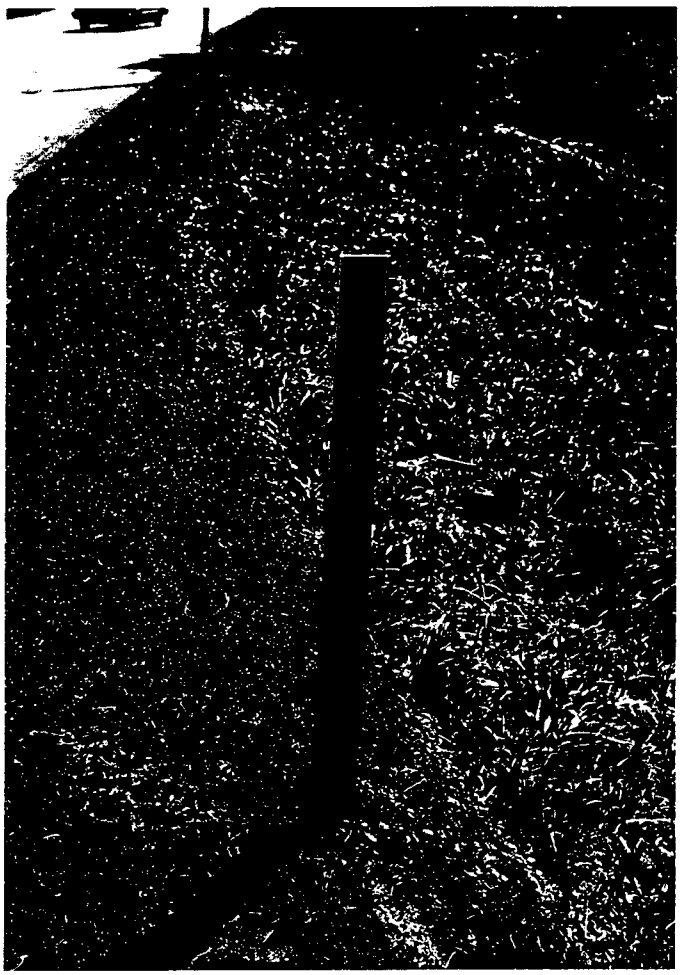

Figure 2. "Roadmarker" CRM-375 Flexible Post.

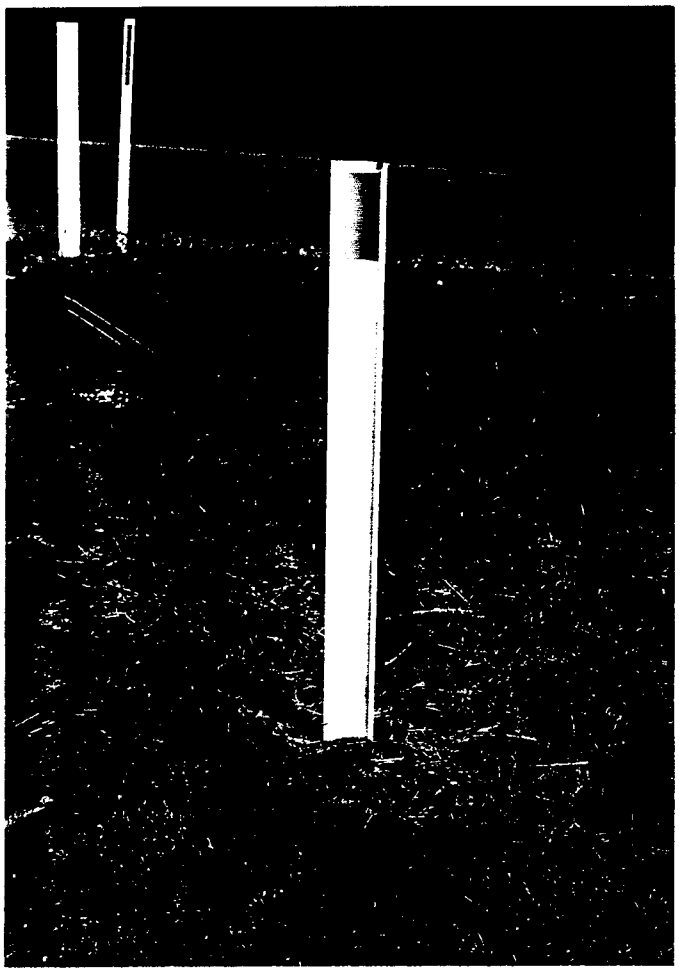

Figure 3. "Curv-Flex" CFRM-400 Flexible Post.

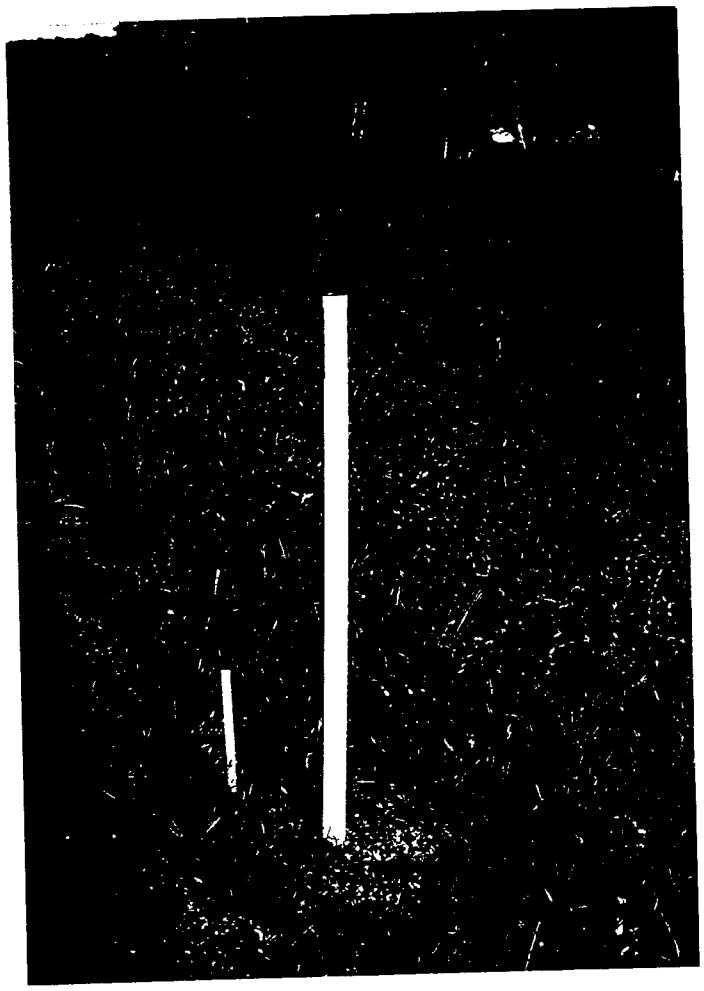

Figure 4. "Safe-Hit" Flexible Post.

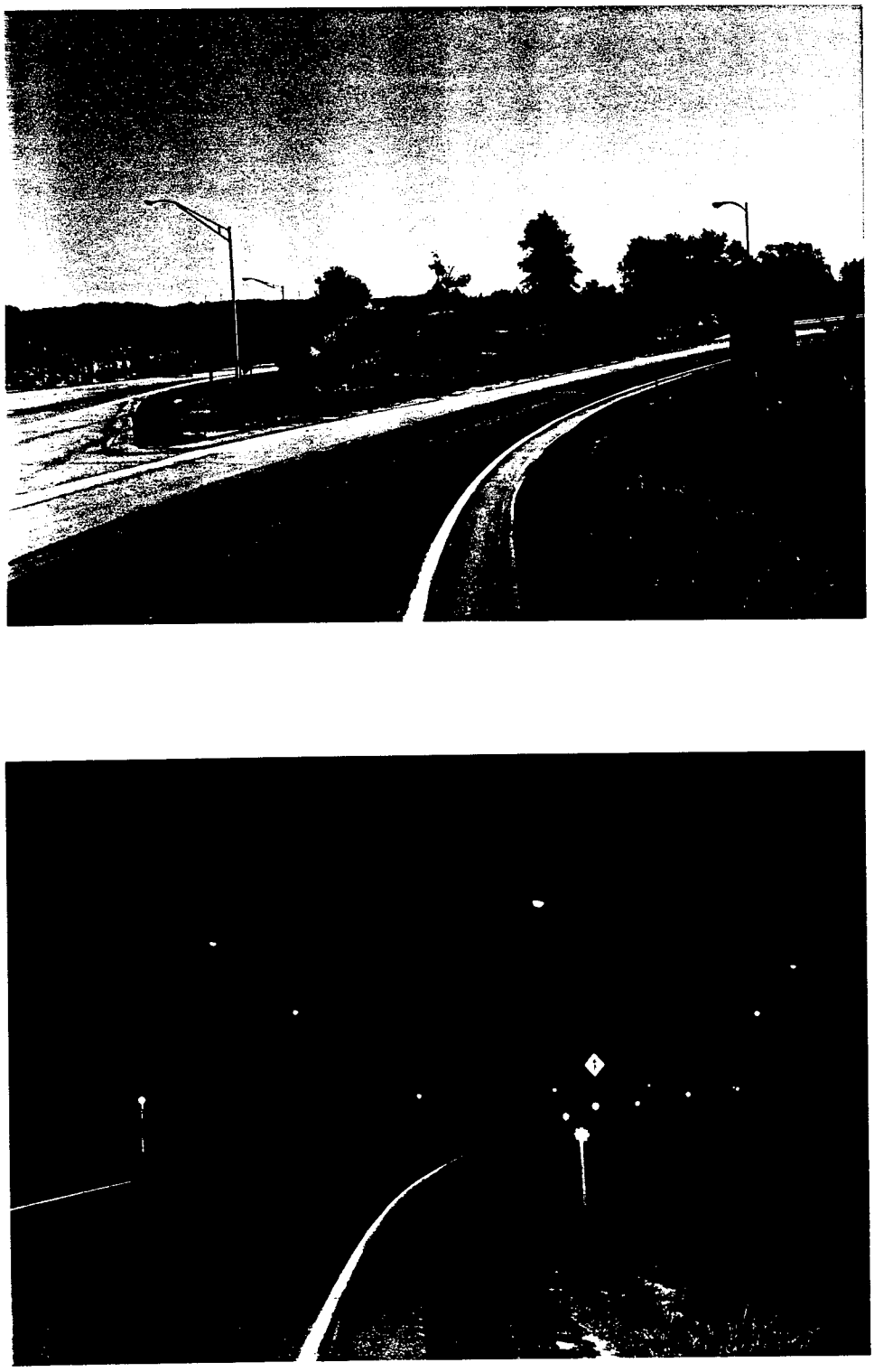

Figure 5. Daytime and Nighttime Photographs of New Installation of Standard Lightweight Metal Posts (Ramp from I 64 EB to US 127 NB).

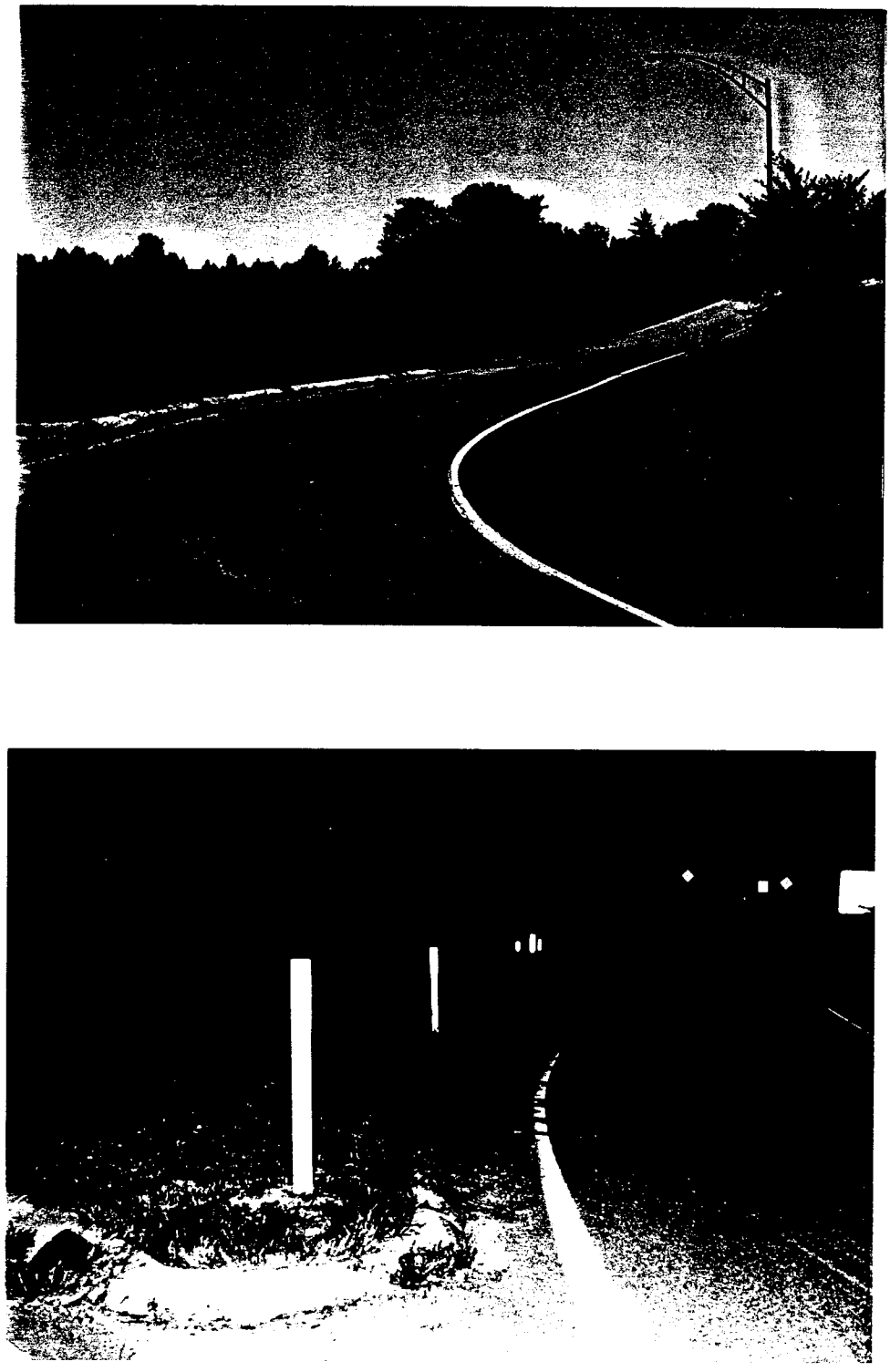

Figure 6. Daytime and Nighttime Photographs of New Installation of "Roadmarker" CRM-375 Flexible Posts (Ramp from KY 151 to I 64 WB).

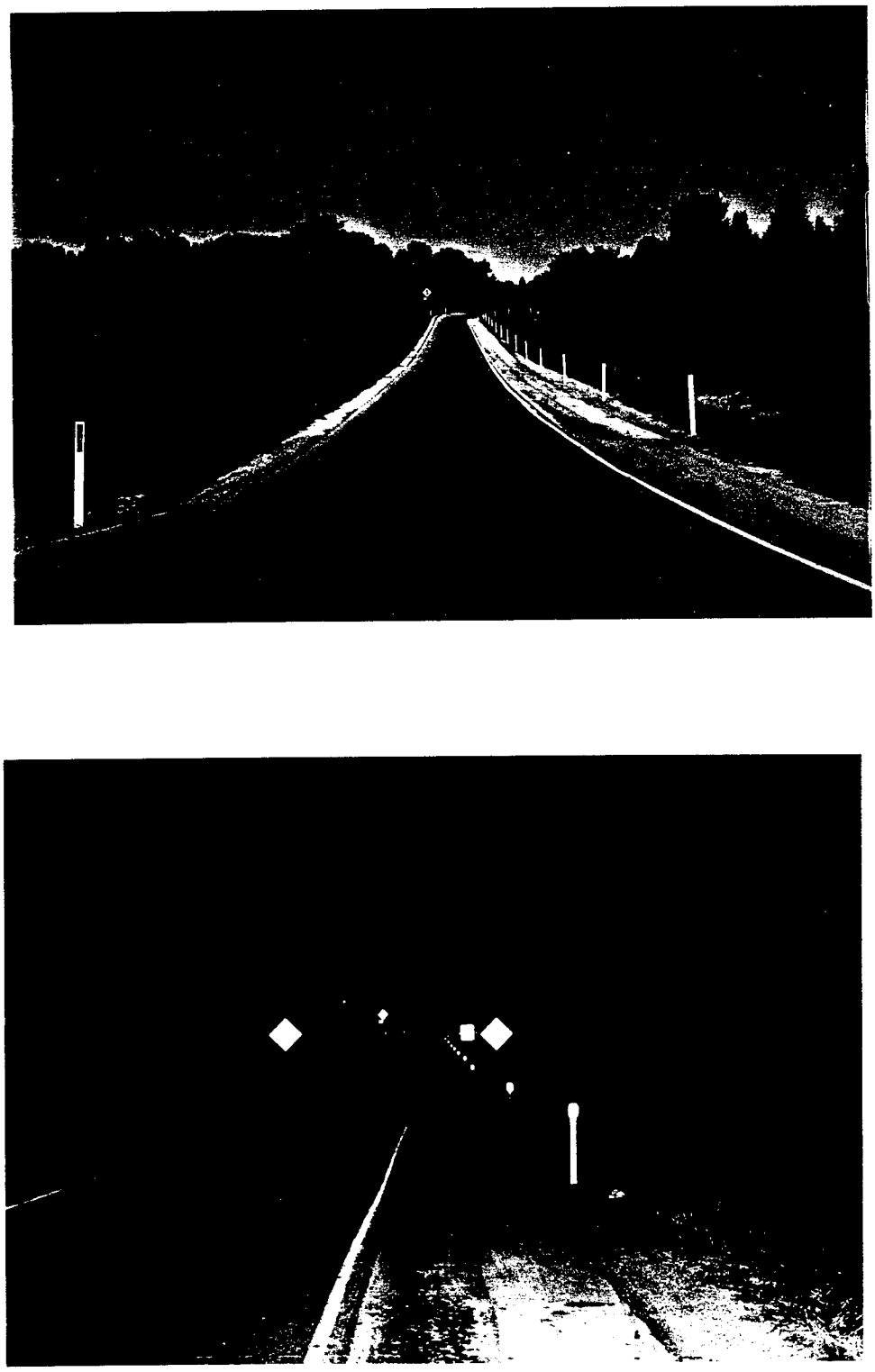

Figure 7. Daytime and Nighttime Photographs of New Installation of "Curv-Flex" CFRM-400 Flexible Posts (Ramp from KY 151 to I 64 EB).

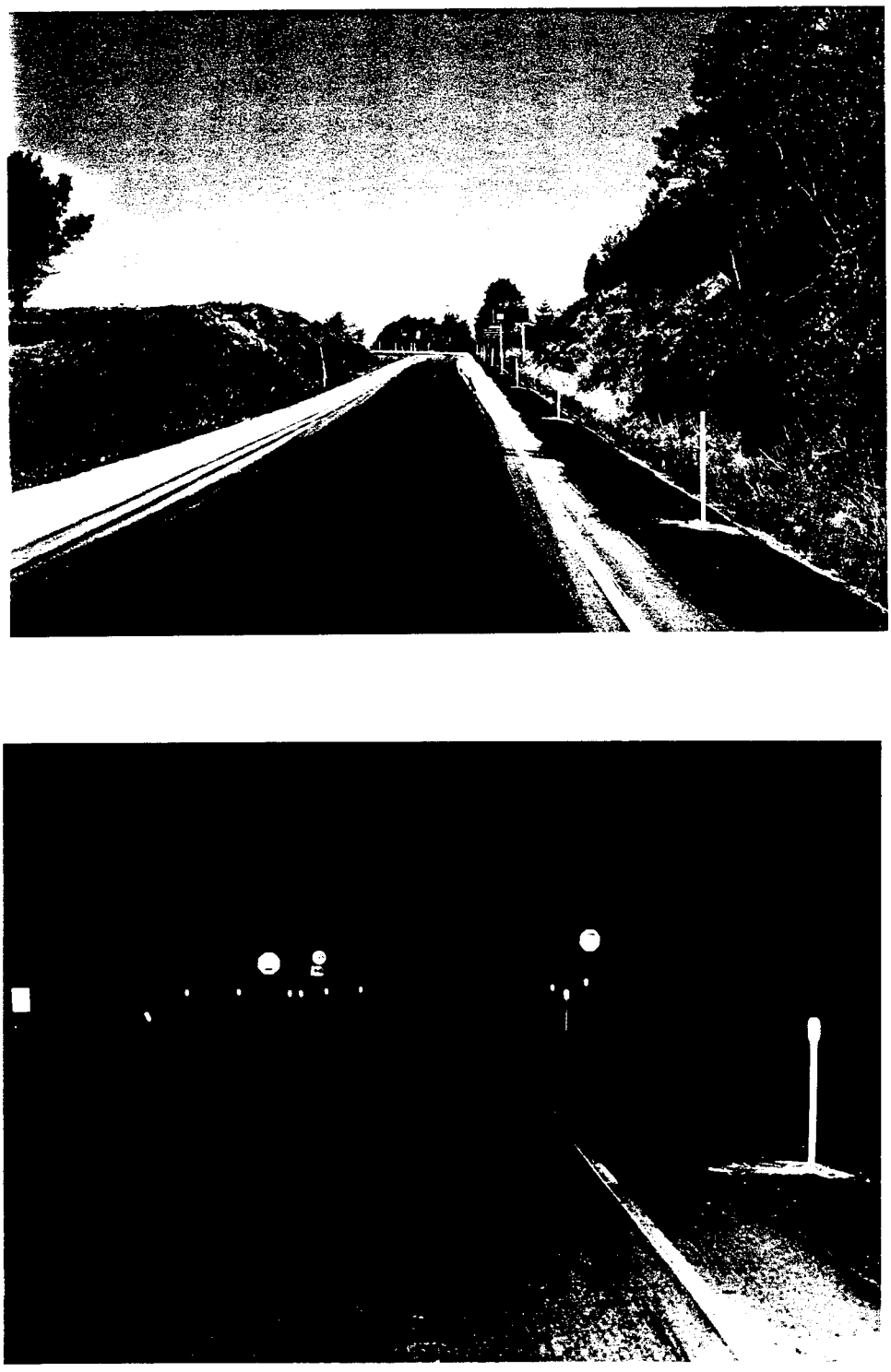

Figure 8. Daytime and Nighttime Photographs of New Installation of "Safe-Hit" Flexible Posts (Ramp from I 64 WB to KY 395).

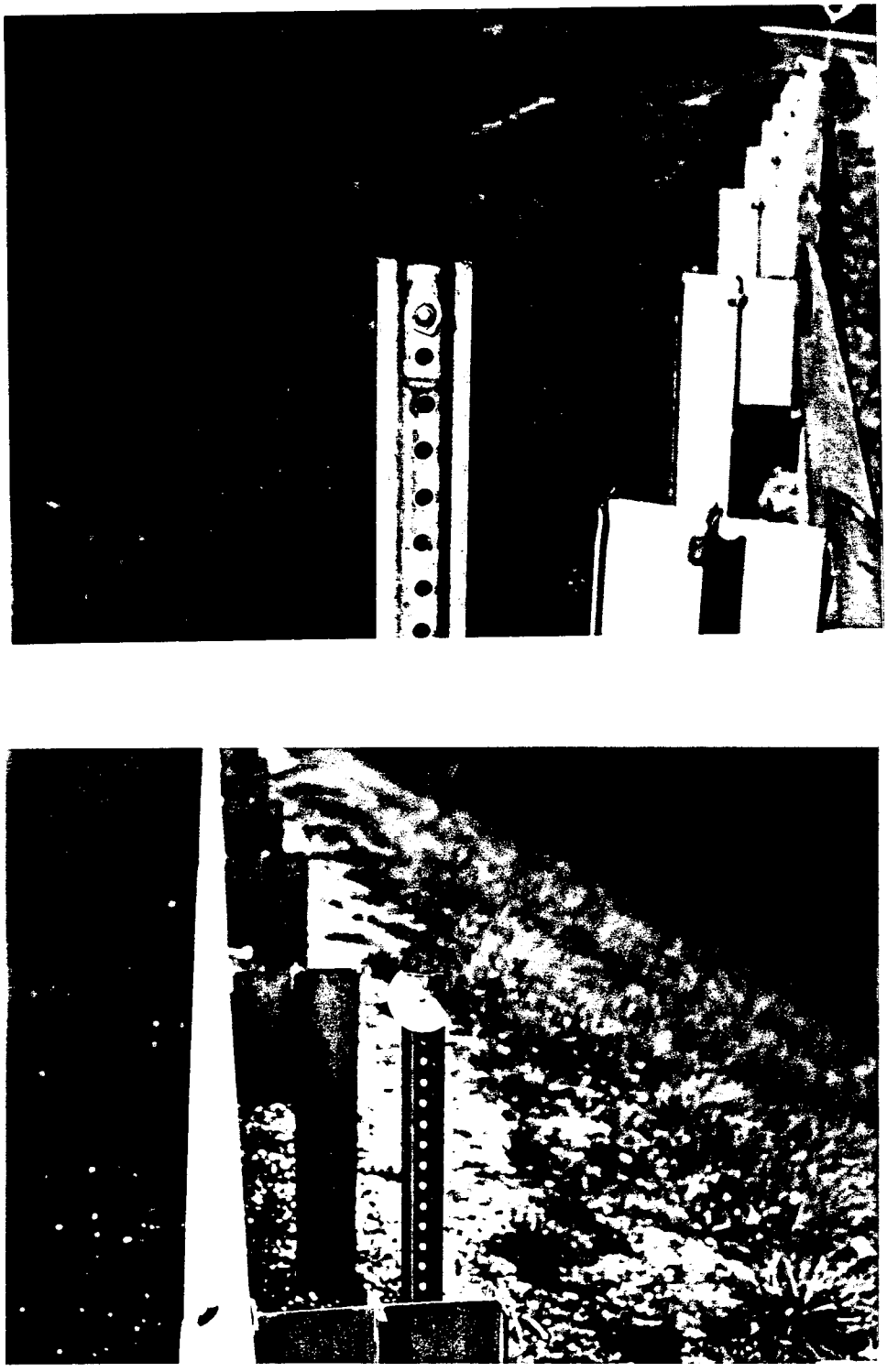

Figure 9. Damage to Delineator on Metal Post.

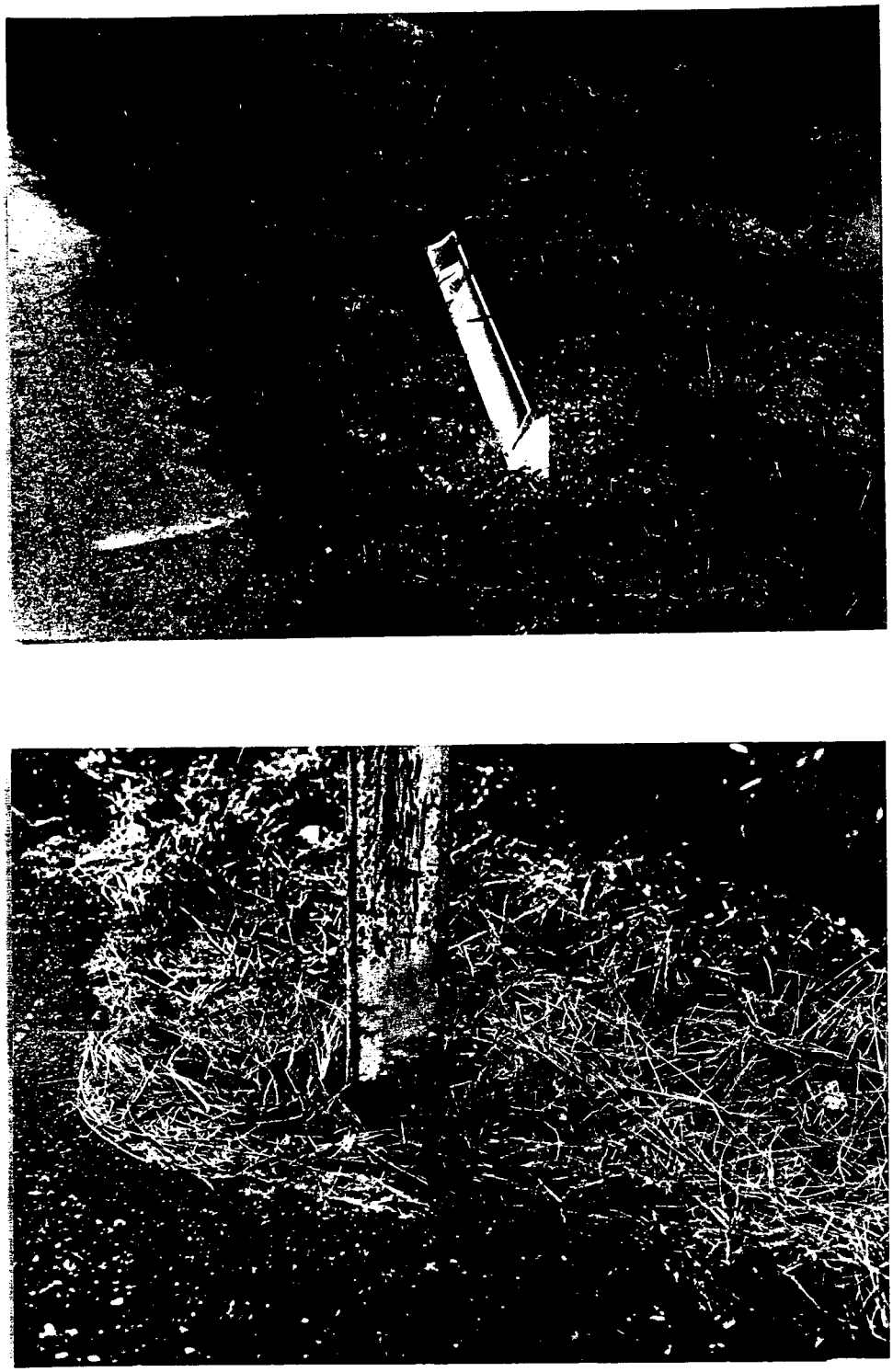

Figure 10. Failure of Base of Flexible Post.

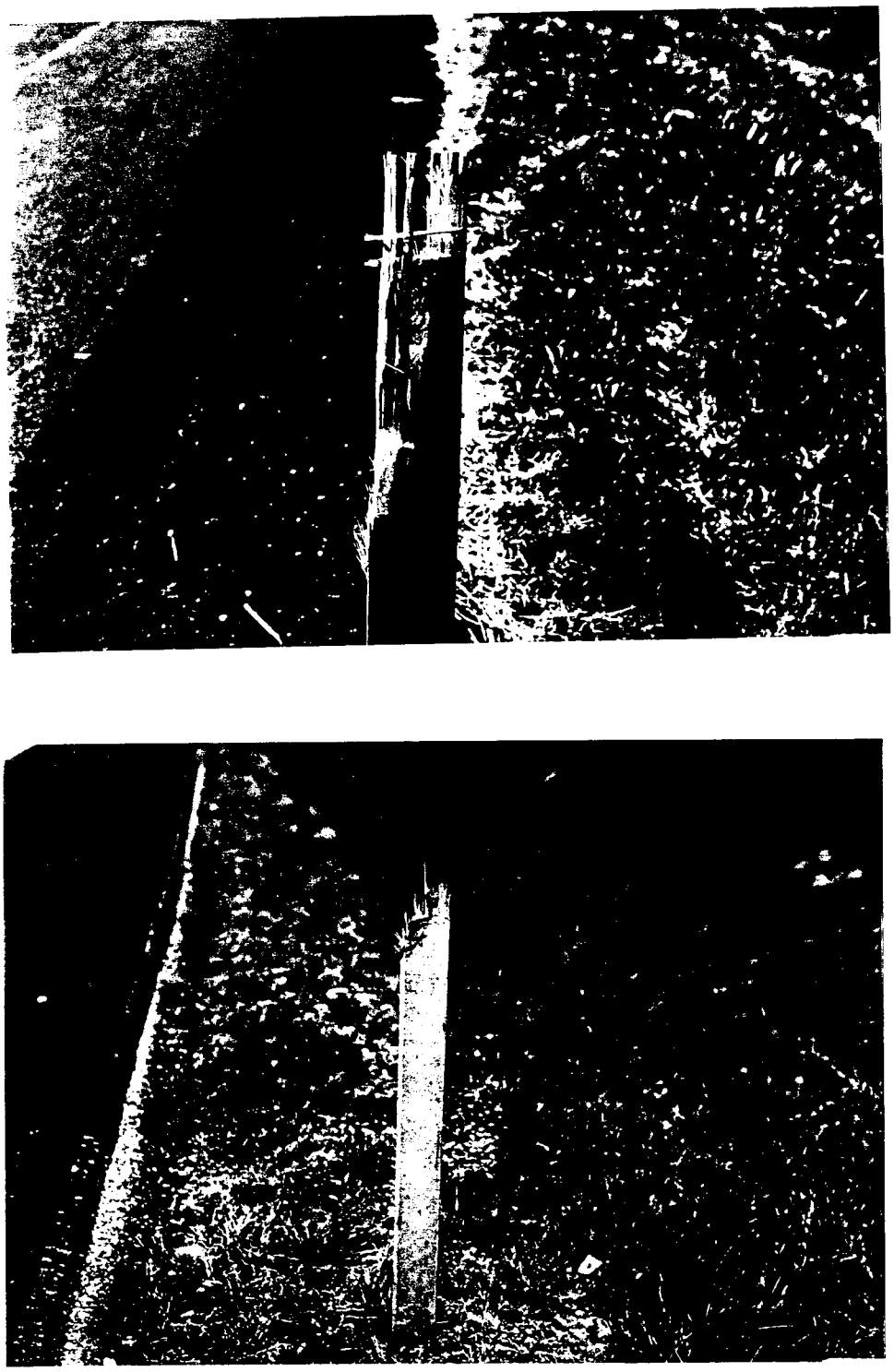

Figure 11. Mowing Damage to Flexible Post.

Figure 12. Flexible Post in Good Condition after Two Years in Service.