VEHICLE ACCIDENTS AT MAINTENANCE AND UTILITY WORK ZONES

by

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(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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ABSTRACT

The objective of this study was to determine the magnitude and characteristics of safety problems, in terms of reported accidents, that are associated with moving vehicular traffic around and through highway maintenance and utility work zones. This was accomplished by examining 280 maintenance and utility work zone accidents that occurred on the Virginia state highway network over a period of 14 months. These represented approximately 0.4% of the total number of accidents reported during that period. A review of accident reporting procedures, however, indicated that the sample of accidents examined did not include a variety of work zone accidents where the roadway was not under physical repair (e.g., sweeping and landscaping) or where the first event in the accident was not related to the work activity (e.g., driver falling asleep).

The report discusses several characteristics of the maintenance and utility work zone accidents including general and specific locations of the accident, time of the accident, roadway and environmental factors, characteristics of the work zone, cause of the accident, and accident severity. Where data were available comparisons were made between the maintenance and utility work zone accidents and all reported accidents.

ACKNOWLEDGEMENTS

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INTRODUCTION

The safety of the motoring public in highway maintenance and utility work areas has become an issue of growing concern. While notable efforts have been made to improve maintenance and utility work zone practices and the traffic control procedures used in these work areas, little is known about the specific safety problems involved. Consequently, this study was undertaken to determine the magnitude and characteristics of motor vehicle accidents in highway maintenance and utility work zones. Since there was essentially no prior work in this area, the primary goal of this study was to determine the need for future studies. The study was based on an analysis of 14 months of Virginia accident data.

OBJECTIVE

The objective of this research was to determine the magnitude and characteristics of safety problems, measured in terms of reported accidents, associated with moving vehicular traffic around and through highway maintenance and utility work zones. This objective was accomplished by examining Virginia motor vehicle accident reports marked "Road Under Repair." In addition, an assessment was made of the consistency and completeness with which investigating officers checked the designation "Road Under Repair" for accidents occurring at maintenance and utility work zones or accidents relating to traffic conditions caused by these zones.

STUDY TASKS

In order to accomplish the above objective the following tasks were performed.

Task A: Review Instructions

A review was undertaken of the instructions and guidelines, both written and oral, that are given to State Police officers for using the "Road Under Repair" designation, the "Accident Diagram" and the "Accident Description" sections of the Virginia Motor Vehicle Accident Report (form FR-300). As part of this review, training officers and field officers were interviewed to determine both instructions and typical interpretations. In addition, a questionnaire was used to identify field officers' interpretations of these instructions.

Task B: Review Designated Accident Reports

The accident reports specified above were examined to determine (a) if the accident occurred in the maintenance or utility work zone; (b) if the accident was related to the presence of the work zone; and (c) if the accident occurred upstream of the work zone and was directly related to traffic conditions caused by the work zone. Other items on the accident report form (e.g., traffic control, light and surface conditions, roadway alignment, weather, and accident severity) were examined to further describe the characteristics of accidents in these areas.

The sample of accident reports used in the analysis consisted of those Virginia accident report forms (FR-300) for the state highway system marked "Road Under Repair" that could not be related to accidents having occurred in construction zones. Fourteen months of accident data were used in the analysis.

Task C: Assess Completeness of Work Zone Accident Reports

Based on the results of Tasks A and B an assessment was made of the consistency and completeness of the reporting of maintenance and utility work zone accidents designated "Road Under Repair" and/or indicated in the "Accident Description" section of the accident report form. In addition, a separate assessment was made by reviewing all of the accident reports for several long-term construction projects to determine the number of reports not marked "Road Under Repair."

INSTRUCTIONAL REVIEW

Instruction

The Virginia Department of State Police conducts a comprehensive, in-house training program which is required for all prospective state troopers. Recruits first attend a 6-day, 53-hour orientation, after which they proceed immediately to field training wherein they "ride" with selectively chosen officers. This field training continues until the next regularly scheduled training school (training schools typically are scheduled at 6-month intervals). After attending the training school, which lasts 20 weeks (1,011 hours), the recruits become regular troopers.

Of particular interest in the present study was the training in accident investigation and reporting given recruits. Approximately 6 hours of in-class training are devoted to instruction in and discussion of accident investigation and reporting procedures. The instruction includes an examination of the instruction materials and discussion of written and oral assignments. Approximately 2 of the 6 hours are devoted specifically to instructions for filling out the accident reports. Copies of parts of the FR-300 accident report are included in the Appendix. It is noteworthy that on January 1, 1978, a new FR-300 with an extensively revised format was adopted.

In regard to the specific instructions for completing the FR-300, three items were of interest to this investigation, namely, the "Road Under Repair" designation, the "Accident Diagram", and the "Accident Description." An examination of the training materials (see references 1 and 2) and interviews with state police training officers indicated that the written and oral instructions were identical. The pertinent points of this instruction are described below.

The investigating officer is instructed to indicate on the FR-300 any road defects which contribute to the accident by checking off the appropriate item in the "Roadway Defects" block (see Figure 1). For the case where multiple responses are possible, the officer is instructed to indicate only the one item that is considered to have contributed most to the accident or that best describes its cause. For example, if the defect could be classified as "soft or low shoulders" and "under repair" the officer would have to decide which best describes the cause of the accident. From noting the different items in the "Road Defects" block and discussions with training officers it was assumed that some accidents that could be identified as "under repair" were in fact classified under a more explicit classification. No attempt was made, however, to determine how often this occurred.

Before January 1, 1978		After January 1, 1978	
DEFECTS (CHECK ONE)		ROAD DEFECTS	
X	Under Repair	1.	No Defects
_____	Loose Material	2.	Holes, Ruts, Bumps
_____	Holes, Ruts, Bumps	3.	Soft or Low Shoulders
_____	Soft or Low Shoulders	(4.)	Under Repair
_____	No Defects	5.	Loose Material
		6.	Restricted Width
		7.	Slick Pavement
		8.	Roadway Obstructed
		9.	Other Defects

Figure 1. Designation of "Road Under Repair" on accident report.

Completion of the "Accident Diagram" on the FR-300 consists of drawing the vehicle(s); indicating the path(s) of travel, including point(s) of impact; and noting approximate landmarks for locating the accident. For the "Accident Description" section, the officers are simply instructed to "write a summary of how the accident happened."

In regard to both the "Accident Diagram" and "Accident Description", guidelines are given by way of examples in both the initial trooper training program and the instruction manual. These guidelines indicate that factors contributing to the cause of the accident should be identified or detailed in these sections.

In regard to the initial trooper training, it should be noted that there was no change in the overall intensity of the training program in the last two years nor were there any changes in emphasis or instruction on the specific items identified above. It was recognized that there might be differences in instructions or emphasis in the different state police areas or districts throughout the state; however, no attempt was made to identify these possible differences.

It is also noteworthy that before the new accident report forms went into use (January 1, 1978), field training teams from state police headquarters were used to explain their use. While this instruction had no direct impact of importance to this study, it should be recognized that the use of the new forms probably changed the relative number of accidents being designated as "Road Under Repair." That is, by including more specific items under the category of Road Defects (see Figure 1) it is more likely that an "under repair" situation would be classified under one of the new and more specific items (e.g., restricted width or roadway obstructed) than under the items previously listed.

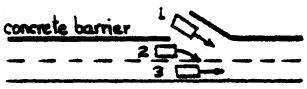
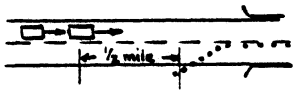
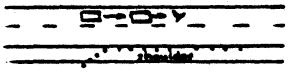
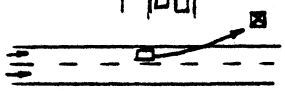
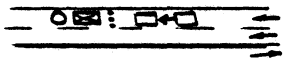
Trooper Questionnaire

The purpose of the troopers' questionnaire was to determine the personal guidelines or criteria used by the investigating officers in filling out the FR-300. In particular, the responses were used to determine the specific circumstances under which the troopers checked off "Road Under Repair." One hundred questionnaires representing roughly a 12% sample of active Virginia State Police troopers were used in the analysis. The troopers completing the questionnaire represented a variety of experience and areas of regular patrol (i.e., urban and rural) including different roadway types (i.e., interstate, primary, and secondary highways).

In the instructions for filling out the questionnaire, the troopers were advised that the questions were largely opinion type and that their personal responses, without discussion with others, were desired. The questionnaire with a summary of results is shown in Figure 2.

Question I was designed to determine the proportion of officers that would check off "Road Under Repair" in a variety of specific accident scenarios. A wide variety of scenarios was selected to make the choices more obvious and to reduce questionnaire bias. As shown in Figure 2, the responses to this question indicated that the troopers were likely to check off "Road Under Repair" when (1) the maintenance/utility activity was in or physically on the roadway, thus necessitating a lane closure; (2) when there was work related debris in the roadway; and (3) when there was a malfunction in the traffic control system. The questionnaire also showed that the troopers were less likely to check off "Road Under Repair" when the work activity was not physical repair of the roadway and when the first event in the accident sequence was not related to the work area (e.g., vehicle runs off road and hits some component of the work area).

I. Assume you are the investigating officer at the scene of an accident. In the following scenarios, please mark yes, if you would check off "under repair" for the category "roadway defects" on the FR 300.

		YES	NO
1.	 Construction vehicle (1) entering through opening in concrete barrier fails to yield to oncoming vehicle (2); vehicle (2) sideswipes vehicle (3).	39	61
2.	 Temporary lane closure for bridge repairs (using cones) creates substantial congestion upstream. Rear end collision takes place upstream of work area.	67	33
3.	Driver falls asleep - vehicle runs off road and hits construction barrels on shoulder.	20	80
4.	 Rear end collision; first vehicle stopping for cone blown into roadway from road work on shoulder.	56	44
5.	 Utility trench across two lane rural road filled in at night. Vehicle runs off road in curve due to dirt/mud left in roadway.	85	15
6.	Rear end collision with street sweeper; dust may have obscured driver vision.	16	84
7.	 Utility pole being set near edge of a two-lane rural road; poor advance sight distance of the work zone causes driver to over react and veer into path of oncoming car.	36	64
8.	Resurfacing operation has been completed on a two-lane rural road, but has yet to be marked (with edge lines and center lines); vehicle runs off road at night due to poor delineation in a curve.	46	54
9.	 Maintenance vehicle (X) working on overhead signal; sideswipe accident.	38	62
10.	 Vehicle runs off road at night and hits exposed storm drain (X) under construction in the middle of a 60' depressed open median; evident that no work has taken place in last few weeks.	4	96
11.	 Four-lane urban road; rear end collision due to lane closure for work in manhole.	63	37
12.	Run off road accident - skidding on loose gravel; tar and gravel treatment finished several days before but gravel still loose.	15	85

(See Reverse)

Figure 2. Trooper questionnaire.

II.

1. While investigating an accident, you may sometimes feel that certain changes in traffic control (e.g., better signing or delineation) could prevent future accidents. Have you ever made these suggestions to the VDH&T? If yes, briefly explain how (e.g., memo to Resident Engineer). (see text)

2. Check the item in the list below which best describes when you check "Road Under Repair."

11 If there are any M/U (maintenance or utility) traffic control devices in the area (e.g., cones, barriers, signs)

10 If there is any physical evidence of M/U work in the area. (e.g., new surface without pavement markings).

53 Only if M/U activity was a contributing factor in the accident.

17 Only if M/U activity was the direct cause of accident.

9 Other, briefly describe. (see text)

3. Check any of the activities below that you would classify as "Road Under Repair" if they were the direct cause of an accident.

Work Actually in Travel Way

YES	NO		YES	NO	
67	33	A. Painting Edge Line	61	39	F. Utility Trenching
14	86	B. Street Sweeping	100	0	G. Pot Hole Repair
95	5	C. Bridge Repair	18	82	H. Surveying
97	3	D. Resurfacing	86	14	I. Joint Repair
68	32	E. Manhole/Utility Work			

Work On Shoulder Or Beyond

YES	NO		YES	NO	
70	30	J. Grading Shoulder	92	8	P. Lane Addition on Interstate
48	52	K. Guard Rail Repair	84	16	Q. Adding Left Turn in Median of Primary Road
19	81	L. Sign Replacement	87	13	R. Extending Accleration Ramp on Interstate
11	89	M. Tree Trimming			
19	81	N. Mowing	70	30	S. Construction of Overpass
17	83	O. Landscaping			

Longer Term Activities

4. General Comments (see text)

Figure 2. Continued.

While not related to the central purpose of the study, question II-1 (see Figure 2) was included to identify the frequency and mode of suggestions or recommendations the troopers had regarding the prevention of accidents at specific locations. The regular procedure used by the Virginia Department of State Police makes use of the Highway Hazard Report. This is a formal memorandum to the appropriate resident engineer which is initiated whenever some element of the highway environment requires correction or repair. It may be initiated through accident investigation or through routine patrol. For example, this form is used to alert the resident engineer that missing or damaged signs need to be replaced. In addition to noting that they had used the Highway Hazard Report, a number of the troopers (11%) indicated that they had also developed verbal lines of communication with resident engineers or maintenance shop supervisors.

Question II-2 was designed to examine the relationship between the maintenance-utility (M/U) activity and the cause of the accident. As shown in Figure 2 the majority of troopers (70%) indicated that they would check off "Road Under Repair" only if the M/U activity was a contributing factor or the direct cause of the accident. Twenty-one percent of the troopers said that only some indication of the M/U activity (i.e., traffic control devices or physical evidence of work) was necessary to warrant their checking "Road Under Repair." The remaining nine responses fell under the category of "other" and consisted of multiple responses.

The final question (II-3) was designed to determine how the troopers interpreted "road repair"; that is, which situations or work activities qualify as road repair and which do not. A variety of activities were chosen to reflect different work locations (i.e., on roadway, on shoulder, and beyond shoulder) and different work types (i.e., moving, less than one day, several days, and long-term construction activities).

The results of the questionnaire indicated that, as before, the troopers are not likely to check off "Road Under Repair" when the work activity is not concerned with physical repair of the roadway surface (e.g., sweeping, tree trimming, surveying, mowing, landscaping, and sign replacement). Excluding shoulder grading, only 22.8% of the troopers indicated that accidents directly caused by work activity on or beyond the shoulder would warrant checking off "Road Under Repair". In contrast, 82.0% indicated that work in the traveled way (excluding sweeping and surveying) would qualify. This is very close to the average response (83%) for the long-term construction activities listed (e.g., lane addition on interstate).

Space was provided at the end of the questionnaire for comments, and three comments were received. The first suggested that road repairs should not be done during peak traffic periods, a practice heartily endorsed by the Virginia Department of Highways and Transportation. The second comment suggested that improvements could be made in the Highway Hazard Report, and the third noted that in some cases accidents are caused by driver inattention while observing off-road work activities.

Through the trooper questionnaire it was shown that the troopers chose a highly literal interpretation of the phrase "Road Under Repair." That is, if the actual roadway was not under repair they were much less likely to check-off "Road Under Repair" than if it was. From this finding it was concluded that a fairly wide variety of M/U activities were not included in the sample of accidents used in the study. On the other hand, it was concluded that, generally, there was (in the subjective view of the investigating officers) a cause-effect relationship between the accidents and the work activity for those accidents that were designated "Road Under Repair."

Construction Project Check

For comparative purposes, a second approach was used to help identify how often the "Road Under Repair" designation was used. This consisted of determining the frequency with which the "Road Under Repair" designation was checked on accidents that occurred in known construction projects. Six projects were selected; in each case they involved a lane addition to an existing limited access highway within the last 5 years.

The results, summarized in Table 1, show that for the six selected construction projects, between 18% and 72% of all reported accidents were designated as "Road Under Repair." In contrast, the results of the trooper questionnaire indicated that 92% of the officers would check off "Road Under Repair" if the accident was directly caused by activity associated with such a lane addition. The disparity between these data suggests that the "Road Under Repair" designation was in fact being used by investigating officers to indicate a relationship between the accident and the work activity. Furthermore, the results suggest that the majority of accidents in areas of this type are in fact related to the work activity.

Table 1

Percentages of Accidents Designated as "Road Under Repair"

Project	Percentage of Accidents Designated as "Road Under Repair"			
	Project			Weighted Average
	A	B	C	
3 Projects Using Portable Concrete Barriers (Represent 16 Months of Data)	72	18	53	51
3 Projects Using Timber Barricades (Represent 20 Months of Data)	69	66	38	63
	Weighted Average			62

ANALYSIS OF ACCIDENT REPORTS

Methodology

To examine the nature of M/U zone accidents an analysis was undertaken to (1) identify the specific characteristics of M/U accidents, and (2) compare selected characteristics of those accidents with the characteristics of Virginia traffic accidents in general. To facilitate this analysis approximately 50 items of information from the FR-300 forms were coded for automatic data processing. While a regular state coding procedure was available, (see reference 3) a separate procedure was used because the analysis required several pieces of data that are not included in the state's coding. This separate coding was possible because of the relatively few number of accidents used in the analysis.

The sample of M/U accidents used was based on those accident reports for the state highway system* from March 1977 through April 1978 where "Road Under Repair" was designated and the work activity could not be identified as a construction project.**

*The state highway system accounts for approximately 81% of the total mileage of roads in Virginia. It consists primarily of the interstate system and all nonurban roads. Roughly 72% of the annual vehicle miles of travel occur on the state highway system.

**Virginia law requires the reporting of all accidents in which persons are injured or killed or in which property damage of $250 or more occurs.

In determining if the "Road Under Repair" designation referred to construction activity the following general criteria were used. Construction activity was characterized as work —

1. being performed by a contracting agency,
2. involving an improvement to design standards, and
3. being more expensive and longer in duration than M/U work.

Maintenance activity, on the other hand, was characterized as work —

1. being performed by highway agency personnel,
2. involving restoration of previous conditions and
3. requiring less time and money than construction activity, or
4. being performed by utility company personnel.

As noted above, where possible selected characteristics of the M/U accidents were compared with those of motor vehicle accidents in general. Since the sample of M/U accidents examined included primarily rural accidents, "all 1977 rural accidents" were used as the basis for comparison. Because of the time constraints on the study, only published summary data were available for the "all 1977 rural accidents". Consequently, some desirable comparisons could not be made. Also, since slightly different time periods were involved, only rate comparisons could be made.

Since March 1977 approximately 3.0% of all the rural motor vehicle accident reports (roughly 68,500 per year) have come under the designation fo "Road Under Repair". For the 14 months of accident data used in this analysis, all but 280 accidents were identified as having occurred in construction areas. This figure represents approximately 13% of the "Road Under Repair" accidents and 0.4% of the total number of reported accidents on the rural state highway system.*

The next section describes the procedure used to identify the accident reports used in this analysis, and the succeeding sections describe the characteristics of those accidents, including accident location, time of accident, roadway and environmental factors, characteristics of the work zone, accident causes, and accident severity.

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*It is noteworthy that 70% of the 280 accident reports were completed by State Police officers. The remaining 30% were completed by county police officers (26%) and town police (4%) who used the same training materials discussed earlier. No significant differences in reporting were observed between the different groups.

Accident Location

Accident location was identified by locality type and by route type. As shown in Table 2, over half of the M/U accidents occurred in areas designated as "open country". A comparison with all 1977 rural accidents shows only a relatively larger number of M/U accidents in residential areas.

Table 2

Accident Location by Locality Type

Location Type	M/U Accidents		All 1977 Rural Accidents, Percent*
	Number	Percent	
Open Country	159	56.8	58.2
Business/Industrial	54	19.3	19.2
Residential	44	15.7	20.0
Other & Not Stated	23	8.2	2.6
Total	280	100.0	100.0

*Source: Virginia Crash Facts, 1977.

In Table 3 accidents are shown by route classification. As shown, the M/U accidents are most common at grade intersections and on primary and secondary highways. The comparison with all 1977 rural accidents only shows that relatively fewer M/U accidents occur at intersections.

Additional information on accident location by roadway type is given in Table 4. As shown, over half of the reported M/U accidents occurred on two-lane roads. Comparable data for all 1977 accidents were not available. However, the information in Table 4, coupled with that above, indicates that in general M/U accidents are relatively more prevalent on two-lane primary and secondary highways, and at grade intersections.

Table 3

Accident Location by Route Classification

Route Type	M/U Accidents		All 1977 Rural Accidents, Percent*
	Number	Percent	
Intersection	87	31.1	44.4
Interstate	32	11.4	
Primary	77	27.5 (68.9)	55.6
Secondary	74	26.4	
Interchange	10	3.6	
Total	280	100.0	100.0

*Source: Virginia Crash Facts, 1977.

Table 4

M/U Accidents by Type of Roadway

Roadway Type	Number	Percent
Two Lane	160	57.1
Four Lane		
Undivided	12	4.3
No Access Control	20	7.1
Partial Access Control	25	8.9
Full Access Control	36	12.9
Six Lane	10	3.6
All Others and Not Stated	17	6.1
Total	280	100.0

Within the location analysis, an attempt was made to establish a relationship between the number of M/U accidents and highway maintenance expenditures at the district level.* Unfortunately, this approach provided no useful information.

Time of Accident

All of the M/U accidents were identified by month and by hour of the day. Figure 3 shows the monthly variation. As expected, M/U accidents are more frequent in the warmer months when regular maintenance and utility work is typically scheduled. From May to October there were an average of 31.5 accidents per month. During the rest of the months in the March '77 to February '78 period the rate dropped to 11.1 accidents per month.

The breakdown of M/U accidents by the hour of day is shown in Figure 4. As can be seen, the lowest number of accidents occur in the late evening and early morning hours. There is a small peak during the typical morning traffic peak (7-9 a.m.); the number then rises steadily to late afternoon (3-5 p.m.), then drops off rapidly. Not unexpectedly, the hourly variation in M/U accidents matches the variation in all 1977 accidents. The one notable exception is that there are relatively more M/U accidents from midmorning (10 a.m.) to midafternoon (3 p.m.). This exception is due, no doubt, to the relatively larger amount of maintenance and utility activity that occurs during this period.

*Virginia is divided into eight highway districts.

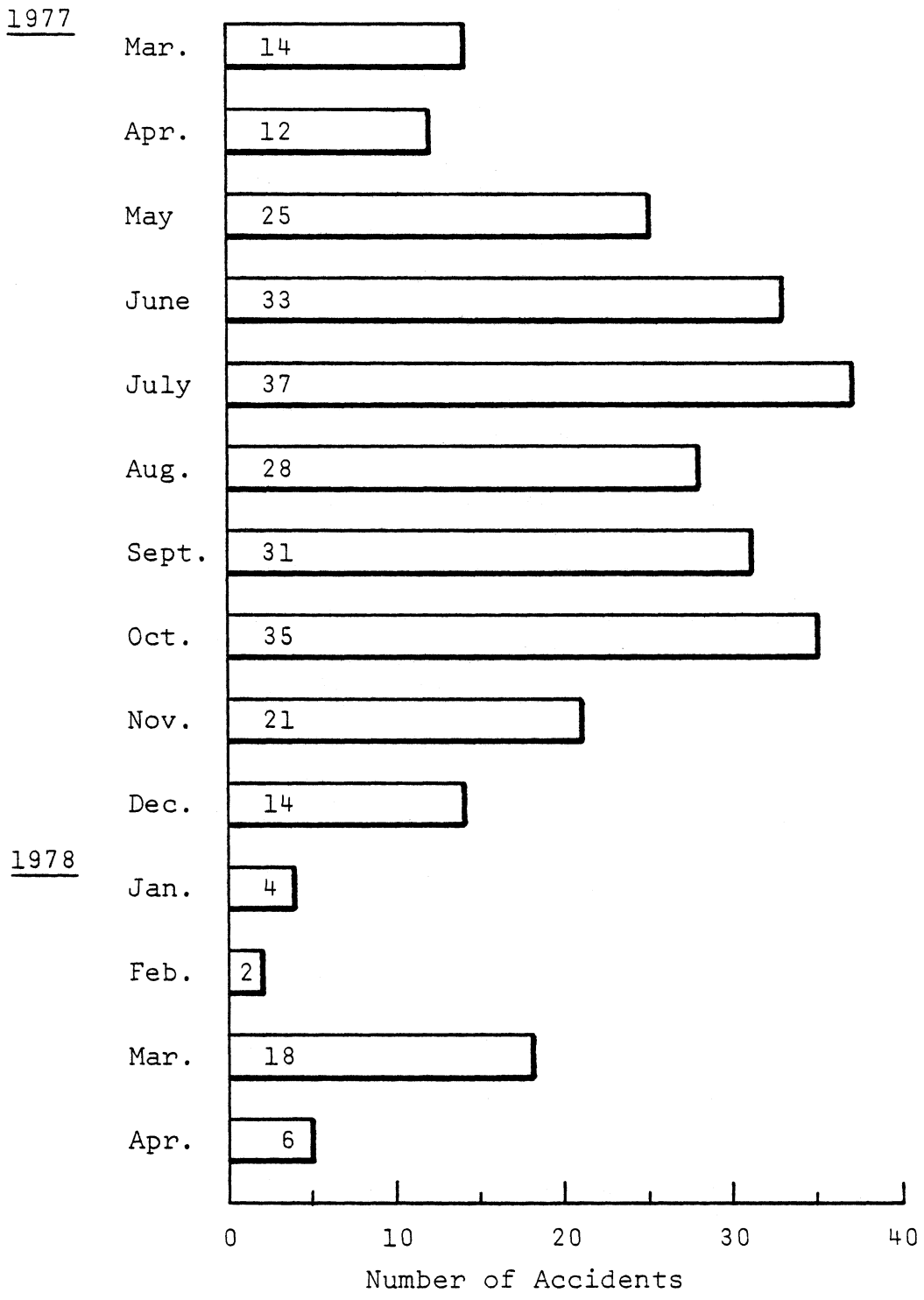

Figure 3. M/U accidents by month.

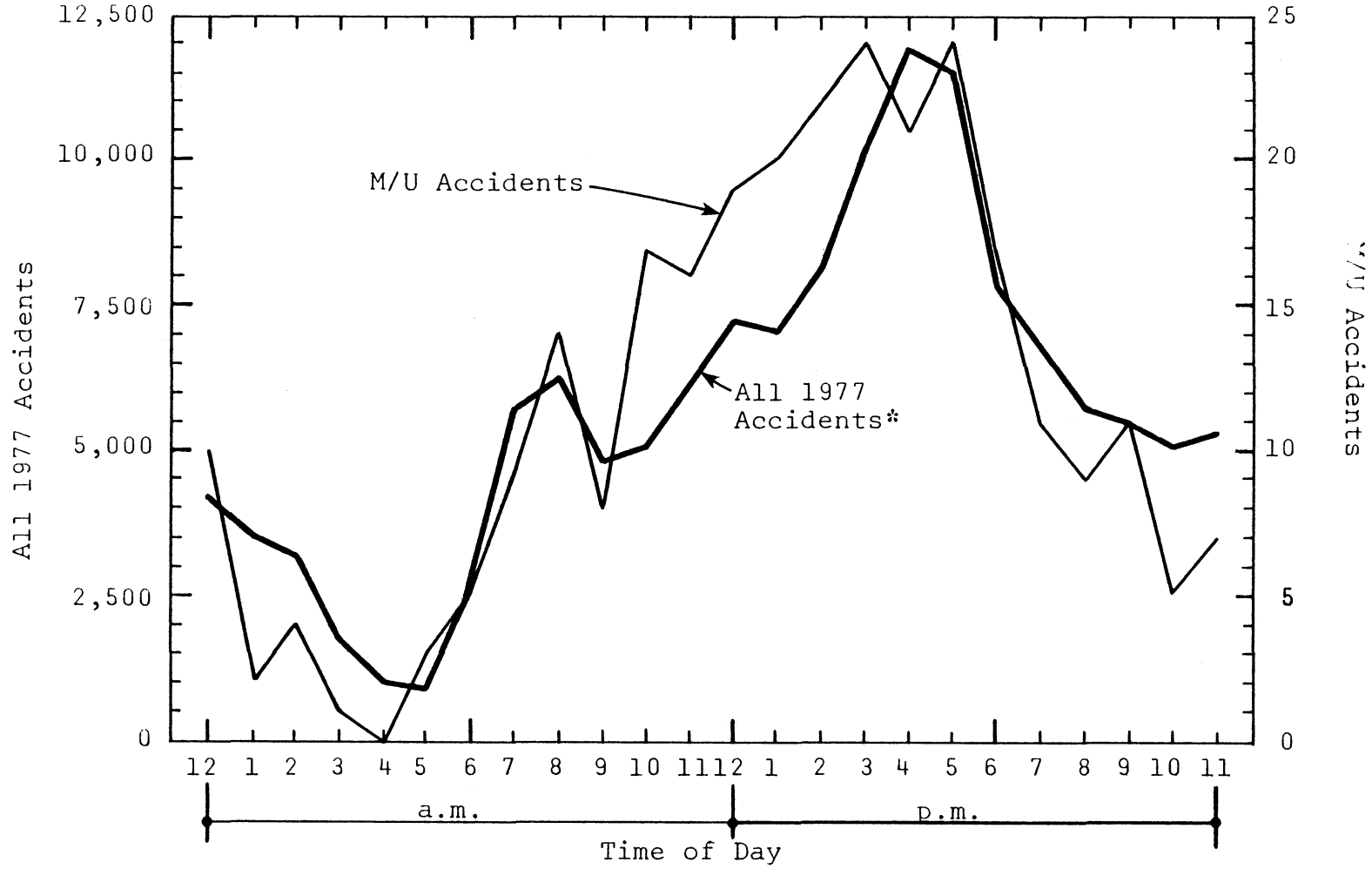

Figure 4. Accident by time of day.
*Source: Virginia Crash Facts, 1977.

Roadway and Environmental Factors

In this section the results of an examination of roadway alignment, surface condition, and light and weather conditions are presented. Since the information for these factors is regularly coded on all accident reports, comparisons between M/U accidents and all 1977 rural accidents were possible.

Table 5 shows the number of accidents that occurred on different types of roadway alignments. As can be seen there is reasonably close agreement between the M/U accidents and all 1977 rural accidents. The notable exceptions are the relatively larger number of M/U accidents under straight-grade conditions and the relatively fewer M/U accidents under level-curve conditions. The first exception suggests that there may be braking problems in work areas located on grades.

Accidents are broken down by road surface condition in Table 6. Over 80% of both the M/U accidents and all 1977 rural accidents occurred on dry pavement. The slightly higher percentage of M/U accidents occurring on muddy and oily surfaces may have been a direct influence of the work activity. This speculation could not, however, be verified from the accident reports. The lower percentage of M/U accidents on wet pavement may suggest that motorists are more cautious under these conditions or that M/U work activity is curtailed during wet weather.

Table 7 shows the breakdown of accidents by light conditions. Approximately 75% of the M/U accidents occurred during daylight compared to 60% for all 1977 rural accidents. This is due most likely to the fact that more M/U work activity is performed under daylight than under other conditions. The other major difference between the M/U accidents and all 1977 rural accidents is the relatively fewer number of M/U accidents under the "darkness — road not lighted" condition. This finding suggests that less M/U work is performed at night, that traffic control techniques used at night are effective, or both.

In Table 8 accidents are shown by weather conditions. The only significant difference between the M/U accidents and all 1977 rural accidents is the relatively fewer number of M/U accidents occurring under rainy conditions. As noted above, this finding may suggest that motorists are more cautious under these conditions or that M/U work activity is curtailed during rainy weather.

Table 5

Accidents by Road Alignment

Alignment	M/U Accidents		All 1977 Rural Accidents, Percent*
	Number	Percent	
Level-Straight	124	44.4	42.8
Level-Curve	15	5.4	12.8
Grade-Straight	75	26.9	20.5
Grade-Curve	47	16.8	17.2
Hillcrest-Straight	14	5.0	3.7
Hillcrest-Curve	2	0.7	1.5
Dip-Straight	1	0.4	0.9
Dip-Curve	1	0.4	0.6
Not Stated	1	**	**
Total	280	100.0	100.0

*Source: Virginia Crash Facts, 1977.

**Not included in percent calculations.

Table 6

Accidents by Road Surface Condition

Surface Condition	M/U Accidents		All 1977 Rural Accidents, Percent*
	Number	Percent	
Dry	229	82.1	77.9
Wet	38	13.6	21.7
Muddy	6	2.2	0.2
Oily	6	2.2	0.2
Other and Not Stated	1	**	**
Total	280	100.0	100.0

*Source: Virginia Crash Facts, 1977.

**Not included in percent calculations.

Table 7

Accidents by Light Conditions

Light	M/U Accidents		All 1977 Rural Accidents, Percent*
	Number	Percent	
Daylight	211	75.4	60.1
Dusk	8	2.9	3.5
Dawn	6	2.1	1.4
Darkness — Road Not Lighted	40	14.3	27.5
Darkness — Road Lighted	15	5.4	7.5
Not Stated	0	0.0	**
Total	280	100.0	100.0

*Source: Virginia Crash Facts, 1977.

**Not included in percent calculations.

Table 8

Accidents by Weather Conditions

Weather	M/U Accidents		All 1977 Rural Accidents, Percent*
	Number	Percent	
Clear	171	61.3	59.0
Cloudy	76	27.2	25.1
Raining	19	6.8	11.6
Mist	10	3.6	3.0
Fog	2	0.7	1.3
Dust or Smoke	1	0.4	0.0
Other and Not Stated	1	0.4	**
Total	280	100.0	100.0

*Source: Virginia Crash Facts, 1977.

**Not included in percent calculations.

Characteristics of the Work Zone

This section reports on several characteristics of the M/U work zones that were examined. These include the type of work activity being performed, the characteristics of the traffic control used, and the location of the accident within the work zone. Data for this examination were taken almost entirely from the "Accident Diagram" and "Accident Description" sections of the accident reports. Table 9 shows the frequency with which the work zone was cited in these sections.

Table 10 shows that in only 54 of the 280 M/U accidents (19.3%) was the nature of the work activity described in the Accident Diagram or Accident Description. In half of those 54 accidents, the work activity was identified as resurfacing operations.

Table 11 also gives some information on the nature of the work activity. In 54 of the 280 accident reports (19.3%) a lane closure was indicated. In 23 of the reports (8.2%) the presence of a flagman or an automatic signal was noted in the "Accident Diagram" or "Accident Description". From other information coded on the reports, however, a traffic officer or flagman was cited as the type of traffic control in 9.8% of the accidents.

Not shown in Table 11 is the fact that temporary speed limit signs were indicated as being in use in 18.2% of the work areas and that 14.2% of the accident reports indicated the presence of slow or warning signs. No traffic control was noted on 29.1% of the M/U accident reports.

Table 9

Indication of the Work Zone in the Accident Diagram and Accident Description

Indication In	Number	Percent
Diagram Only	24	8.6
Description Only	55	19.6
Both	54	19.3
Neither	147	52.5
Total	280	100.0

Table 10

M/U Accidents by Type of Work Zone

Type of Work Zone	M/U Accidents	
	Number	Percent
Work in Roadway		
Pavement Marking	2	0.7
Pothole Repair	4	1.4
Trenching	3	1.1
Sweeping/Washing	3	1.1
Resurfacing	27	9.6
Bridge Deck Repair	8	2.9
Grading/Stabilizing Shoulder	3	1.1
Work Beyond Shoulder	4	1.4
Unknown	226	80.7
Total	280	100.0

Table 11

M/U Accidents by Work Zone Characteristics and Traffic Control

Characteristic	Number	Percent
Lane(s) Closed	54	19.3
Lane Narrowed	4	1.4
Shoulder Closed	14	5.0
Work Beyond Shoulder	4	1.4
Flagman/Signal	23	8.2
Unknown	181	64.7
Total	280	100.0

In addition to the location analysis described above, a microscopic approach was used to locate the accident within the work zone. For this analysis the area surrounding a typical work area was divided into six overlapping areas (see Figure 5). From the information in the Accident Diagram and the Accident Description, locations for 122 of the 280 reported accidents were determined.

As shown in Figure 5, 59 accidents (48.4% of those located) occurred immediately adjacent to the work area. Further analysis showed that 15.3% of these were rear end accidents, 13.5% side-swipe, 10.2% fixed object in roadway, and 8.5% angle accidents. Of the 46 accidents positively located in advance of the work area, 34.8% were identified as being rear end type.

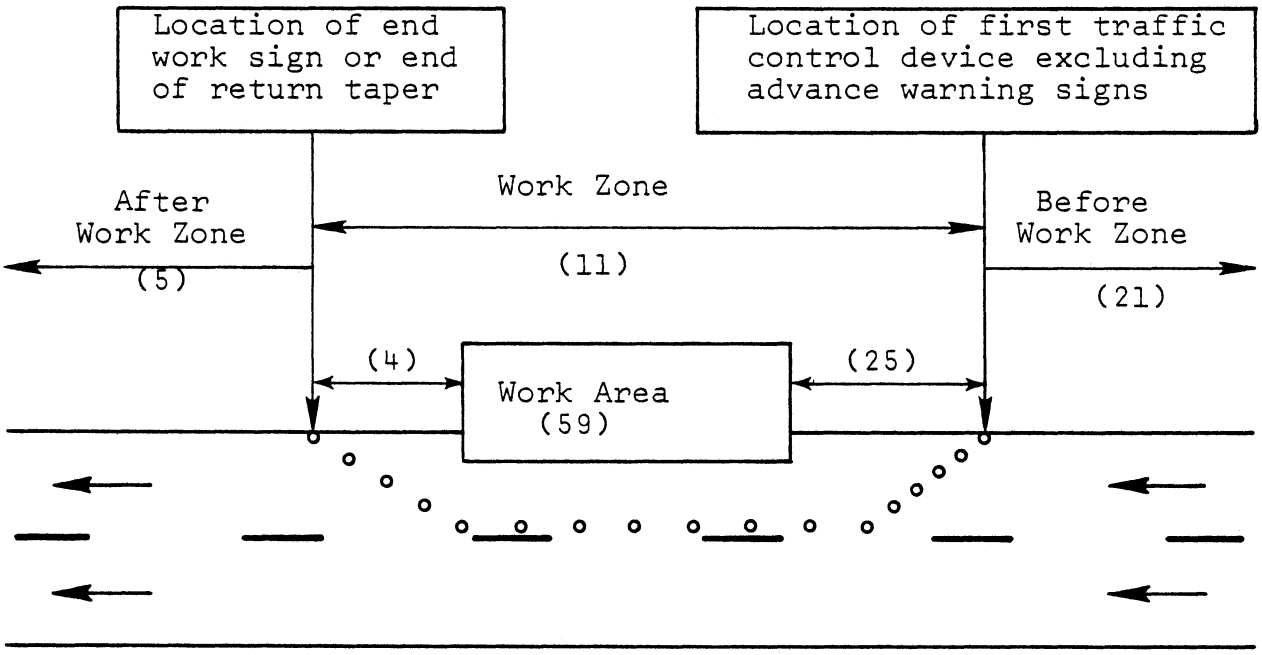

Figure 5. Accident location within the work zone. (Note: Numbers in parentheses indicate the number of accidents located in that area.)

Factors Relating to the Cause of the Accident

In this section several factors relating to the causes of M/U accidents are identified. These factors include the principal cause of the accident, the type of collision, traffic violations, and the relationship between the accidents and traffic congestion. The data used were taken largely from the "Accident Diagram" and "Accident Description" sections. However, in some cases, information was available from items regularly coded on the accident reports. Consequently, some comparisons could be made between M/U accidents and all 1977 accidents.

Table 12 shows that the primary cause of 221 of the M/U accidents (79%) was driver error. In only 49 of the accidents (18%) was some specific characteristic of the M/U activity cited as the primary cause. Nearly 70% of these were due to Unsafe Movement of M/U Vehicles (e.g., pulling out into traffic) and Road Defects or M/U Debris (e.g., loose material on roadway).

While most of the accidents were in fact attributed to driver error, the specific cause of the error was of interest. For example, why didn't the motorist perceive the need to reduce speed or yield to a lane closure when specifically instructed to do so? Obviously questions of this type could not be answered in this investigation; however, they do point to two critical underlying questions. How much additional caution should the motorist be expected to exercise while traveling through an M/U work area? And, what are the most effective methods of communicating to the driver the need for increased caution?

The types of collisions in M/U accidents are shown in Table 13. As shown, the greatest percentage of collisions by type were rear end accidents (29.4%), followed by angle collisions (15.2%), and non-collision (14.9%). Of the 48 vehicles that hit fixed objects, 7 were identified as hitting work zone barriers or signs, and 13 as having collided with M/U vehicles or equipment. A comparison of the M/U accidents with 1976 accident data for the state network indicates that rear end type accidents were roughly 50% more common in M/U areas.*

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*Data for 1976 shows that approximately 19% of all accidents on the state network were rear end accidents.

Table 12

Principal Cause of M/U Accidents

Cause	Number of Accidents
DRIVER ERROR INDICATED	221
Speed And Too Fast For Conditions	54
Driver Inattention	45
Did Not Have Right-Of-Way	43
Following Too Closely	38
On Wrong Side Of Road	21
Improper Passing Or Backing	20
M/U ACTIVITY ERROR INDICATED	49
Unsafe Movement Of M/U Vehicle	17
Road Defect Or M/U Debris	17
Inadequate Advance Signing	5
Poor Delineation Of Work Area	4
Inadequate Transition	3
Poor Pavement Delineation	2
Flagman Error	1
OTHER AND UNKNOWN	10
TOTAL	280

Information on traffic violations was taken directly from the regularly coded data on the accident reports. This information consists of the number of drivers that were cited with traffic violations as a result of the accident. As shown in Table 14, the breakdown of violations in M/U accidents is quite similar to that for all 1977 rural accidents. There is a slight tendency, however, for M/U accidents to involve relatively more improper passing and following too closely violations. In both the M/U accidents and all 1977 rural accidents roughly 52% of the drivers were cited with some violation.

Table 13

M/U Accidents by Type of Collision

Type of Collision	Number of Accidents	Percent of Accidents
Rear End	79	29.4
Angle	41	15.2
Head-On	9	3.3
Sideswipe — Same Direction	22	8.2
Sideswipe — Opposite Direction	12	4.5
Fixed Object in Roadway	20	7.4
Fixed Object off Roadway	28	10.4
Non-Collision	40	14.9
Pedestrian & Bicycle	5	1.9
Backed Into	13	4.8
Other & Not Stated	11	*
Total	280	100

*Not included in percent calculations.

One of the primary tasks of the study was to determine if M/U accidents were related to traffic congestion in the work zone. This determination was made by subjective consideration of the information regularly coded on the accident reports and that contained in the "Accident Diagram" and "Accident Description" sections. As shown in Table 15, the results of this investigation indicated that congestion was at least a contributing factor in 78 of the 280 M/U accidents (27.9%). There was no way to determine if the congestion was due to the work activity, except in a very few cases where the investigating officer made direct comments to this effect in the "Accident Description".

Table 14

M/U Accidents by Traffic Violations

Driver Actions	M/U Accidents Number And (Percent)		All 1977 Rural Accidents (Percent)*
Exceeding Legal Speed Limit	28	(10.4)	(9.4)
Exceeding Safe Speed Limit	29	(10.8)	(12.6)
Improper Passing	15	(5.6)	(1.7)
Failure to Signal	1	(0.4)	(0.7)
Improper Turning and Backing	19	(7.1)	(5.1)
Following Too Close	42	(15.7)	(9.7)
Disregard Stop Sign	4	(1.5)	(1.6)
Disregard Traffic Signal	2	(0.7)	(1.2)
Didn't Have Right-of-Way	25	(9.3)	(16.1)
Other Violations	103	(38.5)	(41.9)
No Violations Or Not Stated	251	(**)	(**)
Total	519	100.0	100.0

*Source: Virginia Crash Facts, 1977.

**Not included in percent calculations.

Table 15

Was Congestion a Contributing Factor in the Accident?

Congestion	Number of Accidents	Percent of Accidents
Yes	78	41.9
No	108	58.1
Unable to Determine	94	*
Total	280	100.0

*Not included in percent calculations.

Accident Severity

To evaluate the relative severity of the M/U accidents, a variety of severity indicators where formulated. As shown in Table 16, the typical M/U accident was slightly more severe than the typical 1977 rural accident in that more vehicles were involved per accident. This was due perhaps to the relatively larger number of rear end accidents (and therefore the larger number of multiple vehicle accidents) in M/U areas than in all 1977 rural accidents. There was, however, a consistent, albeit small, tendency for the typical M/U accident to be less severe than all 1977 rural accidents in terms of personal injury and property damage. In all of the accident severity indicators the differences between the M/U accidents and all 1977 accidents were extremely small.

Table 16

Accident Severity

Severity Index	M/U Accidents	All 1977 Rural Accidents
No. of Vehicles Involved Per Accident	1.85	1.66
No. of Persons Killed* or Injured Per Accident	0.436*	0.464
Percent of Injury Accidents	29.6%	30.7%
Percent of Property Damage	70.0%	68.2%
Property Damage (Dollars) Per Accident	$1,027	$1,104**

*Only one fatality occurred in the 280 M/U accidents.
**Average property damage for all 1977 accidents, urban and rural.

SUMMARY AND CONCLUSIONS

The objective of this study was to determine the magnitude and characteristics of safety problems , in terms of reported accidents, that are associated with moving vehicular traffic around and through highway maintenance and utility work zones. This objective was accomplished by examining 14 months of Virginia accident reports where "Road Under Repair" was designated. Accidents occurring in construction projects were removed and the remaining sample was assumed to represent maintenance and utility work zone accidents. Because of the small sample used in the analysis, caution should be exercised in interpreting and generalizing the results.

Instructional Review

The first task involved a review of the written and oral instructions given State Police for using the "Road Under Repair" designation and "Accident Diagram" and "Accident Description" sections of the accident reports. As part of this review a questionnaire was used to identify field troopers' interpretation of the instructions. The major finding of this review was that the investigating officers used a highly literal interpretation of the "Road Under Repair" designation. That is, they were not likely to mark an accident as "Road Under Repair" unless the roadway was physically under repair or the first event in the accident was related to the work zone. It was concluded, therefore, that a wide variety of accidents that occurred in maintenance and utility zones were probably not included in the sample of accidents used in this analysis because they did not have the "Road Under Repair" designation. Based on the results of the trooper questionnaire and the types of work activity cited in the accident reports, it was subjectively estimated that half of the accidents that occurred in M/U areas were not designated "Road Under Repair".

Accident Characteristics

The primary purpose of analyzing the M/U accident reports was to determine if (1) the accident occurred in the work zone; (2) if the accident was related to the presence of the work zone; (3) if the accident occurred upstream of the work zone and was directly related to traffic conditions caused by the work zone. For this study 280 accidents occurring from March 1977 through April 1978 were identified as carrying the "Road Under Repair" designation and not being associated with construction activity. These 280 accidents made up 13% of the 1.5% of the accidents that were designated as "Road Under Repair". (These 280 accidents represented approximately 0.2% of the total number of reported accidents.)

The major findings of this analysis are as follows:

1. In contrast to all 1977 rural accidents, M/U accidents were more likely to occur in straight-grade alignments, and from midmorning to late afternoon; they were less likely to occur in rainy weather, at night, in residential areas and at intersections. Rear end type accidents were 50% more common in M/U areas when compared to all 1976 accidents on the state network.

2. Nearly 60% of all the M/U accidents studied occurred on two-lane roads; they were also nearly three times more frequent in the period from May to October than during the rest of the year.

3. In roughly half of the M/U accident reports the "Accident Diagram" and/or "Accident Description" was used to identify some characteristic of the work activity or associated traffic control. The actual type of work activity was identified, however, in only 20% of the reports. Nearly half of these were resurfacing operations.

4. In 122 of the 280 accidents the specific location of the crash relative to the work zone was identified. From this information it was determined that 16 of the 46 accidents (35%) that occurred in advance of the work zone were rearend accidents.

5. In 78 of the 280 accidents (28%) traffic congestion was identified as being at least a contributing factor. In 94 of the reports no determination could be made.

6. In only 49 of the 280 accidents (18%) was some aspect of the M/U work activity or traffic control cited as the principal cause of the accident.

7. On the average, M/U accidents involved slightly more vehicles per accident than did the average 1977 rural accident. The average property damage and number of persons killed or injured per M/U accident, however, was slightly less than the average reported for all 1977 rural accidents.

RECOMMENDATIONS FOR FUTURE STUDY

Based on the results of this investigation the following recommendations for future study are made. First, research should be undertaken to determine: (1) in general, how much additional caution the typical motorist should be expected to exercise when traveling in highway maintenance and utility work areas, and (2) specifically, the most effective methods of communicating the need for increased caution to the motorist. In this regard it is recommended that research on the effectiveness of various traffic control practices and devices in highway work areas be continued.

Because of the inherent difficulties involved in using accident data it is recommended that research be undertaken to evaluate highway work area traffic control procedures by criteria other than reported accidents. The application of methods such as the traffic

conflicts technique to a variety of field installations may provide a great deal of insight into what motorists expect to encounter.

Finally, it is recommended that a study be undertaken to determine the special traffic control problems and needs in highway work zones in urbanized areas.

REFERENCES

1. Instructions for the Filing of Accident Report Forms SR-300 Police, Commonwealth of Virginia, Department of State Police and Division of Motor Vehicles (Used prior to January 1, 1978).

2. Police Officer's Instruction Manual for Investigating Traffic Accidents FR-300M, Commonwealth of Virginia, Division of Motor Vehicles (used after January 1, 1978).

3. Coding Manual for Highway Analysis of Motor Vehicle Accidents, Joint Venture of the Department of State Police — Division of Safety and the Department of Highways — Division of Traffic and Safety, Commonwealth of Virginia, January 1, 1977.

4. Virginia Crash Facts, 1977, Department of State Police, Commonwealth of Virginia.

5. Summary of Accident Data, 1976, Department of Highway and Transportation, Commonwealth of Virginia.

APPENDIX

ACCIDENT REPORT FORMS

Accident Report Form (sides 1 and 2) Used prior to January 1, 1978

Accident Report Form (with overlay) Used since January 1, 1978

1536

IF A QUESTION DOES NOT APPLY, ENTER AN "X". IF AN ANSWER IS UNKNOWN, ENTER A "U". "OTHER" - EXPLAIN IN ACCIDENT DESCRIPTION. FR-300P 1/78

1 TRAFFIC CONTROL

1. NO TRAFFIC CONTROL
2. OFFICER OR WATCHMAN
3. TRAFFIC SIGNAL
4. STOP SIGN
5. SLOW OR WARNING SIGN
6. TRAFFIC LANES MARKED
7. NO PASSING LINES
8. YIELD SIGN
9. ONE WAY ROAD OR STREET
10. RAILROAD CROSSING WITH MARKINGS AND SIGNS
11. RAILROAD CROSSING WITH SIGNALS
12. RAILROAD CROSSING WITH GATE AND SIGNALS
13. OTHER

2 WAS TRAFFIC CONTROL DEVICE WORKING BEFORE ACCIDENT?

1. YES
2. NO

3 ALIGNMENT

1. STRAIGHT - LEVEL
2. CURVE - LEVEL
3. GRADE - STRAIGHT
4. GRADE - CURVE
5. HILLCREST - STRAIGHT
6. HILLCREST - CURVE
7. DIP - STRAIGHT
8. DIP - CURVE
9. OTHER

4 WEATHER

1. CLEAR
2. CLOUDY
3. FOG
4. MIST
5. RAINING
6. SNOWING
7. SLEETING
8. SMOKE - DUST
9. OTHER

5 SURFACE CONDITION

1. DRY
2. WET
3. SNOWY
4. ICY
5. MUDDY
6. OILY
7. OTHER

6 ROADWAY DEFECTS

1. NO DEFECTS
2. HOLES, RUTS, BUMPS
3. SOFT OR LOW SHOULDER
4. UNDER REPAIR
5. LOOSE MATERIAL
6. RESTRICTED WIDTH
7. SLICK PAVEMENT
8. ROADWAY OBSTRUCTED
9. OTHER DEFECTS

7 LIGHT

1. DAWN
2. DAYLIGHT
3. DUSK
4. DARKNESS - STREET OR HIGHWAY LIGHTED
5. DARKNESS - STREET OR HIGHWAY NOT LIGHTED

8 KIND OF LOCALITY

1. SCHOOL
2. CHURCH
3. PLAYGROUND
4. OPEN COUNTRY
5. BUSINESS/INDUSTRIAL
6. RESIDENTIAL
7. INTERSTATE
8. OTHER

WHICH VEHICLE OCCUPIED

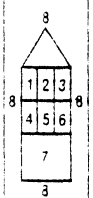
1. VEHICLE NO. 1
2. VEHICLE NO. 2
B. BICYCLIST
P. PEDESTRIAN
O. OTHER

POSITION IN/ON VEHICLE

-1. DRIVER 2-7. PASSENGERS
8. RIDING/HANGING ON OUTSIDE

SAFETY EQUIPMENT USED

1. NO RESTRAINT USED
2. LAP BELT
3. HARNESS
4. LAP BELT AND HARNESS
5. CHILD RESTRAINT
6. AIR BAG
7. OTHER



EJECTION FROM VEHICLE

1. NOT EJECTED
2. PARTIALLY EJECTED
3. EJECTED

BIRTH DATE MONTH DAY YEAR	SEX M/F

DRIVER'S ACTION

1. NONE
2. EXCEEDED SPEED LIMIT
3. EXCEEDED SAFE SPEED BUT NOT SPEED LIMIT
4. OVERTAKING ON HILL
5. OVERTAKING ON CURVE
6. OVERTAKING AT INTERSECTION
7. IMPROPER PASSING OF SCHOOL BUS
8. CUTTING IN
9. OTHER IMPROPER PASSING
10. WRONG SIDE OF ROAD - NOT OVERTAKING
11. DID NOT HAVE RIGHT - OF - WAY
12. FOLLOWING TOO CLOSE
13. FAIL TO SIGNAL OR IMPROPER SIGNAL
14. IMPROPER TURN - WIDE RIGHT TURN
15. IMPROPER TURN - CUT CORNER ON LEFT TURN
16. IMPROPER TURN FROM WRONG LANE
17. OTHER IMPROPER TURNING
18. IMPROPER BACKING
19. IMPROPER START FROM PARKED POSITION
20. DISREGARDED OFFICER OR WATCHMAN
21. DISREGARDED STOP - GO LIGHT
22. DISREGARDED STOP OR YIELD SIGN
23. DRIVER INATTENTION
24. FAIL TO STOP AT THROUGH HIGHWAY - NO SIGN
25. DRIVE THROUGH SAFETY ZONE
26. FAIL TO SET OUT FLARES OR FLAGS
27. FAIL TO DIM HEADLIGHTS
28. DRIVING WITHOUT LIGHTS
29. IMPROPER PARKING LOCATION
30. AVOIDING PEDESTRIAN
31. AVOIDING OTHER VEHICLE
32. AVOIDING ANIMAL
33. CROWDED OFF ROADWAY
34. HIT AND RUN
35. CAR RAN AWAY - NO DRIVER
36. BLINDED BY LIGHTS
37. OTHER VIOLATIONS

VEHICLE NO. 1 17
VEHICLE NO. 2 18

VEHICLE MANEUVER

1. GOING STRAIGHT AHEAD
2. MAKING RIGHT TURN
3. MAKING LEFT TURN
4. MAKING U - TURN
5. SLOWING OR STOPPING
6. STARTING IN TRAFFIC LANE
7. STARTING FROM PARKED POSITION
8. STOPPED IN TRAFFIC LANE
9. RAN OFF ROAD - RIGHT
10. RAN OFF ROAD - LEFT
11. PARKED
12. BACKING
13. PASSING
14. CHANGING LANES
15. OTHER

VEHICLE NO. 1 19
VEHICLE NO. 2 20

TYPE OF COLLISION

1. REAR END
2. ANGLE
3. HEAD ON
4. SIDESWIPE - SAME DIRECTION
5. SIDESWIPE - OPPOSITE DIRECTION
6. FIXED OBJECT IN ROAD
7. TRAIN
8. NON - COLLISION
9. FIXED OBJECT - OFF ROAD
10. DEER
11. OTHER ANIMAL
12. PEDESTRIAN
13. BICYCLIST
14. MOTORCYCLIST
15. BACKED INTO
16. OTHER

FIRST EVENT: VEHICLE WITH 21
SECOND EVENT: VEHICLE NO. 1 22
VEHICLE NO. 2 23

COLLISION WITH FIXED OBJECT

1. BANK OR LEDGE
2. TREES
3. UTILITY POLE
4. FENCE OR FENCE POST
5. GUARD RAIL OR POST
6. PARKED VEHICLE
7. BRIDGE, UNDERPASS, CULVERT, ETC.
8. SIGN, TRAFFIC SIGNAL
9. IMPACT CUSHIONING DEVICE
10. OTHER

VEHICLE NO. 1 24
VEHICLE NO. 2 25

DRIVER VISION OBSCURED

1. NOT OBSCURED
2. RAIN, SNOW, ETC. ON WINDSHIELD
3. WINDSHIELD OTHERWISE OBSCURED
4. VISION OBSCURED BY LOAD ON VEHICLE
5. TREES, CROPS, ETC.
6. BUILDING
7. EMBANKMENT
8. SIGNBOARD
9. HILL CREST
10. PARKED VEHICLES
11. MOVING VEHICLES
12. SUN OR HEADLIGHT GLARE
13. OTHER

VEHICLE NO. 1 26
VEHICLE NO. 2 27

COMMONWEALTH OF VIRGINIA
DIVISION OF MOTOR VEHICLES

POLICE ACCIDENT REPORT

INJURY TYPE

1. DEAD BEFORE REPORT MADE
2. VISIBLE SIGNS OF INJURY, AS BLEEDING WOUND OR DISTORTED MEMBER; OR HAD TO BE CARRIED FROM SCENE
3. OTHER VISIBLE INJURY, AS BRUISES, ABRASIONS, SWELLING, LIMPING, ETC.
4. NO VISIBLE INJURY BUT COMPLAINT OF PAIN OR MOMENTARY UNCONSCIOUSNESS

PEDESTRIAN ACTIONS

1. CROSSING AT INTERSECTION - WITH SIGNAL
2. CROSSING AT INTERSECTION - AGAINST SIGNAL
3. CROSSING AT INTERSECTION - NO SIGNAL
4. CROSSING AT INTERSECTION - DIAGONALLY
5. CROSSING NOT AT INTERSECTION - RURAL
6. CROSSING NOT AT INTERSECTION - URBAN
7. COMING FROM BEHIND PARKED CARS
8. GETTING OFF OR ON SCHOOL BUS
9. PLAYING IN ROADWAY
10. GETTING OFF OR ON OTHER VEHICLE
11. HITCHING ON VEHICLE
12. WALKING IN ROADWAY WITH TRAFFIC, SIDEWALKS AVAILABLE
13. WALKING IN ROADWAY WITH TRAFFIC, SIDEWALKS NOT AVAILABLE
14. WALKING IN ROADWAY AGAINST TRAFFIC, SIDEWALKS AVAILABLE
15. WALKING IN ROADWAY AGAINST TRAFFIC, SIDEWALKS NOT AVAILABLE
16. WORKING IN ROADWAY
17. STANDING IN ROADWAY
18. LYING IN ROADWAY
19. NOT IN ROADWAY
20. OTHER

CONDITION OF DRIVERS AND PEDESTRIAN

1. NO DEFECTS
2. EYESIGHT DEFECTIVE
3. HEARING DEFECTIVE
4. OTHER BODY DEFECTS
5. ILL
6. FATIGUED
7. APPARENTLY ASLEEP
8. OTHER HANDICAP

VEHICLE NO. 1 28
VEHICLE NO. 2 29
PEDESTRIAN 30

DRINKING

1. HAD NOT BEEN DRINKING
2. DRINKING - OBVIOUSLY DRUNK
3. DRINKING - ABILITY IMPAIRED
4. DRINKING - ABILITY NOT IMPAIRED
5. DRINKING - NOT KNOWN WHETHER IMPAIRED

VEHICLE NO. 1 31
VEHICLE NO. 2 32
PEDESTRIAN 33

VEHICLE CONDITION

1. NO DEFECTS
2. LIGHTS DEFECTIVE
3. BRAKES DEFECTIVE
4. STEERING DEFECTIVE
5. PUNCTURE OR BLOWOUT
6. WORN OR SLICK TIRES
7. MOTOR TROUBLE
8. CHAINS IN USE
9. OTHER DEFECTS

VEHICLE NO. 1 34
VEHICLE NO. 2 35

SKIDDING

1. BEFORE APPLICATION OF BRAKES
2. AFTER APPLICATION OF BRAKES
3. BEFORE AND AFTER APPLICATION OF BRAKES

VEHICLE NO. 1 36
VEHICLE NO. 2 37

9 10 11 12 13 14 15 16

NAMES OF INJURED - IF DECEASED, INCLUDE DATE OF DEATH

R. 300 Rev. 1-73

WITHIN 5 DAYS MAIL TO: DIVISION OF MOTOR VEHICLES, BOX 27412, RICHMOND, VIRGINIA 23261

(6-7) MONTH (8-9) DATE (10) YEAR (11) (12-13)

IME DATE OF ACCIDENT | DAY OF WEEK | HOUR | A.M | P.M

DO NOT WRITE IN THIS SPACE

NO 1537

(14-15-16)

COUNTY | CITY OR TOWN

(17)

L O C A T I O N

IF ACCIDENT OCCURRED IN RURAL AREA INDICATE DISTANCE IN MILES AND TENTHS OF MILE FROM NEAREST TOWN. USE TWO DISTANCES AND TWO DIRECTIONS IF NECESSARY.

MILES NORTH
MILES SOUTH
MILES EAST
MILES WEST

OF ☐ LIMITS OF CITY OR TOWN

CA

LET

LET

TYPE

ACCIDENT HAPPENED ON (18-19-20)

(21)

GIVE NAME OF STREET OR HIGHWAY NUMBER (U.S. OR STATE). IF NO HIGHWAY NUMBER, IDENTIFY BY NAME

(1-2-3-4-5)

NO

CODED BY

TYPE

CHECK AND COMPLETE ONE

☐ AT ITS INTERSECTION WITH - OR IF

NAME OF INTERSECTING STREET OR HIGHWAY NUMBER

☐ NOT AT INTERSECTION

FEET NORTH OF
FEET SOUTH
FEET EAST
FEET WEST

URBAN - LOCATE TO NEAREST INTERSECTING STREET, HOUSE NUMBER, BRIDGE, RAILROAD CROSSING, ALLEY, DRIVEWAY, UNDERPASS, NUMBERED TELEPHONE POLE, OR OTHER IDENTIFYING LANDMARK.

RURAL - LOCATE TO NEAREST INTERSECTION. SHOW EXACT DISTANCE USING TWO DIRECTIONS AND TWO DISTANCES IF NECESSARY.

(22)

FAT P.I. PD 50 P.D.U.

T T B.V.S. NSP OFF

R O A D

ALIGNMENT (CHECK ONE) (23)

1 ___ STRAIGHT-LEVEL
2 ___ CURVE-LEVEL
3 ___ GRADE-STRAIGHT
4 ___ GRADE-CURVE
5 ___ HILLCREST-STRAIGHT
6 ___ HILLCREST-CURVE
7 ___ DIP-STRAIGHT
8 ___ DIP-CURVE

SURFACE CONDITION (CHECK ONE) (24)

4 ___ DRY
5 ___ WET
6 ___ SNOWY
7 ___ ICY
8 ___ MUDDY
9 ___ OILY

DEFECTS (CHECK ONE)

12 ___ UNDER REPAIR
0 ___ LOOSE MATERIAL
1 ___ HOLES, RUTS, BUMPS
2 ___ SOFT OR LOW SHOULDER
3 ___ NO DEFECTS

TRAFFIC CONTROL (CHECK ONE) (25)

4 ___ OFFICER OR WATCHMAN
1 ___ STOP AND GO LIGHT
2 ___ STOP SIGN
3 ___ SLOW OR WARNING SIGN
7 ___ RAILROAD GATES OR SIGNALS
12 ___ TRAFFIC LANES MARKED
5 ___ NO PASSING LINES
0 ___ YIELD SIGN
9 ___ ONE WAY ROAD OR STREET
6 ___ RAILROAD WATCHMAN
8 ___ NO TRAFFIC CONTROL

KIND OF LOCALITY (CHECK ONE) (26)

12 ___ BUSINESS OR INDUSTRIAL
0 ___ RESIDENTIAL DISTRICT
1 ___ SCHOOL, CHURCH OR PLAYGROUND ZONE
2 ___ OPEN COUNTRY

LIGHT (CHECK ONE)

4 ___ DAYLIGHT
5 ___ DUSK
6 ___ DAWN
7 ___ DARKNESS-STREET OR HIGHWAY LIGHTED
8 ___ DARKNESS-STREET OR HIGHWAY NOT LIGHTED

WEATHER (CHECK ONE) **SURFACE** (27)

1 ___ CLEAR
2 ___ CLOUDY
3 ___ FOG
4 ___ MIST
5 ___ RAINING
6 ___ SNOWING
7 ___ SLEETING
8 ___ SMOKE-DUST

___ CONCRETE
___ BLACKTOP
___ BRICK
___ GRAVEL
___ DIRT
___ SPECIFY OTHER

V E H I C L E S

Your Vehicle-No. 1 (28) | (29) | (30) | *Office Use Only*

Make | Type (Sedan, Truck, Taxi, Bus, etc.) | Year | Was Vehicle Insured? Yes or No | Vehicle License Plate Year State Number | Ins. Code

Driver's Name First Middle Initial Last | Street or R.F.D. | City and State | (31) | Born (Mo., Day, Yr.) | (32) | Sex | Race | (33)

Driver's Occupation (34) Carpenter, Clerk, etc. | Driving Experience Years | Driver's License State Number | ☐ Chauffeur ☐ Operator ☐ Beginner | (35) | Soc. Sec. Number

Owner's Name First Middle Initial Last | Street or R.F.D. | City and State | Estimated Speed Before Acc. M.P.H. | (36-37) | Speed Limit M.P.H. | Maximum Safe Speed M.P.H.

Driver's License State Number | Was Safety Belt Installed? Yes ☐ No ☐ | Was Belt in use? Yes ☐ No ☐

Parts of Vehicle Damaged | Approximate Cost to Repair Vehicle $

Other Vehicle-No. 2 (38) | (39) | (40) | *Office Use Only*

Make | Type (Sedan, Truck, Taxi, Bus, etc.) | Year | Was Vehicle Insured? Yes or No | Vehicle License Plate Year State Number | Ins. Code

Driver's Name First Middle Initial Last | Street or R.F.D. | City and State | (41) | Born (Mo., Day, Yr.) | (42) | Sex | Race | (43)

Drivers Occupation (44) Carpenter, Clerk, etc. | Driving Experience Years | Driver's License State Number | ☐ Chauffeur ☐ Operator ☐ Beginner | (45) | Soc. Sec. Number

Owner's Name First Middle Initial Last | Street or R.F.D. | City and State | Estimated Speed Before Acc. M.P.H. | (46-47) | Speed Limit M.P.H. | Maximum Safe Speed M.P.H.

Driver's License State Number | Was Safety Belt Installed? Yes ☐ No. ☐ | Was Belt in use? Yes ☐ No ☐

Parts of Vehicle Damaged | Approximate Cost to Repair Vehicle $

NOTE! DO NOT WRITE IN BOXES.

nage to Property ier than Vehicles | (48)

Name Object, Show Ownership, and State Nature of Damage

Approximate Cost to Repair $

Name | Address

Age | (49) | Sex | (50) | Race

Nature and Extent of Injury | Was Person Killed

☐ Driver ☐ Passenger ☐ Pedestrian ☐ Bicyclist | In Vehicle No. | (51)

Name | Address

Age | (52) | Sex | (53) | Race

Nature and Extent of Injury | Was Person Killed

☐ Driver ☐ Passenger ☐ Pedestrian ☐ Bicyclist | In Vehicle No. | (54)

1528

LOCATION IN VEHICLE OF PERSONS KILLED AND INJURED.
(CHECK ONE FOR EACH PERSON KILLED AND INJURED)

	VEHICLE 1 2 (55) (56) KILLED	VEHICLE 1 2 (55) (56) INJURED
1 FRONT LEFT	___ ___	___ ___
2 FRONT CENTER	___ ___	___ ___
3 FRONT RIGHT	___ ___	___ ___
4 REAR LEFT	___ ___	___ ___
5 REAR CENTER	___ ___	___ ___
6 REAR RIGHT	___ ___	___ ___

INDICATE ON THIS DIAGRAM WHAT HAPPENED.

(57) (58)

INDICATE NORTH BY ARROW

INSTRUCTIONS

1. FOLLOW DOTTED LINES TO DRAW OUTLIN OF ROADWAY AT PLACE OF ACCIDENT.
2. NUMBER EACH VEHICLE AND SHOW DIRECT OF TRAVEL BY ARROW.
3. USE SOLID LINE TO SHOW PATH BEFORE ACCIDENT, DOTTED LI AFTER ACCIDENT
4. SHOW PEDESTRIAN BY:
5. SHOW RAILROAD BY:
6. SHOW DISTANCE AND DIRECTIONS T LANDMARKS: IDENTIFY LANDMARKS NAME OR NUMBER.

DESCRIBE WHAT HAPPENED

(REFER TO VEHICLES BY NUMBER)

USE THIS SPACE FOR LISTING ADDITIONAL INJURED PERSONS. ALSO EXPLAIN QUESTIONS NOT FULLY ANSWERED BY CHECKING IN THE SPACES PROVIDED AND REASON FOR SUBMITTING IF SUPPLEMENTARY

IF MORE SPACE IS NEEDED USE ANOTHER FORM OR A SHEET OF PAPER THE SAME SIZE

(59) OFFENSES CHARGED DRIVER?

DRIVERS' ACTIONS INDICATED (CHECK ONE FOR EACH DRIVER)

	DRIVER 1	DRIVER 2
	(60)	(63)
1 EXCEEDED SPEED LIMIT	___	___
2 EXCEEDED SAFE SPEED BUT NOT SPEED LIMIT	___	___
3 OVERTAKING ON HILL	___	___
4 OVERTAKING ON CURVE	___	___
5 OVERTAKING AT INTERSECTION	___	___
6 IMPROPER PASSING OF SCHOOL BUS	___	___
7 CUTTING IN	___	___
8 OTHER IMPROPER PASSING	___	___
9 WRONG SIDE OF ROAD-NOT OVERTAKING	___	___
	(61)	(64)
12 DID NOT HAVE RIGHT-OF-WAY	___	___
0 FOLLOWING TOO CLOSE	___	___
1 FAILED TO SIGNAL OR IMPROPER SIGNAL	___	___
2 IMPROPER TURN-WIDE RIGHT TURN	___	___
3 IMPROPER TURN-CUT CORNER ON LEFT TURN	___	___
4 IMPROPER TURN FROM WRONG LANE	___	___
5 OTHER IMPROPER TURNING	___	___
6 IMPROPER BACKING	___	___
7 IMPROPER START FROM PARKED POSITION	___	___
8 DISREGARDED OFFICER OR WATCHMAN	___	___
9 DISREGARDED STOP-GO-LIGHT	___	___
	(62)	(65)
12 DISREGARDED STOP OR YIELD SIGN	___	___
0 DISREGARDED SLOW SIGN	___	___
1 FAILED TO STOP AT THROUGH HIGHWAY-NO SIGN	___	___
2 DROVE THROUGH SAFETY ZONE	___	___
3 FAILED TO SET OUT FLARES OR FLAGS	___	___
4 FAILED TO DIM HEADLIGHTS	___	___
5 DRIVING WITHOUT LIGHT	___	___
6 IMPROPER PARKING LOCATION	___	___
7 OTHER VIOLATIONS	___	___
8 NO VIOLATIONS	___	___

MISCELLANEOUS (CHECK ONE ITEM FOR EACH DRIVER, IF APPLICABLE)

	DRIVER 1	DRIVER 2
	(66)	
12 AVOIDING PEDESTRIAN	___	___
0 AVOIDING OTHER VEHICLE	___	___
1 AVOIDING ANIMAL	___	___
2 SKIDDING-BEFORE APPLYING BRAKES	___	___
3 SKIDDING-AFTER APPLYING BRAKES	___	___
4 CROWDED OFF ROADWAY	___	___
5 HIT AND RUN	___	___
6 CAR RAN AWAY-NO DRIVER	___	___
7 BLINDED BY LIGHTS	___	___

PEDESTRIAN ACTIONS (CHECK ONE)

(67-68)

- 01 CROSSING AT INTERSECTION-WITH SIGNAL
- 02 CROSSING AT INTERSECTION-AGAINST SIGNAL
- 03 CROSSING AT INTERSECTION-NO SIGNAL
- 04 CROSSING AT INTERSECTION-DIAGONALLY
- 05 CROSSING NOT AT INTERSECTION-RURAL
- 06 CROSSING NOT AT INTERSECTION-URBAN
- 07 COMING FROM BEHIND PARKED CARS
- 08 GETTING OFF OR ON SCHOOL BUS
- 09 PLAYING IN ROADWAY
- 10 GETTING OFF OR ON OTHER VEHICLE
- 11 HITCHING ON VEHICLE
- 12 WALKING IN ROADWAY WITH TRAFFIC-SIDEWALKS AVAILABLE
- 13 WALKING IN ROADWAY WITH TRAFFIC-SIDEWALKS NOT AVAILABLE
- 14 WALKING IN ROADWAY AGAINST TRAFFIC-SIDEWALKS AVAILABLE
- 15 WALKING IN ROADWAY AGAINST TRAFFIC-SIDEWALKS NOT AVAILABLE
- 16 WORKING IN ROADWAY
- 17 STANDING IN ROADWAY
- 18 LYING IN ROADWAY
- 19 NOT IN ROADWAY

CONDITION OF DRIVERS AND PEDESTRIAN (CHECK ONE FOR EACH DRIVER AND PEDESTRIAN)

	DRIVER 1	DRIVER 2	PED
	(69)	(71)	(73)
9 NO DEFECTS	___	___	___
0 EYESIGHT DEFECTIVE	___	___	___
1 HEARING DEFECTIVE	___	___	___
2 OTHER BODY DEFECTS	___	___	___
3 ILL	___	___	___
4 FATIGUED	___	___	___
5 APPARENTLY ASLEEP	___	___	___
6 OTHER HANDICAP	___	___	___

(CHECK ONE FOR EACH DRIVER AND PEDESTRIAN)

	DRIVER 1	DRIVER 2	PED
	(70)	(72)	(74)
12 HAD NOT BEEN DRINKING	___	___	___
0 DRINKING-OBVIOUSLY DRUNK	___	___	___
1 DRINKING-ABILITY IMPAIRED	___	___	___
2 DRINKING-ABILITY NOT IMPAIRED	___	___	___
3 DRINKING-NOT KNOWN WHETHER IMPAIRED	___	___	___

VEHICLE CONDITION (CHECK ONE FOR EACH VEHICLE)

	VEHICLE 1	VEHICLE 2
	(75)	(76)
8 NO DEFECTS	___	___
1 LIGHTS DEFECTIVE	___	___
2 BRAKES DEFECTIVE	___	___
3 STEERING DEFECTIVE	___	___
4 PUNCTURE OR BLOWOUT	___	___
5 WORN OR SLICK TIRES	___	___
6 MOTOR TROUBLE	___	___
7 OTHER DEFECTS	___	___

WHAT DRIVERS WERE DOING (CHECK ONE FOR EACH DRIVER)

	DRIVER 1	DRIVER 2
GOING STRAIGHT AHEAD	___	___
MAKING RIGHT TURN	___	___
MAKING LEFT TURN	___	___
MAKING U TURN	___	___
SLOWING OR STOPPING	___	___
STARTING IN TRAFFIC LANE	___	___
STARTING FROM PARKED POSITIO	___	___
STOPPED IN TRAFFIC LANE	___	___
PARKED	___	___
BACKING	___	___
Passing	___	___

DRIVER VISION OBSCURED (CHECK ONE FOR EACH DRIVE

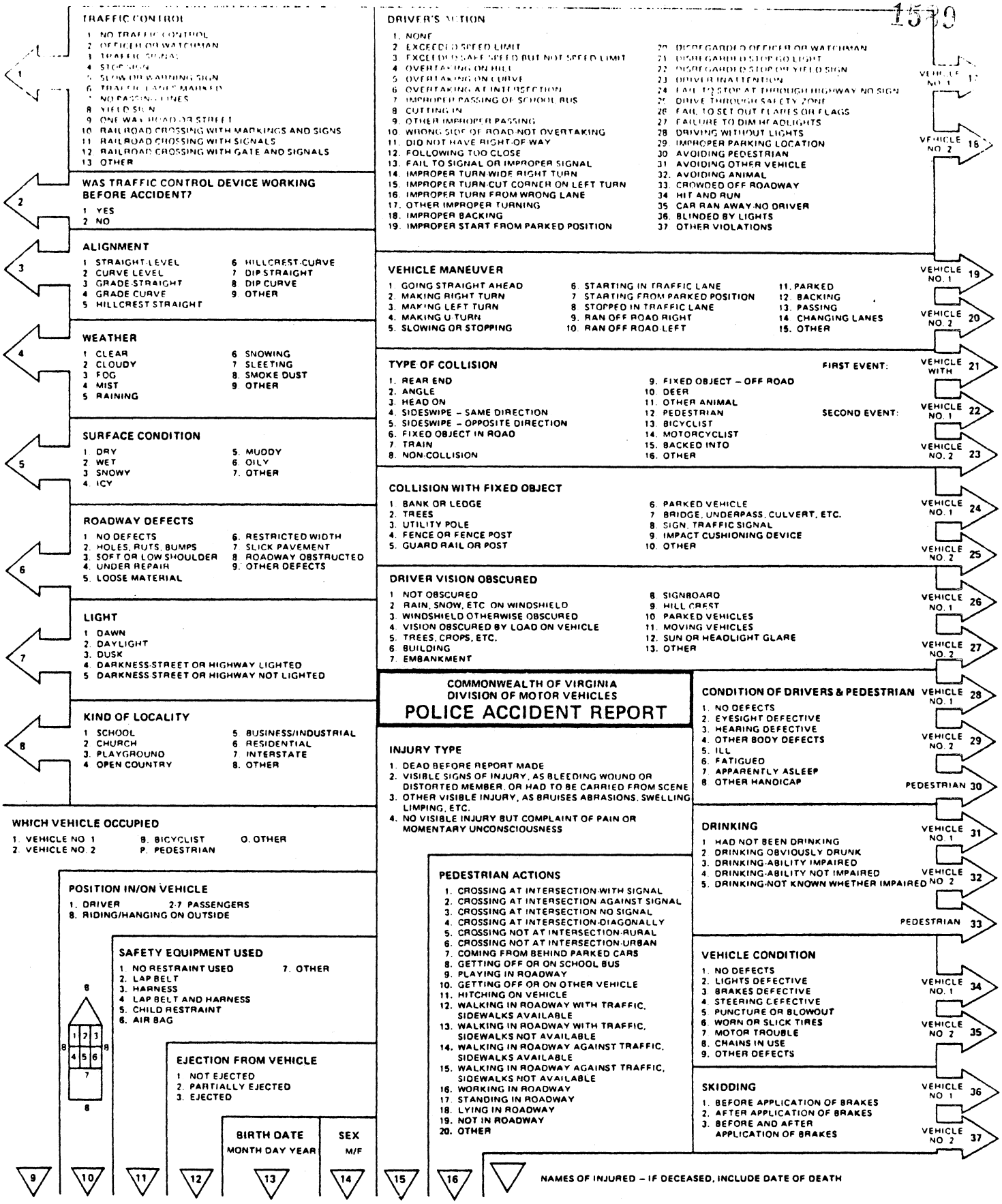
	DRIVER 1	DRIVER 2
RAIN, SNOW, ETC. ON WINDSHIELD	___	___
WINDSHIELD OTHERWISE OBSCURE	___	___
VISION OBSCURED BY LOAD OR VEH	___	___
TREES, CROPS, ETC.	___	___
BUILDING	___	___
EMBANKMENT	___	___
SIGNBOARD	___	___
HILLCREST	___	___
PARKED VEHICLES	___	___
MOVING VEHICLES	___	___
..... SPECIFY OTHER	___	___
NOT OBSCURED	___	___

SIGNATURE.....
SIGNATURE OF PERSON SUBMITTING REPORT IS REQUIRED

___ WITNES
___ OCCUPA
___ DRIVER

DATE OF REPORT (77)

IF FILED BY POLICE BADGE NO. DEPT.



OVERLAY FOR POLICE REPORT

COMMONWEALTH OF VIRGINIA - DIVISION OF MOTOR VEHICLES

POLICE ACCIDENT REPORT

DMV COPY

FR-300P 1/78

PAGE ___ OF ___ PAGES

ACCIDENT DATE Month Day Year | DAY OF WEEK | TIME AM PM | COUNTY OF ACCIDENT | MILE POST NUMBER | RAILROAD CROSSING ID. NO. IF WITHIN 150 FEET

1 CITY OR TOWN | OF | LANDMARKS AT SCENE | NUMBER OF VEHICLES | OFFICIAL USE ONLY

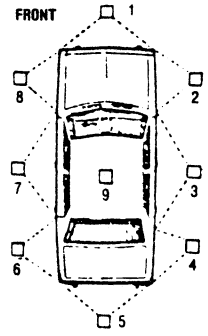
ROUTE NO. OR STREET NAME AT SCENE

AT INTERSECTION WITH OR ___ MILES FEET N S E W OF ROUTE NUMBER OR STREET NAME

2	VEHICLE NO. 1		VEHICLE NO. 2 (OR PEDESTRIAN)	
	DRIVER'S NAME (LAST, FIRST, MIDDLE)	OCCUPATION	DRIVER'S NAME (LAST, FIRST, MIDDLE)	OCCUPATION
3	ADDRESS (STREET & NO.)	YEARS OF DRIVING EXPERIENCE	ADDRESS (STREET & NO.)	YEARS OF DRIVING EXPERIENCE
	CITY / STATE / ZIP CODE		CITY / STATE / ZIP CODE	
4	DATE OF BIRTH Month Day Year / SEX / DRIVER'S LICENSE NUMBER / STATE		DATE OF BIRTH Month Day Year / SEX / DRIVER'S LICENSE NUMBER / STATE	
	VEHICLE OWNER'S NAME (LAST, FIRST, MIDDLE)		VEHICLE OWNER'S NAME (LAST, FIRST, MIDDLE)	
5	ADDRESS (STREET & NO.)		ADDRESS (STREET & NO.)	
	CITY / STATE / ZIP CODE		CITY / STATE / ZIP CODE	
	MAKE & TYPE OF VEHICLE (SHOW MOPED, MOTORCYCLE, AMBULANCE, ETC.....) / YEAR / REPAIR COST		MAKE & TYPE OF VEHICLE (SHOW MOPED, MOTORCYCLE, AMBULANCE, ETC.....) / YEAR / REPAIR COST	
6	LICENSE PLATE NUMBER / STATE / NAME OF INSURANCE CO. (NOT AGENT)		LICENSE PLATE NUMBER / STATE / NAME OF INSURANCE CO. (NOT AGENT)	

DAMAGE TO PROPERTY OTHER THAN VEHICLES | OBJECT STRUCK (TREE, FENCE, ETC.) | OWNER'S NAME (LAST, FIRST, MIDDLE) | ADDRESS | REPAIR COST

7 **VEHICLE NO. 1 DAMAGE** CHECK POINTS OF IMPACT

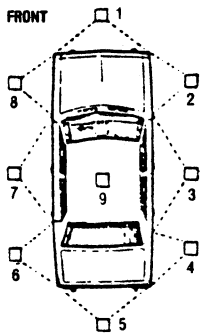


8

ACCIDENT DIAGRAM

INDICATE NORTH BY ARROW

VEHICLE NO. 2 DAMAGE CHECK POINTS OF IMPACT



SPEED		
BEFORE ACCIDENT	LIMIT	MAXIMUM SAFE

SPEED		
BEFORE ACCIDENT	LIMIT	MAXIMUM SAFE

VEHICLE NO. 1 DAMAGES: ☐ UNKNOWN ☐ NO DAMAGE ☐ OVERTURNED ☐ MOTOR ☐ UNDERCARRIAGE ☐ TOTALED ☐ BY FIRE ☐ OTHER

VEHICLE NO. 2 DAMAGES: ☐ UNKNOWN ☐ NO DAMAGE ☐ OVERTURNED ☐ MOTOR ☐ UNDERCARRIAGE ☐ TOTALED ☐ BY FIRE ☐ OTHER

ACCIDENT DESCRIPTION:

OFFENSES CHARGED DRIVER:

ALL INJURED

	9	10	11	12	13	14	15	16	NAMES OF INJURED - IF DECEASED, INCLUDE DATE OF DEATH
A									
B									
C									
D									
E									

TROOPER/OFFICER'S NAME | BADGE/CODE NUMBER | DEPARTMENT NAME AND CODE NUMBER | REVIEWING OFFICER | DATE REPORT FILED