DOT HS-805 639

MODEL REGULATIONS AND PUBLIC EDUCATION FOR RURAL-SUBURBAN PEDESTRIAN SAFETY

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Contract No. DOT HS-7-01753
Contract Amt. $112,660

AUGUST 1980
FINAL REPORT

Prepared For
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Washington, D.C. 20590

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT-HS-805-639		

4. Title and Subtitle	5. Report Date
MODEL REGULATIONS AND PUBLIC EDUCATION FOR RURAL-SUBURBAN PEDESTRIAN SAFETY	August 1980
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
A. Hale, R.D. Blomberg and E.F. Kearney	ED 80-10
9. Performing Organization Name and Address	10. Work Unit No.
Dunlap and Associates, Inc. One Parkland Drive Darien, Connecticut 06820	11. Contract or Grant No. DOT-HS-7-01753
	13. Type of Report and Period Covered Final Report Sept. 1977 - Aug. 1980
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, D.C. 20590	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The objectives of this study were to review the rural-suburban pedestrian accident data (Knoblauch, 1977) and freeway pedestrian accident data (Knoblauch, Moore and Schmitz, 1976) and determine which accident types were amenable to countermeasures development. Countermeasure classes considered were model traffic regulations and public information and education (PI&E). The results of the analysis indicated that the development of four prototype regulations to serve as legislative models appeared to be promising in reducing the target accident types. The four model regulations include the:

- Model Regulation for School Bus Pedestrians
- Model Regulation for Pedestrians on Highways
- Model Freeway Restrictions Regulation
- Model Vehicle Hazard Warning Lights Regulations

Four media packages were also seen as potentially effective countermeasures for their target accident types. Initial concepts are presented for the following media packages:

- School Bus Driver Pamphlet
- Dismounted Motorist Public Service Announcements
- Mailbox Safety Flyer
- Road Worker Pamphlet

A complete discussion of the background accident data, the countermeasure objectives, content rationale, and the requirements for further development, implementation and testing (where appropriate) is provided for the model regulations and media packages.

17. Key Words	18. Distribution Statement
Pedestrian, Model Regulations, Public Education, Accident Countermeasures, School Bus, Disabled Vehicle, Vehicle Hazard Warning Lights, Mailboxes, Road Worker	Document is available to the U.S. public through the National Technical Information Service; Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	112	

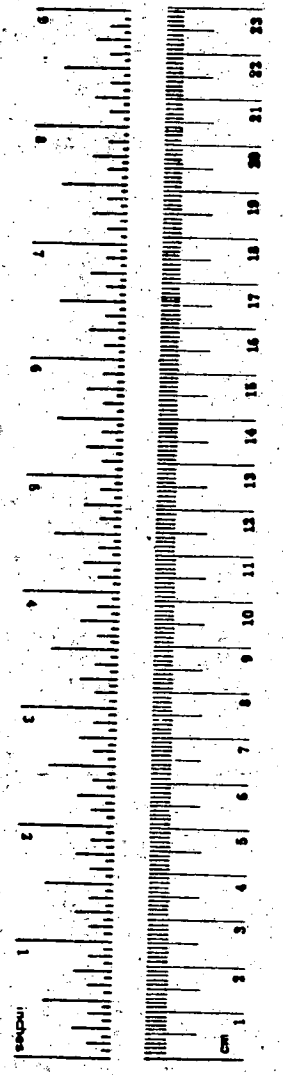
Form DOT F 1700.7 (8-69)

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

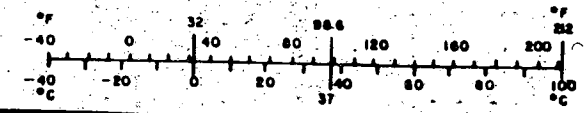
Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



MODEL REGULATION SUMMARY

Title:	Model Regulation for School Bus Pedestrians
Target Problem:	Children being struck crossing to or from school buses or by school buses themselves
Principal Features of Regulation and Impact on Problem:	To minimize the failures of motorists to stop for school buses, the model regulation mandates a uniform appearance for school buses (paint scheme and legend) and the use of compelling signalling devices (flashing amber pre-stop warning lights, flashing red lights and a "stop" signal arm) to remind motorists of their obligation to stop and remain stopped for a school bus which has stopped to receive or discharge passengers. The requirements for use of the signalling equipment by bus drivers are clearly specified. Aids such as convex mirrors, are required to enhance the bus driver's ability to detect any child immediately in front of the bus who cannot be directly seen. The bus driver is held responsible for clearing the front of the bus before moving forward. A minimum training requirement for school bus drivers is postulated as well as a minimum safety education requirement for pupils riding school buses. Inspection requirements are stipulated to ensure that the special signalling equipment is operational on buses used to transport school children.
Supporting Evidence:	Studies conducted by Bequette (1976) and the National Safety Council (1975) have shown a drop in school bus passing violations when the stop signal arm has been employed.
Recommended Level of Application:	State law.

MODEL REGULATION SUMMARY

Title:	Model Regulation for Pedestrians on Highways
Target Problem:	Pedestrians who are struck walking along rural and suburban highways principally during nighttime and mostly walking on the right with traffic.
Principal Features of Regulation and Impact on Problem:	Provisions require preferential use of various highway elements (i.e., sidewalk, shoulder, roadway edge) under certain conditions to minimize the risk of traffic collisions. Walking on the left, facing traffic is also required in the absence of sidewalks. To improve the nighttime conspicuity of pedestrian on highways yet to be specified (by pending research) materials or devices are mandated to be worn by pedestrians between the hours of sunset and sunrise, with certain exceptions.
Recommended Level of Application:	State law.

MODEL REGULATION SUMMARY

Title:	Model Freeway Walking Restrictions
Target Problem:	Pedestrians being struck on freeways who are not compelled or authorized to be there.
Principal Features of Regulation and Impact on Problem:	Basically, unnecessary "foot traffic" is banned from freeways, with notable exceptions (e.g., dismounted motorists, police officers, road workers, tow truck operators, etc.) A requirement to post the ban on foot traffic is also stated.
Recommended Level of Application:	State law.

MODEL REGULATION SUMMARY

Title:	Model Vehicle Hazard Warning Lights Regulation
Target Problem:	Pedestrians being struck near disabled vehicles, mostly at night
Principal Features of Regulation and Impact on Problem:	Vehicle hazard warning lights are defined and their use mandated whenever a vehicle stops upon the highway, with certain exceptions. To complete treatment of the useful applications for vehicle hazard warning lights, their use is required by slow moving vehicles.
Supporting Evidence:	Research by Lanman, Lum and Lyles (1979) suggests that the risk of collision between a slow moving vehicle and an overtaking vehicle is reduced when the slow moving vehicle employs its vehicle hazard warning lights.
Recommended Level of Application:	State law.

MEDIA PACKAGE SUMMARY

Topic:	Pedestrian safety of school bus passengers
Target Audience:	School bus drivers
Medium:	Pamphlet
Informational Objectives:	Inform bus drivers of the basic steps associated with the operation of the bus and its signalling equipment to enhance the safety of school children going to and from the bus.

MEDIA PACKAGE SUMMARY

Topic:	Dismounted motorists
Target Audience:	All drivers
Media:	60 second television public service announcement (PSA) 60 second radio PSA 30 second radio PSA
Informational Objectives:	Provide behavioral advice to enable drivers and passengers of disabled vehicles to avoid being struck by passing traffic.

MEDIA PACKAGE SUMMARY

Topic:	Children going to and from mailboxes or newspaper boxes
Target Audience:	The parents of children who may enter the street to obtain mail or papers.
Medium:	Flyer
Informational Objectives:	Inform parents of the hazards involved in allowing children under ten years of age to obtain the mail. Advise parents to have "older" children obtain the mail or retrieve the mail themselves.

MEDIA PACKAGE SUMMARY

Topic:	Road worksite pedestrian accidents
Target Audience:	Road workers
Medium:	Pamphlet
Informational Objectives:	Inform road workers of the major traffic accident hazards encountered at road worksites. Provide behavioral advice to avoid these hazards.

ACKNOWLEDGEMENTS

Valuable support and assistance has been provided by various agencies and individuals. As National Highway Traffic Safety Administration (NHTSA) research sponsors, technical consultation was provided by Dr. Alfred J. Farina, Jr. and Mr. William C. Wheeler, Jr., Contract Technical Managers of the Office of Driver and Pedestrian Research. In support of countermeasure concept development, the following individuals contributed valuable ideas and approaches during a "group think" session:

Dr. Alfred J. Farina, Jr., NHTSA
Mr. John C. Fegan, Federal Highway Administration (FHWA)
Mr. Edward F. Kearney, National Committee on Uniform Traffic Laws and Ordinances (NCUTLO)
Mr. Richard L. Knoblauch, BioTechnology, Inc.
Mr. J.W. Lanum, Washington, D.C. Pedestrian Safety Coordinator
Mr. Mitchell Laub, Saxe Mitchell, Inc.
Mr. Dennis O'Malley, Albany, New York Traffic Engineering Department
Mr. Lawrence Pavlinski, NHTSA
Mr. William C. Wheeler, Jr., NHTSA

In addition, the following individuals offered thoughtful and constructive criticism of draft versions of the model regulations during focus group discussions:

Mr. Thomas Brahms, Institute of Traffic Engineers
Dr. Alfred J. Farina, Jr., NHTSA
Ms. Phoebe Howell, FHWA
Mr. Edward F. Kearney, NCUTLO
Mr. Richard L. Knoblauch, BioTechnology, Inc.
Mr. Lawrence Pavlinski, NHTSA
Mr. David Soule, NHTSA
Mr. William C. Wheeler, Jr., NHTSA

For the innovative and potentially effective public information and education concepts and materials developed on this project, we wish to acknowledge the creative development efforts of Mr. Joseph Saxe and Mr. Mitchell Laub, the copywriting of Mr. Howard Edgar and the illustrations of Mr. Stanley Miller of Saxe Mitchell, Inc.

Mr. Edward F. Kearney, Executive Director of the National Committee on Uniform Traffic Laws and Ordinances is a co-author of this report. Mr. Kearney oversaw and interrelated the drafting of the regulatory language for the countermeasure concepts of each model regulation with respect to existing provisions of the Uniform Vehicle Code and Model Traffic Ordinance (UVC/MTO) (1979). The involvement of Mr. Kearney with this project and references to the UVC/MTO produced by NCUTLO should not be construed as either endorsement of the findings of this study by NCUTLO or the likely incorporation of the findings into the UVC/MTO.

And finally, we wish to thank Karen Schoelch for her patience and skill in preparing this finished document.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

Research has been conducted for NHTSA into the contributing factors for rural and suburban (Knoblauch, 1977) and freeway (Knoblauch, Moore and Schmitz, 1976) pedestrian accidents. The contributing factors identified embraced unique combinations of driver and pedestrian behavioral errors, predisposing environmental situations and locations, and defined target groups of involved individuals. In the estimation of NHTSA, regulatory countermeasure approaches to these accident types seemed promising. In an earlier study (Blomberg, Hale and Kearney, 1974), nine model regulations were developed to counteract specific types of urban pedestrian accidents. One of these model regulations, the Model Ice Cream Truck Ordinance, resulted in an annual 77% reduction in ice cream truck related child pedestrian accidents in Detroit during 1977 and 1978 (Hale, Blomberg and Preusser, 1978). The initial objectives of the current study were to:

- Analyze the data associated with the twenty-three "rural/suburban" and fourteen "freeway" accident types and determine regulatory countermeasure concepts for those accident types deemed particularly amenable to regulatory approaches.

- Develop fully articulated model regulations for the selected accident types.

- Provide support materials for each model regulation to include:

  — The empirical or logical rationale for each section of each regulation

  — Identification of factors affecting the successful implementation of the regulation

  — Descriptions of the public information and education (PI&E) materials needed to promote voluntary compliance with each regulation

  — Identification of requirements for and possible scenarios and measures for full scale field testing of the model regulations to assess their effectiveness

After the study was into the initial analytical phase, it became quite apparent that the staff was in a position to provide additional services at no extra cost to the Government. Due to the extensive background of Dunlap and Associates, Inc., in the development of pedestrian safety messages for public education (e.g., Blomberg and Preusser, 1974) it was felt that the project staff should recommend and/or develop PI&E "stand-alone" materials for accident tyeps not particularly well suited to regulatory countermeasures but seemingly treatable by PI&E approaches. Thus, since people with PI&E background were studying the rural/suburban and freeway pedestrian accident type data to develop regulatory countermeasures, it was only logical that PI&E stand-alone approaches should be considered at the same time.

The report is organized into three additional principal sections. Section II deals with the methods and procedures employed in developing the regulatory and public educational countermeasures. The four model regulations and supporting material are presented in Section III. In Section IV, the initial concepts for public education materials developed are described along with initial layouts, copy and scripts. Section V contains the overall conclusions and recommendations concerning the products of this study.

II. METHOD AND PROCEDURE

A. General Considerations and Guidelines

Early in the study period several tenets were articulated to guide the development of the model regulations and PI&E materials. These principles have been derived from previously successful traffic regulation development efforts (Blomberg, Hale, and Kearney, 1974) and PI&E efforts (Blomberg and Preusser, 1974).

In studying the predisposing and precipitating factors associated with the twenty-three rural suburban and fourteen freeway accident types which were the focus of this study, a careful screening process was applied to potential countermeasure concepts which included educational as well as regulatory approaches. This process revealed the differential merits of both and is discussed in considerable detail later on in this section. Thus, the model regulations proposed herein have been developed as potential countermeasures for pedestrian accident types considered unlikely to respond to only public educational approaches. This selection bias takes full account of justifiable public antipathy towards "more regulations."

1. Attributes of Effective Model Regulations

The difference between criminal laws and traffic regulations has been carefully noted in the approach to this study. Criminal laws proscribe various antisocial behaviors which a relatively small proportion of the population exhibits. Traffic regulations prescribe and proscribe various kinds of traffic behaviors which we all exhibit from time to time. Considering the tremendous impact and scope of traffic regulations and the fact that few traffic offenses are felonies with severe sanctions, there is a compelling requirement for traffic laws to have inherent rational appeal. Ideally, sound traffic regulations promote the safe, expeditious and equitable flow of all traffic elements (motor vehicles, bicycles, pedestrians, etc.) upon the trafficway, accounting for the capacities and limitations in the performance of each element. Therefore, traffic rules must be drafted so as to denote a "reasonable" regulation of traffic behavior while minimizing any attendant inconveniences. Since the penalties for traffic violations are less severe than those for criminal violations, the "threat value" for traffic laws is overall lower than for criminal laws. This underscores the desirability for traffic laws to have as much self-apparent merit as possible to promote voluntary compliance by the public. Self-apparent merit is manifest in a regulation whose intent and rationale are easily understood by the public without need for official "interpretation." However, the economy of expression demanded by traffic regulations does not always allow for a clear expression of the rationale. For this reason, and as an aid to legislative acceptance and enactment, it was necessary to "annotate" each provision of each model regulation contained within this report. The annotation succinctly describes the reasons for the regulatory provision and interconnection with the entire body of the regulation. Thus, the goal of "self-apparent merit" for model traffic regulations is quite important from the two principle standpoints of public acceptance, i.e., legislative enactment and public compliance. The importance of voluntary public compliance, engendered by a perception of reasonableness and value in the regulations, cannot be overemphasized. Police enforcement of all provisions of all traffic laws all of the time is obviously impossible.

Besides having self-apparent merit, traffic regulations must be behaviorally realistic. They must take account of human habits and inclinations in the traffic

environment. Where possible in accomplishing their purpose, traffic regulations should not conflict with population stereotypes or negatively transfer to provisions of existing, effective regulations.

The operational provisions of traffic regulations must be stated simply and clearly, without the need for interpretation of complex legal language, and employ as few qualifying clauses and exceptions as possible.

The need for clarity and simplicity also translates into the area of traffic law enforcement. Effective traffic regulations incorporate provisions which denote well defined elements of offenses which are amenable to objective and consistent law enforcement actions. Although certain necessary and difficult to enforce provisions may have "educational value" within the body of a regulation, inclusion of such items in model regultions should be the exception rather than the rule.

To promote compliance with and enforcement of traffic regulations, consideration should be given to having the regulations specify "cues" to be installed in the traffic environment, whenever practicable, to evoke the driver and/or pedestrian behavior required by the regulation. Traffic control devices (i.e., signs, signals and pavement markings), are examples of methods for displaying cues for ensuring the performance of some required traffic behaviors. Traffic regulations whose provisions incorporate reasonable and acceptable traffic behavior cues will facilitate compliance and aid in enforcement by doing the following:

- Relieving drivers and pedestrians of the burden for total recall of the required or prohibited behaviors.

- Providing police with benchmarks and objective guidelines for taking enforcement action.

It is acknowledged that appropriate regulatory control of driver behavior is of paramount concern for improving pedestrian safety, as the driver is the control agent for the lethal forces which can be imparted by motor vehicles. However, to omit provisions which attempt to regulate the behavior of pedestrians as well as drivers would be unwise and inequitable. Despite the fact that pure pedestrian provisions (those that only regulate pedestrian behavior) have enforcement and public acceptance problems, such provisions have been included in these model regulations as appropriate to strike a balance between driver and pedestrian responsibilities in reducing pedestrian accidents. Distributed responsibility between drivers and pedestrians should increase the chances for accident reduction. Moreover, voluntary compliance should be improved when one party can plainly see that the other party also has obligations and responsibilities.

2. Attributes of Effective Public Information and Education Messages

Given the aforementioned basic structure of specific accident types describing the perils for pedestrians in the suburban and rural settings, the associated predisposing conditions and predisposing factors can form the basis for truly instructive public information and education (PI&E) materials. Given rigorous analyses of the accident types and causal factors, then PI&E remedies that are behaviorally valid, specific and realistic can be generated. Such PI&E messages should accomplish the following objectives:

- Clearly identify the target audience and traffic environment to which the message is directed

- Specifically describe the hazards involved and the cues for recognizing specific accident producing situations

- Where possible, prescribe specific accident avoidance behaviors to be performed in the presence of specific traffic situations or environments

- In the absence of prescribable actions to take in a hazardous situation describe the attributes of the hazardous situations in as much detail as possible to enable the individual to take responsive action based on good information

- Include or allude to an incentive to motivate the audience to perform the recommended behavior(s) in the given situations

- Be sufficiently attractive and compelling to:

  — Gain and hold the attention of the audience to allow transmission of message contents

  — Insure the maximum possible public service air time in the case of broadcast media

- Portray situations, styles, settings, etc. which are as timeless and universal (yet specific to the accident type being addressed) as possible to maximize the "lifetime" and appeal of the materials

- "Sell" message contents to the target audiences to the extent that they understand the "whats" and "whys" of what should be done and, thereby, are motivated to perform the recommended behavior as well.

Within the scope of this study, two basic forms of PI&E have been considered for development. One form may be considered "stand-alone" PI&E and the other "supportive" PI&E. "Stand-alone" PI&E refers to those concepts and materials developed to counteract an accident type on a one to one basis.

In this case, it is felt that well conceived and executed public education materials would better effect an accident reduction than the implementation of a traffic regulation. In other words, if properly informed about the hazardous elements of a traffic situation and given a reasonable and specific behavioral remedy there would be a high probability that the public would respond without the force of law behind the message.

In other cases during the course of this study, it was clear that for the safety of all concerned, behavior required by law was necessary to achieve the best level of performance reliability for the desired behaviors. The reasons for this were:

- The necessary description of all the hazards involved or the stimulus conditions were either too detailed or too vague to be effective in a stand-alone PI&E format

- The most efficacious description of the conditions and required behaviors did not appear to have a great deal of incentive value: performance of the required behaviors appeared to need the threat of sanction to override a relatively high "self-convenience" motive which seemed to be operant

Thus, four model regulations have been developed to counter four pedestrian accident types which were deemed not likely to respond to "stand-alone" public education. However, given that a new and/or model traffic law or ordinance is enacted in a jurisdiction, effective supportive public education can increase the chances for compliance by:

- Publicizing the existence of the law and authenticating it in the public's mind
- Divulging the rationale for the existence of the law (i.e., hazards to be controlled)
- Describing the specific elements of the traffic situation which require the mandated specific behaviors

Regulation-supportive public education does not have to carry an incentive with it to encourage performance of the desired behaviors. The force of legal sanction is present for non-compliance. What public education can do via the previously itemized objectives is increase the chances for voluntary compliance and reduce the demands for enforcement.

The selection or recommendation of media to transmit the designated message contents is a complex decision-making process, involving a consideration of at least the following items:

- Message length, composition and complexity
- Target audience characteristics
- Media characteristics
  - Content-carrying potential
  - Attention-getting value
  - Cost of production and reproduction
  - Audience impact potential
  - Audience exposure potential

Careful media selection must consider each of the above factors if the number of target audience members who receive and understand the message is to be maximized. As message complexity increases, and in particular, as the desired behavior or motivational appeals represent more of a radical departure from existing baselines, more reliance must typically be placed on audiovisual media (e.g., films, slides, videotape, pictures, etc.). Words, alone, are rarely as effective in promoting complex behaviors as are words with visual augmentation. In general, visual media, especially audiovisuals, are more attention getting than pure audio or printed media.

Radio public service announcements (PSA's) represent a promising media channel for the tranmission of traffic safety messages. This medium provides the opportunity for "point of behavior," in-situ exposure of messages to drivers. Receiving traffic safety messages in the traffic environment theoretically increases the chances for the received message resulting in desired behavioral change by:

- Decreasing the time between receipt of message and the opportunity to put the message into practice. Thus, the operational validity of the message can be quickly established without having to store the message contents until such time as they may be implemented.

- Drawing upon the concrete stimuli of the traffic environment at hand to support or reinforce the individual message elements.

The various forms of media or media channels are numerous. Some of the more prominent forms which are particularly relevant for the transmission of highway safety messages are:

- Broadcast Media

  - Television (VHF, UHF)

    — 30 or 60 second PSA's
    — short films
    — editorials
    — drop-in slides

  - Radio (FM, AM)

    — 30 or 60 second PSA's
    — 10 to 30 second live copy
    — tag lines

- Print Media

  - Newspapers, magazines

    — feature articles
    — interviews
    — public service ads
    — paid ads augmented by postage-size drop-ins

  - Brochures/pamphlets

  - Flyers/direct mailings/"statement stuffers"

    — Posters
    — Transit cards, taxi signs
    — Bumper stickers

What has been briefly reviewed are the more important design criteria for the development of public educational messages. The details of the methodology and steps taken to develop the media materials and concepts for this project are discussed in subsequent sections.

B. Phase I Efforts

Early endeavors on this project focused on an in-depth review and analysis of the predisposing and precipitating factors for each of the 23 rural-suburban accident types (Knoblauch, 1977) and the 14 freeway accident types (Knoblauch, Moore and Schmitz, 1976). Summary descriptors were screened as well as the narratives of the actual police accident reports available. The primary objective of this initial review was to determine the "countermeasurability" of accident types with particular emphasis on the regulatory countermeasure potential of accident types. It became apparent that before countermeasure concepts could reasonably start to be generated, the field of 37 accident types had to be narrowed to a manageable number of suitable candidates. Suitability criteria for regulatory development were generated to serve as a basis for evaluating the countermeasure potential of accident types. The criteria considered of primary importance were:

- Basic Countermeasure Amenability

  Accident types with unusual accident circumstances, unlikely chances for recurrence, limited or no reasonable opportunities to prevent the occurrence thereof (e.g., weird, auto/auto, other) were not considered promising for countermeasure development.

- Current or Previous Countermeasure Consideration

  Accident types which were undergoing current regulatory testing or for which model regulations had been developed and successfully tested (e.g., Ice Cream Vendor Related) were dropped from further consideration.

- Proportion of Data Base Involved

  The higher the number of cases accounted for by an accident type, the more appealing it was for countermeasure development, all other things being equal.

- Representation in Multiple Data Bases

  An accident type which was represented in more than one data base (urban, rural/suburban, freeway) should deserve close scrutiny for countermeasure development.

- Narrowness of Definition for an Accident Type

  The more limited geographically and recognizable an accident type situation was, the more desirable it was as a regulatory candidate; the specificity of the situation should increase likelihood of public recognition and compliance.

- Physical Environmental Factors Involved

  Physical contributing factors to an accident type such as the location of parked cars, school bus stops, mailboxes are all factors which seemed generally amenable to a regulatory countermeasure approach.

- Behavioral Realism—Whose Behavior is to be Regulated and How Old is the Party?

  If the preponderance of contributory behavior to accident occurrence is from the pedestrian and the pedestrian is a juvenile, then an accident type would rank low for a regulatory countermeasure approach.

  In general, "pure pedestrian laws" which attempt to directly regulate pedestrian behavior are notoriously unpopular for widespread and consistent police enforcement. This attitude seems to acknowledge the general view of the public that substantial enforcement of pedestrian laws is petty and constitutes harrassment. Thus, a pedestrian behavior regulation must be well considered and well supported by accident facts and documented hazards to have a chance of enactment in the first place, and adequate police enforcement and public compliance in the second place.

  Regulating, by statute, the behavior of juveniles (person under 14 years of age) is particularly inappropriate. Aside from the aspect of legal accountability, the susceptibility of a juvenile to regulation as a primary means of shaping behavior is judged as low. Consider the Dart-Out accident type. The driver has little or no contribution to the accident, it is widespread geographically in its occurrence and involves a young child for the most part as the negligent party. Clearly, if anything stands a chance to correct the situation, pedestrian education and behavior modification seem to be the most promising approaches.

- Novelty of the Accident Type

  Heretofore unknown or unpublicized accident types will have inherent appeal.

In consideration of these criteria the 37 accident types were screened and eventually reduced to the 14 accident types considered promising for countermeasure development shown in Table 1.

It was shortly after the delimitation of accident types to 14 candidates that the scope of the contract was expanded at no extra cost to the Government to include public information and education (PI&E) countermeasures as well as regulatory countermeasures. Thus initial countermeasure concept formation embraced both the regulatory and PI&E varieties.

After initial countermeasure concepts were generated by the staff for each accident type, a 2 1/2 day group creative thinking session was held at the Belmont Conference Center in Elkridge, Maryland. The off-staff highway safety and PI&E experts participating in this brainstorming session are listed in the Acknowledgements Section of this report. Background information packages were prepared for the participants which summarized the accident data for each of the fourteen accident types. Each accident type and associated data were intensively discussed and probed for possible countermeasure approaches. In these discussions, all potential countermeasure approaches were considered, namely, regulations, public education and training/behavior modification. As a stimulus to idea generation, a Problem/Solution Matrix shown in Figure 1 was employed. On the vertical

Table 1. Accident Types Initially Considered for Countermeasure Generation

	Accident Type	Data Base Representation	% Cases	Brief Descriptor
1.	Vehicle Turn Merge with Attention Conflict	R/S, U	1.3 (1)	The pedestrian is struck by a vehicle whose driver is turning or merging and is attending to traffic and not the pedestrian.
2.	Turning Vehicle	R/S, U	1.9 (1)	The pedestrian is struck by a turning vehicle while walking across the roadway (i.e., not running). It was not determined that the driver was attending to traffic and therefore failed to see the pedestrian.
3.	Walking Along the Roadway	R/S	11.6 (1)	Pedestrian is struck while walking along the edge of the roadway or on the shoulder; can be either walking with or against traffic.
4.	Hitchhiking	R/S, F	1.5 (1), 9 (2)	The pedestrian is struck while attempting to hitchhike or doing a hitchhiking-related activity, i.e., changing rides.
5.	Disabled Vehicle Related	R/S, F, U	5.6 (1), 20 (2)	The pedestrian is struck while working on or next to a disabled vehicle.
6.	Working on the Roadway	R/S, F, U	1.7 (1), 3 (2)	The pedestrian, a flagman or other construction worker, is struck while working on the roadway or shoulder.
7.	School Bus	R/S	3 (1)	The pedestrian is struck while going to or from a school bus or school bus stop.
8.	Mailbox Related	R/S	1.4 (1)	The pedestrian is struck while going to or coming from a mailbox or newspaper box.
9.	Emergency/Police Vehicle Related	R/S, F	0.6 (1), 4 (2)	Pedestrian struck while in the vicinity of an emergency or police vehicle.
10.	Walking to or from a Disabled Vehicle	R/S, F	0.7 (1), 8 (2)	Pedestrian struck while walking to or from a disabled vehicle.
11.	Interchange Dash	F	8 (2)	Pedestrian struck while crossing at an interchange; pedestrian appeared suddenly or ran into the path of the vehicle (short-time exposure).
12.	Dart-Out and Dash	F	5 (2)	Pedestrian struck while crossing not at interchange. Pedestrian was either running or appeared suddenly in the path of the vehicle (short-time exposure).
13.	Walking in the Traveled Way	F	5 (2)	The pedestrian was standing, walking, stumbling, falling, running with or against traffic in traveled way before being struck.
14.	Interchange Walk	F	8 (2)	Pedestrian struck while walking across the freeway at an interchange.

Key: (1) - R/S - Rural/Suburban (Knoblauch, 1977)
(2) - F - Freeway (Knoblauch, Moore and Schmitz, 1976)
(3) - U - Urban (Snyder and Knoblauch, 1971)

PROBLEM/SOLUTION DEFINITION MATRIX
FOR

_____ ACCIDENT TYPE

Traffic Elements / Problem Aspects	Driver	Ped	Traffic Environment	Vehicle
Appearance				
Knowledge				
Attitude/ State of Mind				
Actions/ Performance (Skill)				
Physical/ Functional Condition				

Figure 1. Problem/Solution Matrix

axis of the matrix were arrayed various potential aspects of the accident type safety problem, i.e., appearance; knowledge; attitude/state of mind; actions/performance (skills), and physical/functional condition. On the horizontal axis various elements of the traffic system in question were arrayed, i.e., driver, pedestrian, traffic environment and vehicle. The problem solution matrix served not only as a useful prompt for creating countermeasure concepts but was an effective means for categorically recording generated ideas. Audio tape recordings of the entire conference procedings were analyzed and all coherent countermeasure concepts were documented.

A joint review of the countermeasure concept document by NHTSA and the project staff resulted in a selection of the accident types and countermeasure concepts for full scale development in Phase II shown in Table 2. It must be emphasized that careful consideration of the model regulation suitability criteria previously discussed was given when model regulations were slated for development. Regulations were only developed for those accident types considered unlikely to respond to PI&E approaches alone. Where stand-alone PI&E seemed promising, it was proposed as the countermeasure in lieu of a model regulation.

C. Phase II Efforts

With the countermeasure packages identified for full scale development, Phase II efforts initially turned to literature searches and reviews in the subject areas, which yielded useful background material for and insight into the development of countermeasure packages.

Since the priority in order of development was for the model regulations, drafting of "plain language" initial versions of the regulation by the project staff began early in Phase II. Plain language versions consisted of terse statements of the elements and intentions of each model regulation, devoid of legal language, and without being interrelated with the Uniform Vehicle Code/Model Traffic Ordinance (NCUTCO, 1979). Following internal review and critique, the plain language versions of the model regulations were interrelated with the UVC/MTO to be certain there were no unintended contradictions and then reduced to traffic regulatory language by Mr. Edward F. Kearney, Executive Director of NCUTLO. Subsequently, a focus group review of the draft model regulations took place. The highway safety experts participating in the focus group discussion are listed in the Acknowledgements Section. Each of the model regulations was thoroughly documented with respect to the accident data background and intentions for each provision. This documentation was provided to focus group members prior to the actual discussion, giving them opportunity for considered judgment prior to actual discussion. During the meeting the regulations were thoroughly reviewed and critiqued. The results of the focus group discussion were incorporated into the final versions of the model regulations found within this report.

After the major efforts on the model regulations had subsided, work could reasonably begin on the regulation-supportive and stand-alone PI&E materials. To provide a sound basis for the PI&E materials development effort, it was necessary that the media consultants (Saxe-Mitchell, Inc.) have certain resource material:

Table 2. Accident Types and Countermeasure Concepts Selected for Phase II Development

Accident Type		Countermeasure Concept	
1.	Walking Along the Roadway	1.1	Model regulation to enhance pedestrian conspicuity at night
2.	Disabled Vehicle Related/Walking to and from a Disabled Vehicle	2.1	Model regulation to require use of fourway flashers for a stopped or slow moving vehicle
		2.2	PI&E in support of the model regulation
		2.3	Stand alone PI&E for the dismounted motorist (what to do when it happens)
3.	Working on the Roadway	3.1	Stand-alone PI&E (do's and don'ts) for those people who must work on or near the roadway.
4.	School Bus Related	4.1	A model regulation requiring flashing amber and red lights and a "STOP" swing arm to reduce stopping violations.
		4.2	PI&E for motorists in support of the model regulation
		4.3	PI&E advisory to school bus drivers
5.	Mailbox Related	5.1	Revised or new model postal regulation to allow mailboxes on same side of street as residence
		5.2	PI&E for parents in support of model postal regulation
			or
		5.3	In lieu of 5.1 and 5.2, stand-alone PI&E for parents on mailbox safety for children
6.	Interchange Dash/Dart-Out and Dash/Walking in the Traveled Way Way/Interchange Walk	6.1	Model regulation to exclude unessential pedestrian traffic from freeways
		6.2	PI&E support of model regulation

- To develop detailed descriptions of the media materials seen to be required to support the public education and compliance for each model regulation, a copy of the model regulation was provided along with all accompanying rationale.

- To develop stand-alone media materials, a complete list was provided of prominent environmental features, behavioral errors and remedial behavioral advice—all derived from the accident data for each accident type in question.

Several iterations of copy, script and graphics were produced until the products described in Chapter IV evolved.

III. MODEL REGULATIONS

A. Introduction

Four model regulations for suburban and rural pedestrian safety are presented in succeeding sections of this chapter. The regulations are entitled:

- Model Regulation for School Bus Pedestrians
- Model Regulation for Pedestrians on Highways
- Model Freeway Walking Restrictions Regulations
- Model Vehicle Hazard Warning Lights Regulation

For each regulation a description of the underlying accident problem which sets the need for the regulation is presented. Next, the basic thematic approach to the writing of the model regulation is articulated. The actual provisions of the model regulation are then displayed followed by an "annotation" of each provision. The annotation describes the logical and/or empirical rationale supporting each provision of each regulation. Beyond this, considerations for implementing the regulation are discussed, including such factors as legislative enactment, enforcement, public education and associated cost factors. Finally, where appropriate, a discussion of possible approaches to a full-scale field test of the model regulation is presented along with any risk-benefit consequences.

The traffic terminology employed in the wording of the model regulations basically follows Chapter 1 "Words and Phrases Defined" of the Uniform Vehicle Code (NCUTLO, 1979). That chapter is reproduced in Appendix A for the benefit of the reader.

Some terms have been slightly modified in their application in this report and others included which are not defined in the UVC. In regard to various elements of the traffic environment, the following definitions stand as either having been incorporated in or forming background for the wording of the model regulations and other content of this report:

Trafficway	"...the entire width between property lines, or other boundary lines, of every way or place, of which any part is open to the public for purposes of vehicular travel as a matter of right or custom." (National Safety Council [NSC], 1970) (UVC does not define this term.)
Highway, Street or Road	"...that part of the trafficway which includes both the roadway and any shoulder alongside the roadway." (NSC, 1970) (UVC equates highway and street under a definition more closely approximating that for "trafficway" above; this NSC supplied definition is for their term "road" which the UVC does not define.)

Roadway — "That portion of a highway improved, designed or ordinarily used for vehicular travel, exclusive of the sidewalk, berm or shoulder even though such sidewalk, berm or shoulder is used by persons riding bicycles or other human powered vehicles. In the event a highway includes two or more separate roadways the term "roadway" as used herein shall refer to any roadway separately but not to all such roadways collectively." (NCUTLO, 1979)

Shoulder — "...that portion of the road contiguous with the roadway for accommodation of stopped vehicles for emergency use, and for lateral support of the roadway structure. The line between the roadway and the shoulder may be in a painted edge line, a change in surface, color or material, or a curb..." (NSC, 1970) (The UVC does not define "shoulder;" given the above definition, should a highway not have a visible demarcation between the roadway and any possible shoulder area, then such a highway would be considered as lacking a defined shoulder [and likely a sidewalk as well] as many suburban and rural blacktop roads do. In other words, a road or highway which is paved between the extremities of the roadbed without a "marked" shoulder area must be considered "shoulderless.")

With the exception of the above set of terms, the model regulations and accompanying discussion in this report follow the vehicle and traffic words and phrases as defined in Chapter 1 of the UVC (Appendix A).

Within the body of some of the model regulations, certain words or phrases may appear in parentheses. The parenthetical material may indicate one of two things:

- A description of a jurisdictional agency whose "official designation" should then be supplied by the local jurisdiction.
- Optional language (more than one set of parentheses) with the decision as to which version is selected left up to the local jurisdiction.

Finally, the reader will notice that no penalty provisions appear in any of the model regulations. Again, the matter of penalization is better left to the judgment of local jurisdiction guided by its established codes.

B. Model Regulation for School Bus Pedestrians

1. Background of the Accident Problem

In the study of rural and suburban pedestrian accidents (Knoblauch, 1977) the "School Bus Related" accident type involved pedestrians 45% of whom were 0-9 years of age, being struck while going to or from a school bus or school bus stop.

Ninety-one percent of these accidents occurred on two-lane highways in residential or country locations. Nearly 74% of the accidents occurred in daylight conditions while over 20% occurred during twilight or darkness. Seventy-eight percent of the pedestrians were struck trying to cross the highway. Ironically, 22% of the striking vehicles were the school buses themselves. A disturbing proportion of motorists (34%) proceeded past a stopped bus with signal lights flashing.

While school bus related pedestrian accidents only accounted for three percent of all cases studied (Knoblauch, 1977) there are nevertheless recurring varieties of this accident type which seem preventable. Educational measures should and are being taken to prepare children for coping with the dangers of crossing the street to and from school buses and walking to and from bus stops. They should continue. However, children are forgetful and impulsive and may abandon their training in the real world situation. Thus, it behooves officials to create as benign a traffic environment as possible around school bus stops and loading/unloading school buses. Principally, the existing legal requirement for motorists to stop in both directions when the school bus displays the proper signals seems to be the essential ingredient in fostering that benign traffic environment in which children may cross the street. It remains to be seen if motorist compliance with this requirement can be brought to a satisfactory level. Unambiguous school bus markings and compelling signalling devices that effectively remind motorists of their duties can improve the present situation. Public education on the requirements of the law coupled with credible levels of enforcement carry the necessary improvements the rest of the way.

2. The Model Regulation

a. Approach and Overview

Being called a "Model Regulation for School Bus Pedestrians" this set of provisions seeks to regulate only those aspects of the pupil transportation system which are seen to directly affect pedestrian safety. Thus, the bus as its appearance or operation may affect motorist behavior becomes the principal focus of regulatory attention. Human actions (prescribed, proscribed) and equipment features for school buses and bus stops as they might improve the pedestrian safety of school bus passengers all have been considered. The concern for the children in this regulation begins once they leave the bus and up until they enter the school bus.

Some of the provisions in the model regulation already exist in state traffic codes. Others do not. The objective has been to identify and incorporate provisions that have favorable records of performance and to include new provisions, as necessary, to counteract school bus related pedestrian accident problems uncovered by Knoblauch (1977). Ideally, effective existing practices and new approaches have been combined into a conceptually complete model school bus regulation for pedestrian safety predicated upon a uniform school bus appearance and set of procedures for school bus operations.

b. Provisions of the Model Regulation

Figure 2 contains the provisions of the Model Regulation for School Bus Pedestrians.

MODEL REGULATION FOR SCHOOL BUS PEDESTRIANS

§ 1 — Definitions

(a) School bus--Every motor vehicle that is used to transport children to or from school or school activities and in doing so receives or discharges children along the highway, excluding a bus operated by a common carrier in urban transportation of school children.

(b) School bus driver--a person who drives or is in actual physical control of a school bus.[1]

§ 2 — Appearance and equipment requirements for school buses

(a) The body of the school bus, including hood, cowl and fenders shall be National School Bus Glossy Yellow in color.[2]

(b) Every school bus shall clearly display the words "SCHOOL BUS" on both the front and rear of the bus placed as high as possible without compromising their visibility. The letters shall be black in color, at least eight inches high and conform to "Series D" of the Standard Alphabets for Highway Signs.[3] *Whenever the school bus is operated for purposes other than transporting children, the words "SCHOOL BUS" shall be covered or concealed.*

(c) Every school bus shall, in addition to other equipment required by law, be equipped with:

(1) Signal lamps displaying two alternately flashing amber lights to the front and rear of the bus. The lamps shall be visible at 500 feet in normal sunlight. If separate signal heads are used, the lamps shall be located next to the lamps in subsection (2) but closer to the vertical centerline of the bus. If dual purpose signal heads are used, they shall be positioned as in subsection (2).

[1] *In conjunction with this definition, it should be noted that § 6 requires minimum training for a driver of a school bus carrying school children.*

[2] *A specification range for this color may be found in Federal Standard No. 595a, color 13432.*

[3] *See the Standard Alphabets for Highway Signs and Pavement Markings, Federal Highway Administration, 1977 Edition.*

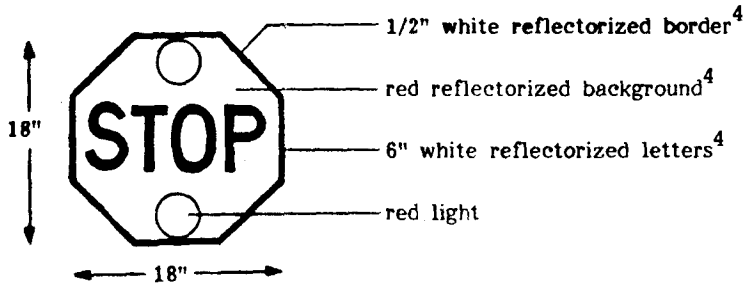
Figure 2. Model Regulation for School Bus Pedestrians

(continued)

(2) Signal lamps displaying two alternately flashing red lights to the front and to the rear of the bus. The lamps shall be visible at 500 feet in normal sunlight and be located as high and widely spaced laterally as practicable.

(3) A stop signal arm that can be extended horizontally from the left side of the school bus coincident with the actuation of the alternately flashing red lights in subsection (2). The arm shall be octagonal in shape, red and white in color and contain two alternately flashing red lights which are visible at 300 feet to the front and rear in normal sunlight. The lights shall only flash when the stop arm is extended. The bottom of the stop arm shall be as close as practicable to 44 inches above the ground. The stop arm shall duplicate the design, size and specifications in subsection (4).

(4) Specifications for the school bus stop signal arm.



(5) Exterior convex mirrors or other appropriate devices shall be installed on the school bus and so adjusted that a school bus driver can detect a person immediately in front of the bus who would otherwise be obscured by the hood. These mirrors or devices shall not be required on any school bus where a school bus driver can directly see the ground near the front of the bus.

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[4]*colors to meet specifications in the latest Federal Highway Administration Standard Color Charts.*

Figure 2. Model Regulation for School Bus Pedestrians

(continued)

(d) The lights and stop signal arm required by this section shall conform to the most recent standards and recommended practices of the Society of Automotive Engineers and the United States Department of Transportation.[5]

(e) This section shall become effective for all school buses put into service after _____(date) and for all school buses now in use on _____(date).

§ 3 — Owner's responsibilities

Every owner of a school bus shall comply with the appearance and equipment requirements in § 2.

§ 4 — Duties of school bus drivers

(a) Except as provided in subsections (c) and (g), a school bus driver shall display the alternately flashing amber lights described in § 2 at least 100 feet but not more than 500 feet before every stop at which the alternately flashing red lights will be used pursuant to subsection (b). This subsection shall not apply to any school bus which is not equipped with such lights.

(b) Except as provided in subsections (c) and (g), a school bus driver shall simultaneously actuate the alternately flashing red lamps and the stop signal arm described in § 2 whenever the bus has stopped on a highway for the purpose of receiving or discharging passengers and the alternately flashing amber lights shall not be displayed. The school bus driver shall prevent any children from leaving the bus until any vehicles approaching the bus from either direction have stopped. The alternately flashing red lights and stop arm shall be displayed until passengers going to or from the bus have completed crossing the roadway and have reached a place of safety. Before resuming motion, the school bus driver shall cease displaying the alternately flashing red lights and stop signal arm.

[5] *As of 1980 Federal Motor Vehicle Safety Standard No. 108, defines vehicular signal lighting requirements with particular reference to school buses in § 4.1.4. SAE Standard J887, "School Bus Signal Lamps," May 1972 specifies quantitative design and performance parameters for school bus signal lamps.*

Figure 2. Model Regulation for School Bus Pedestrians

(continued)

(c) Except as provided in subsection (g), a school bus driver shall not display the alternately flashing amber or red lights and the stop signal arm described in this section:

(1) In business districts and on urban arterial streets designated by (State Highway Commission) or local authorities;

(2) At intersections or other places where traffic is controlled by traffic control signals or police officers;

(3) In designated school bus loading areas where the school bus is entirely off the roadway.

(4) When the school bus has stopped for any purpose other than to receive or discharge school children;

(5) When the school bus is operated on a highway for any purpose other than transporting school children.

(d) A school bus driver shall not display the alternately flashing red lights and stop signal arm described in § 2 on any bus that is in motion.

(e) When stopping for the purpose of receiving or discharging passengers, a school bus driver shall stop as far to the right side of the highway as possible, safe and reasonable.

(f) A school bus driver shall determine that no one is immediately in front of the stopped bus before resuming forward motion.

(g) When a school bus driver is following another school bus and the first bus actuates its alternately-flashing amber or red lights and stop signal arm, the driver of the second bus shall actuate the same alternately flashing amber or red lights and stop signal arm as in use on the first bus. This subsection shall not apply when the first bus is more than (500 ft.) away.

§ 5 — Duties of drivers approaching school buses

(a) The driver of a vehicle meeting or overtaking a school bus from either direction shall proceed at a reasonable and prudent speed and be prepared to stop when the school bus is displaying alternately flashing amber lights.

Figure 2. Model Regulation for School Bus Pedestrians

(continued)

(b) The driver of a vehicle meeting or overtaking from either direction any school bus stopped on the highway shall stop before reaching such school bus when the bus displays the alternately flashing red lights and stop signal arm described in § 2. The driver shall not proceed until the school bus resumes motion or the alternately flashing red lights and stop signal arm are no longer displayed.

(c) The driver of a vehicle on a street with separate roadways need not stop upon meeting a stopped school bus with its red lights and stop signal arm activated which is upon a different roadway or when upon a controlled access highway and the school bus is stopped in a loading zone which is part of or adjacent to the highway and when pedestrians are not permitted to cross the roadway.

§ 6 — Course required for school bus drivers

A person shall not drive a school bus carrying any school child unless that person has successfully completed the school bus driver qualification training course(s) approved by the (State Department of Education).

§ 7 — Instruction required for pupils riding school buses

All 6th grade and below pupils transported by school buses shall, as a minimum, receive instruction approved by the (State Department of Education) in proper school bus riding, boarding and alighting, evacuation, associated street crossing and bus stop waiting practices at the beginning of each school year.

§ 8 — Inspection of school buses required

(a) Every school bus shall be inspected at least twice a year by (appropriate state or local agency). The inspection shall include tests of such equipment as shall be specified in regulations adopted by (appropriate state agency) and shall determine whether the school bus complies with the construction, design and appearance requirements of this Act and the regulations adopted by the (State Department of Education).

Figure 2. Model Regulation for School Bus Pedestrians

(continued)

(b) Prior to each trip by a school bus on a highway, a school bus driver shall determine whether the special flashing lamps and stop arm described in § 2 are functioning properly. If any such lamp or arm does not function properly it shall be repaired or the school bus shall not be used to transport any school child on a highway unless the bus traverses a route where such special equipment is never actuated.

Figure 2. Model Regulation for School Bus Pedestrians

c. Annotation of the Provisions of the Model Regulation

§ 1—Definitions

(a) Irrespective of the passenger carrying capacity of a motor vehicle used to carry school children, said vehicle must be considered a "school bus" if that vehicle picks-up or discharges children along the highway. The underlined phrase is the key to the definition as "along the highway" is where the hazards are greatest for children going to or from a stopped school bus. If a motor vehicle were used to transport children to and from school and did not pick-up or discharge children along the highway, then such a vehicle would not be a "school bus" in a street sense and would not have to conform to the appearance and equipment provisions in § 2 necessary to protect children who will have to cross the highway in going to or from a stopped school bus.

Common carriers transporting school children are excluded from the definition of a school bus as these vehicles operate principally in an urban environment which typically offers a host of traffic control devices (marked crosswalks, traffic signals, bus stop signs, etc.) to protect the crossing of passengers to and from these buses. In addition, the presence of adults in the passenger population of common carrier buses would serve as a moderating influence on the crossing behavior of any school children using these vehicles.

(b) It may seem obvious who a school bus driver is. It was considered important at this stage to define this term and alert the readers to the minimum training requirements specified in § 6. It is not sufficient to be able to operate a school bus carrying school children in a vehicular control sense without benefitting from essential training in the cognitive and affective domains of school bus driving, particularly those related to supervision of roadway crossings by school children. As it is worded, the definition of a school bus driver is linked to the minimum training requirement in § 6 by a footnote. In this configuration § 1(b) and § 6 support a minimum training requirement for school bus drivers but do not absolve anyone from complying with the other requirements of this regulation who might not have had the minimum required training and is nevertheless driving a school bus carrying children.

§ 2—Appearance and equipment requirements for school buses

(a)(b) It is essential from the standpoint of rapid, correct and reliable responses to school buses by motorists that the appearance and operation of school buses and associated equipment is uniform from jurisdiction to jurisdiction. The specification of "National School Bus Glossy Yellow" as the color for the school bus body is one which is of a long standing uniqueness. The black color also is typical and an effective color for lettering on the yellow body. Both these color requirements are specified by the National Conference on School Transportation in Minimum Standards for School Buses (NEA, 1970), as well as the Highway Safety Program Standard No. 17, Pupil Transportation Safety (NHTSA, 1974).

When considering the paint scheme and signal equipment, no other legend or wording other than "SCHOOL BUS" should have to appear on the front and back of school buses to properly identify them to the motoring public. Any additional words or phrases would be superfluous and a potential source of distraction to an approaching motorist. The "Series D" alphabet is an effective series of

letters yielding approximately 50 feet of daytime legibility for each inch of character height (Baerwald, 1965). The "Series D" alphabet is also the one specified in the Highway Safety Program Standard No. 17, Pupil Transportation Safety (NHTSA, 1974). The wording of this provision follows closely that found in the Minimum Standards for School Buses (NEA, 1970) as well as Uniform Vehicle Code (UVC) § 11-706 (c) (NCUTLO, 1976). Because the paint scheme is such a strong symbol connoting school bus, it, therefore, is reasonable to require obscuration of this school bus legend when the vehicle is not being used as a school bus. This should prevent any false positive reactions to a school bus vehicle not being used as a "school bus."

(c) The objective of this entire section is to provide for a minimum, standardized and effective array of displays for school buses—no more or less than are needed to engender the desired responses from the motoring public to school bus operations.

(1) The increasing number of jurisdictions adopting pre-stop amber warning lights, before the flashing red lights are activated, speaks to the perceived utility of this signal phase on school buses. In 1972 four states specifically provided for the use of amber warning lights (Yaw, 1972). In 1979 17 states specifically provided for the use of amber warning lights (NCUTLO, 1980).

When considering the traffic light analogy, the use of flashing amber lights is a consistent and useful application of the traffic light stereotype. A steady amber phase on a traffic light indicates that "the related green movement is being terminated or that a red indication will be exhibited immediately thereafter (UVC § 11-202 (b) 1.)" A flashing amber traffic light is generally understood to mean "drivers of vehicles may proceed through the intersection or past such a signal only with caution (UVC § 11-204 (a) 2.)" Both of these definitions positively transfer to the school bus application. Amber should inform drivers of the imminent onset of the red lights, and swing arm and, thus, the requirement to stop. Amber also should indicate the desirable option of passing a school bus displaying flashing amber lights if a motorist from the opposite direction is too close to make a reasonably controlled stop before reaching the bus. Dangerous stops and vehicle-to-vehicle conflicts can, therefore, be minimized. Thus, amber flashing lights are seen as warranted for two principal reasons: a) To provide reasonable warning to motorists that a school bus is about to stop, therefore, requiring motorists in both directions to stop when the red flashing lights and swing arm are activated, and b) to allow motorists too close to the bus a safety valve and the option to pass or overtake a school bus with amber flashing lights, if a controlled stop cannot reasonably be made before reaching the bus.

Requiring alternately flashing amber warning lights will prevent the misuses of the flashing red lights in motion by a school bus as a "pre-stop" warning signal. As recently as 1972, 15 jurisdictions required bus drivers to activate alternately red flashing lights, while moving, from 50 feet to 300 feet in advance of the intended stop as well as at the stop itself (Yaw, 1972). This is a potentially dangerous and confusing situation for motorists. The difficulties of trying to stop for a moving target are obvious. To allow vehicles to pass a school bus in motion with red lights flashing, but requiring motorists to stop when the bus finally stops, is equally disturbing. In the latter case, motorists are being asked to determine, on-the-fly so to speak, when a school bus's wheels have ceased to rotate

to know when a stop is required. If 15 jurdisdictions agreed that a pre-stop warning signal should be transmitted by a school bus, as do the authors, said signal should conform as much as practicable to existing stereotypes in the traffic environment. Thus, the requirement for alternately flashing amber lights prior to making a stop has been included.

The amber lights, if used properly, will warn drivers of an upcoming school bus stop. Such a warning can reduce vehicle-to-vehicle conflicts which could injure the occupants of the school bus, minimize stopping violations (by preparing the motorist for a stop), and generally foster an attitude of fairness and respect for the pupil transportation system.

The wording of this section acknowledges advancing technology and allows for the incorporation of dual purpose signal heads (a single lens which shows either a red or amber flashing light) in lieu of separate red and amber lenses. The overall content of this provision parallels that of UVC § 12-228 (b), except that in the present case the amber lights are required for standardization, not just permitted as in UVC § 12-228 (b).

(2) The requirement for alternately flashing red lights is a long-standing and consistent application of the traffic signal stereotype in the school bus environment, namely, a flashing traffic signal denoting the requirement to stop. Thus, the use of alternately flashing roof-mounted red lights in conjunction with an activated stop swing arm which also has flashing red lights (§ 2 (c) 3.) is appropriate.

(3)(4) The efficacy of a stop swing arm, as a traffic control device, has been demonstrated both in the school bus context and in ice cream truck operations. During a field test of a stop swing arm in California, Bequette (1976) found a statistically significant reduction in passing violations for buses equipped with octagonal stop arms versus those without across a sample of city and rural jurisdictions throughout the state. Another study showed reductions in passing violations ranging from 40% to 73% after the installation of octagonal stop arms (National Safety Council, 1975). Moreover, Hale, Blomberg and Preusser (1978) found that stop swing arms in conjunction with flashing signal lights mounted on ice cream trucks reduced child pedestrian accidents near ice cream trucks by 77%. It seems quite clear that a stop swing arm on a vehicle authorized to carry it can convey a compelling "stop" message to the motoring public. Short of a physical barricade across the road, it seems as effective a signalling device as can be employed presently. As support for this fact, 22 jurisdictions specifically provide for school bus stop swing arms in their vehicle codes as of 1979 (NCUTLO, 1980).

The octagonal shape for the stop arm has been specified for two reasons: a) it predominates as the shape of stop arm used by school buses today; and b) it is the shape recommended by the Society of Automotive Engineers in SAE J1133 (April, 1976). It is understood that the octagonal school bus stop arm is not a strict application of the roadside octagonal stop sign. The behavior required by the school bus stop arm is for the motorist to stop and stay stopped as long as the swing arm is extended and the red lights are flashing. In the roadside context a stop sign requires that a motorist stop and yield the right of way to any cross traffic before proceeding. While the messages are somewhat different,

the chances for confusion between the two seem minimal because the stop arm is used in a unique discriminable application, namely, as a stop swing arm on a school bus.

The primary legend "STOP" appears on the swing arm and not the school bus body, for one basic reason. Such important information should be conspicuously displayed only at the time motorist reaction is required. If such information were to be carried on the bus body, motorist adaptation could result from the constant display of these legends. Moreover, the legend on the bus body would not be as prominent as it is on a signal arm which temporarily extends beyond the normal silhouette of the bus. Thus, only the swing arm delivers the "STOP" message to motorists when that message is to be obeyed.

The white reflectorized legends and border for the stop swing arm as well as the red reflectorized background are typical for a stop sign and the colors recommended for a stop swing arm in SAE J1133. Reflectorization is seen as an essential conspicuity enhancing device as school bus operations must necessarily extend, in some cases, into the hours of dusk and darkness at certain times of the year. The double-faced lamps at the top and bottom of the stop arm are desirable swing arm conspicuity enhancers and are recommended in SAE J1133 (1976).

The 18" by 18" dimension for the stop arm blade is an industry standard and has proven to be a serviceable item. The stop arm would actually extend about 20" from the side of the school bus to account for a two inch hinge mechanism.

The lettering proposed for the swing arm uses the "Series D" characters. The daytime visibility of six inches high letters for the "STOP" legend should be approximately 300 feet.

The 44" mounting height for the swing arm places it roughly at the driver's eye level as per Allen's (1966) suggestion for maximum conspicuity and visual barrier effect for the close-in motorist.

It is possible that the established format for a jurisdiction's traffic regulations may preclude the use of graphic descriptions within any of its provisions. If this is the case, the following text is recommended as an alternative to the present graphic specification for the signal arm. This optional material shown below should be inserted at the second sentence of § 2 (c) (3), superseding the remainder of § 2 (c) (3) and all of 2 (c) (4):

> *The stop signal arm shall have the shape of a regular octagon measuring 18" in height and width, and approximately seven and one-half inches on a side. The two alternately flashing lights shall be located at the top and bottom of the vertical centerline of the signal arm. The red lights shall only flash when the signal arm is extended and they shall be visible at 300 feet to the front and rear in normal sunlight. The signal arm shall have a red reflectorized background upon which shall be a half inch white reflectorized border. The word "STOP" shall appear in the middle of the signal arm in six inch high white reflectorized letters. All colors shall meet*

specifications in the most recently published Federal Highway Administration Standard Color Charts. The bottom of the extended signal arm shall be as close as practicable to 44 inches above the highway.

(5) A disturbing number of children are struck while standing or crossing in front of the school bus itself. This is a particular problem for the conventional school bus with a protruding engine compartment. The forward control or transit-type school buses afford the seated driver a fairly good direct view of the area immediately to the front of the bus where a small child could be lurking. The requirement for a convex mirror is one, though not totally reliable, means of affording a view of the front of the bus to a seated bus driver (Negri, 1969). Emerging "electronic presence detectors" which can sense the presence of pedestrians in designated zones along the perimeter of the school bus is another possible approach. The need for a special type of mirror or any sensing equipment should start to disappear when the proposed Federal Motor Vehicle Safety Standard No. 128 on Fields of Direct View (NHTSA, 1978) is implemented in September 1981, with particular reference to the § 5.6 Forward Field of Direct View.

(d) The anchoring of all equipment features required in previous sections to the relevant performance specifications in Society of Automotive Engineers recommended practices and standards, as well as Federal Motor Vehicle Safety Standard No. 108, assures proven satisfactory performance for the components selected.

(e) Some reasonable time limits should be set for effectiveness of the equipment provisions which will be new requirements for some jurisdictions. Dates of effectiveness ultimately specified should consider both what is reasonable for the operating companies and each manufacturer involved and what will soonest serve the public interest.

§ 3—Owner responsibilities

This section clearly assigns the responsibility for compliance with the provisions of § 2 to the owner(s) of any school bus. The necessity of such a provision is self-evident.

§ 4—Duties of school bus drivers

(a) The "pre-stop" alternately flashing amber lights are required, not permitted, to be actuated in advance of every bus stop within the distances specified. The requirement for the amber lights ensures the necessary standardization in application and uniformity in motorist response. The actuation distances for the amber flashing lights are basically conservative (covering the stopping distances for a range of speed from approximately 35 to 65 miles per hour) and are those specified in UVC § 12-228 (b).

(b) To only permit the use of the flashing red lights when discharging or receiving passengers, as does UVC § 11-706 (b) and the laws of several jurisdictions, leaves an uncomfortable burden of discretion upon the bus driver as to when the lights may or may not be required. The driver may not always have sufficient knowledge in advance to make the decision. Moreover, young children are unpredictable. A group of children, before leaving the bus, may indicate to

the bus driver that no one is planning to cross the street. When the door opens and children hit the street, one chases another across the street. If the driver was convinced that no one was going to cross, he might not have turned on the warning lights, thinking it desirable not to "inconvenience" vehicular traffic unnecessarily. Another situation frequently encountered is where a group of children are waiting to be picked up on the same side of the street as the school bus. Thinking the group was complete, under permissive wording for use of the signals, the bus driver might be tempted not to turn the warning lights on. During the boarding process, a late-comer could run across the street unbeknown to the school bus driver. In the cases cited, the unpredictable child would be unprotected. Conservatism is best in this matter of child pedestrian safety. The school bus signals should be used prior to and during every stop to receive or discharge passengers along the highway. The presumption should always be made that children will cross the street in spite of reasonable expectations to the contrary.

This section clearly limits the use of the flashing red lights and stop arm (the "stop system") to the case where the school bus has stopped to receive or discharge passengers, avoiding the uncertainties associated with motorists attempting to stop for moving targets. It keys the deactivation of the amber warning lights to activation of the stop system. The bus driver is obligated not to allow children to leave the bus until any approaching traffic has stopped and to leave the stop system activated until all those who must, have crossed safely. Finally, it is required that the stop system be deactivated before the bus may resume motion. This last provision is essential if motorists are to respect and comply with the stop system.

(c) This section stipulates certain traffic situations where the alternately flashing amber and red lights and stop arm should not be used. Most of these exceptions are already set forth in UVC § 11-706 (b). Precluding the use of the flashing lights and stop arm in business districts and arterial streets is desirable from two standpoints. First, these locations are associated with dense and higher speed traffic flows which present hazards to child pedestrians. Second, school bus operations in these locations could wreak havoc with the normal flow of traffic. Prohibited use of the flashing lights and stop arm at intersections avoids the obvious potential conflicts with any traffic control devices already present. When the school bus is entirely off the roadway in a designated loading area, use of the lights and stop arm would be unnecessary and confusing to any motorist nearby. Finally, when the school bus is used for purposes other than the transportation of school children (presumably involving individuals beyond school age), then it should be unnecessary to use the flashing lights and stop arm as the passengers should possess adequate unaided street-crossing skills.

(d) A prohibition of the use of flashing red lights and stop arm while the bus is in motion is included to reinforce the likelihood that the flashing red lights and swing arm will not be abused and become a source of irritation to the motoring public. If the bus drivers use the red flashing lights and swing arm (and amber lights) in the manner prescribed in subsections (a), (b) and (c), there should be no problems of compliance. However, this provision is intended as insurance for attaining that outcome.

(e) Contrary to some thinking on school bus positioning on the roadway during off-loading or on-loading, this subsection requires school buses to be as far right as possible. This expedites the relief of any traffic build-up behind the bus when the situation warrants and allows a maximum available escape route for a large vehicle (e.g., fuel truck, tractor trailer) which may be unable to stop for the stopped school bus. The risk to any crossing pedestrians, posed by this vehicle which cannot stop is probably less than that to the passengers in the stopped bus which otherwise might be struck.

(f) It is absolutely essential that the front of a school bus be cleared of child pedestrians before a stopped school bus resumes forward motion. Children are struck by school buses when this is not done properly. Convex mirrors can aid the seated driver of a conventional school bus in this task, although they are not one hundred percent reliable in this regard.

Emergent technology in the area of "electronic presence sensors" located in any number of zones around the bus (front bumper, right side, rear bumper, etc.) can aid in detecting children who are not visible and near the bus. Whatever means the bus driver employes (i.e., direct vision, mirrors, presence sensors), this provision holds the driver responsible for clearing the front of the school bus before moving forward after a stop. It is not an unreasonable requirement being imposed on the school bus driver. For many years UVC § 11-603 has stated that "No person shall start a vehicle which is stopped, standing or parked unless and until such movement can be made with reasonable safety." Section 4 (f) is but a specific application of this general UVC provision.

(g) Accident data reveal the occurrence of a highly preventable but not very predictable form of school bus related pedestrian accident. Occasionally one or more school buses inadvertently end up traveling in a tandem formation. If the leading bus makes a stop to receive or discharge passengers, its red flashing lights and stop arm are actuated. By current practice any following buses are not obligated to do likewise unless they are receiving or discharging passengers. Any vehicles behind a following bus likely see no signals at the time and may be tempted to pass the stopped following bus because the stopped following bus is screening the lead bus's flashing lights and signal arm. If a motorist behind the following bus decides to move out and pass, then it may not be possible for the passing vehicle to stop in time before coming upon the leading bus. A vehicle and/or a pedestrian accident can be precipitated. Thus, it is necessary for a following bus to employ its flashing lights and swing arm according to any leading bus. The distance between the buses should not be extreme for the screening effect to be a hazard. Thus, the more than 500 feet separation exclusion is specified.

§ 5—Duties of drivers approaching school buses

(a) This subsection is patterned after UVC § 11-706 (a) modified to account for the motorist response required for the flashing amber warning lights. It keys the motorist's response to the display of flashing amber lights.

(b) This provision also closely follows UVC § 11-706 (a). It requires motorists to stop before reaching the school bus only when both the red flashing lights and swing arm are actuated. The lights and signal arm serve as the reliable stimulus for the motorist's stop response, as a motorist coming from the rear of the bus could not see if children were crossing when the bus is stopped. The motorist may only proceed when the red flashing lights and stop arm are no longer displayed or when the bus resumes motion. The latter condition must be stated as a driver

must be relieved of the requirement to remain stopped should a bus driver inadvertently (and illegally) proceed ahead with the red flashing lights and stop arm actuated. No need was seen to specify a stopping distance from the front of the bus for motorists approaching from the front. Such a distance would be hard to enforce and motorists seem to be allowing sufficient clearance for pedestrians to cross.

(c) This section is a close paraphrasing of UVC § 11-706 (d), and relieves a motorist of the obligation to stop for a stopped school bus if on a different roadway of a divided highway. The presumption is clearly that any school bus passengers in this situation are not permitted to cross the divided highway. The divided versus the undivided highway does not seem to be an unreasonable or inconsistent discrimination for a motorist to make. The highway division is a compelling perception to the motorist. It seems preferable from a system reliability perspective for the school bus signal system to work the same way in all cases and not be capable of being partially activated only to the rear and not to the front to accommodate the divided highway case (see Post, 1978 for an opposing argument). The relief from the requirement for motorists to stop for a school bus off the roadway in a loading zone is reinforcement for and consistent with § 4 (c) (3).

§ 6—Course required for school bus drivers

The setting of a minimum standard of qualifications for bus drivers is essential to providing the highest quality operators of school buses. What is described in this provision is in fact a program of certification for school bus drivers which is overseen by the State Department of Education or other appropriate state agency. The U.S. Department of Transportation's basic three-day course, School Bus Drivers Instructional Program* is a widely recognized standard of excellence for preservice qualification and is suggested as the basis for a minimum training requirement. It also must be recognized that a jurisdiction may already have or will develop a local equivalent to the U.S. Department of Transportation's basic training course. Periodic in-service training is highly desirable and the responsibility of the local jurisdiction.

§ 7—Instruction required for pupils riding on school buses

As a complementary requirement to the one expressed in § 6, minimum instruction in school bus safety is required for kindergarten through sixth grade pupils once in the beginning of each school year. A basis for conducting instruction on most of the topics outlined in § 7 may be found in the U.S. Department of Transportation's On-Bus Program—A Pedestrian Safety Curriculum for Rural and Suburban Schools. Manuals for this curriculum exist for both the bus driver and transportation director (NHTSA, 1979).

Although children over 12 years of age are involved in school bus related pedestrian accidents, the majority involved are under 12 years of age. Moreover, any program of pupil-oriented school bus safety instruction conducted annually since kindergarten should have served whatever useful purpose it can by the end of a pupil's sixth year of schooling.

*The June 1974 publication in three volumes is available from the U.S. Government Printing Office: 1) Instructor's Guide, Stock No. 5003-00160; 2) Course Guide, Stock No. 5003-00158; and 3) Trainee Study Guide, Stock No. 5003-00162.

§ 8—Inspection of school buses required

The inspection provisions are included to assure that the special equipment and school bus appearance requirements of this model regulation, as well as any other state and local requirements, are implemented. Subsection (a) sets the options for inspection intervals and compliance standards. Subsection (b) forbids operation of any school bus to transport children on the highway when the special flashing lights and stop arm in § 2 are not functioning properly. The exception to this requirement is where a school bus may travel a route where no stops are made upon the highway to receive or discharge children.

3. Implementation Considerations

a. Enactment

As it stands, the Model Regulation for School Bus Pedestrians is amenable to immediate enactment within the body of a state's vehicle and traffic laws. For maximum uniformity and effectiveness, the model regulation should be controlling throughout an entire state. Moreover, NHTSA encouragement for nationwide enactment to achieve a "national standard" is highly recommended.

No major legal obstacles to enactment are foreseen at this time. The vast majority of states already provide for two alternately flashing roof-mounted red lights to the front and rear of school buses in their vehicle codes. UVC § 12-228 (a) (Supp III, 1979) does likewise. As of 1979 17 states specifically provide for the use of pre-stop amber warning lights to be used in conjunction with the red flashing lights. UVC § 12-228 (b) permits the use of the amber warning lights.

In regard to the stop signal arm, as previously stated, 22 states specifically provide for a stop signal arm in their vehicle code as of 1979. This indicates a substantial amount of public acceptance for the stop signal arm concept which has not been formally promulgated. Also, SAE Recommended Practice, SAE J1133 (1976), basically specifies the model regulation's stop signal arm. The device appears to have a high enactability potential in the context of school bus safety. The behavioral or administrative requirements of the regulation are not viewed as controversial or unreasonable.

b. Enforcement

Given adequate public education (see the next section) enforcement requirements should be minimal. Introduction of a stop signal arm has already been demonstrated to significantly reduce school bus passing violations without increased police traffic enforcement (Bequette, 1976; National Safety Council, 1975). Upon introduction of the model regulation in a jurisdiction, some selective enforcement could be applied in the form of unmarked police vehicles intermittently trailing school buses on their routes to detect passing violations. If school bus drivers were encouraged to record and report the license numbers and any other descriptors for vehicles which unlawfully pass stopped school buses to the proper authorities, this could be a valuable enforcement tool as well.

The amber lights and the stop signal arm are seen as valuable cues to obtain the desired traffic behavior from motorists vis a vis school buses. Little, if any, dependency on police enforcement to gain widespread compliance from the motoring public should ever be necessary, given adequate public education.

c. Public Education

With regard to the behavioral requirements of the model regulation for school bus pedestrians, public education in two areas is foreseen as facilitating compliance. The first area concerns the "duties of drivers approaching school buses." Thirty and sixty second television and radio spots are recommended for development as supplements to a newly enacted model regulation for school bus pedestrians and as pre-school year refresher education for the public in subsequent years. The informational objectives for such media presentations should be:

- Full explanation of the meaning of all signals and devices on school buses required by the model regulation.
- The reasons why stopping for a stopped school bus is is essential (i.e., young, impulsive children crossing the street).
- The hazards and penalties involved in passing a stopped school bus with its signal equipment actuated.
- Reasons why patience should be exercised when driving in a queue behind a school bus; bus drivers are trained to relieve following traffic build-ups when the situation is appropriate.

Such education of the motoring public is seen as essential for gaining the maximum voluntary compliance with the model regulation. The second area concerns that of the behavioral requirements for school bus drivers. Two approaches to the problem seem feasible. The first would be the production of a short (10-15 minute) 16 mm training film covering not only all aspects of on-bus child safety, but emphasizing the driver's role in promoting the pedestrian safety of bus passengers. Legal and obligatory aspects of the model regulation affecting the school bus driver should be incorporated into the film's content as well. Such a widely available film would greatly enhance the prospects for school bus driver minimum training requirements being achieved to a much greater degree on a national level than they are presently. The film could thus serve as a valuable training aid to enhance the pedestrian phase of the pupil transportation system operation.

As a reinforcement to the training film, a pamphlet should be prepared detailing the essential school bus driver behaviors to promote the pedestrian safety of the passengers. A description of the initial concept and layout of such a pamphlet is provided in Section IV.

d. Cost Factors

Principal costs associated with the implementation of this ordinance for an existing pupil transportation system would be the following:

- Costs to purchase and install the amber lights on existing buses (assuming red lights are already in place).

- Costs to purchase and install the stop signal arms (which are readily available) on existing buses.

- Costs to paint out any extraneous wording on the bus except the phrase "SCHOOL BUS."

Material and equipment costs to accomplish the above modifications to existing school buses should not exceed $250 per bus. Administrative costs associated with meeting the minimum training and educational requirements of the model regulation stipulated for school bus drivers and kindergarten through sixth grade school bus riders are difficult to predict as are those for the administrative costs of inspecting school buses. The associated benefits should vastly outweigh the associated costs.

4. Field Testing Considerations and Risk Benefit Analysis

From a pragmatic standpoint, there is not a strong need to field test the Model Regulation for School Bus Pedestrians. There are no truly speculative components to the regulation that suggest any potential negative side effects in their implementation. The basic thrust of the regulation is to insure that motorists will stop for a school bus stopped to receive or discharge passengers along the roadway. Signalling devices are prescribed to remind motorists of the stop requirement and procedures are outlined to assure the safest possible crossings of the roadway by the children. The stop requirement is a long standing one throughout the states. The devices employed to reinforce the stop requirement are not unfamiliar to the motoring public in many jurisdictions. Jurisdictions providing for stop signal arms and pre-stop amber flashing lights appear to be well satisfied with the implementations. The stop signal arm has apparently achieved substantial reductions in illegal passings of stopped school buses by motorists (Bequette, 1976; National Safety Council, 1975). However, as a total integrated set of operational and administrative provisions, the Model Regulation for School Bus Pedestrians does not exist in any jurisdiction. Thus, NHTSA may well wish to assess the effectiveness of the entire model regulation in a field testing environment.

This being the case, a pre-test/post-test at an "experimental" test site with a "comparison" site is recommended as a general paradigm. Candidate dependent variables for measurement include those such as the following:

- Frequency of school bus related pedestrian accidents.

- Motorist compliance with the school bus stop requirement (a simple judgment of stop/no stop without the requirment for measuring approach speeds will suffice; school bus drivers could serve as pre and post data collectors in addition to a small staff of field data collectors).

- School bus driver compliance with provisions of the model regulation.

- Public awareness and acceptance of the model regulations.

- Bus owner compliance with equipment provisions as measured by inspection reports.

An "experimental" state jurisdiction should have several important characteristics. First, the jurisdiction should require only flashing red lights (not swing arms) as signal equipment on buses. Second, if possible, it should only "permit," not require the use of red flashing warning lights coincident with the bus stopping to receive or discharge children. In other words, a jurisdiction should have a provision in conformity with UVC § 11-706 (b).

This feature of the traffic law permits discretionary use of the flashing red lights when making a stop. As has been pointed out earlier, this would be a worst case "red lights only" situation as bus drivers may not always know if the lights are required because of the unpredictable ways of young children. Should such a jurisdiction not be found which would enact the model regulation, then a jurisdiction which "required" a bus to employ flashing red lights when stopped to handle passengers would certainly be adequate. Two experimental sites is another possiblity. One could have the discretionary use of red lights only and the other could have the mandatory use of red lights by school buses.

Considering that the state legislature would be the body to enact the model regulation in the experimental site, then it is recommended that the fall and spring of a given year be allowed to gain enactment of the model regulation which should become effective on the first day of the school year in the following fall. The estimated year's period to enact the model regulation at the state level is based upon the authors' experience with gaining enactment of the Model Ice Cream Truck Ordinance in Detroit*. That regulation was, albeit, more unorthodox** than the Model Regulation for School Bus Pedestrians but was enacted at the municipal level. However, a vigorously prosecuted process of enactment took nearly eight months to complete in Detroit.

In the experimental site(s), baseline measurements should be taken before the model regulation is enacted and school bus modifications are made to accommodate the flashing amber lights, stop signal arm and legends on the bus. Such modifications, as necessary, to the existing fleet of school buses could take place after enactment of the model regulation over the summer before the new school year under the provisions of the model regulation.

Critical "pre-test" behavioral measurements to be taken at the experimental and comparison sites include basically the violation measures such as:

- Frequency of motorists not stopping for stopped school buses displaying the flashing red lights. Identifying the direction of travel for violating motorists (from the front or rear of the bus) would be of interest in terms of evaluating the efficacy of the stop signal arm in the post test period.

- Frequency of school bus drivers not using the flashing red lights as a function of whether the existing law does or does not oblige them to do so.

*It is common for state traffic legislation to become effective one year after date of enactment. However, under many circumstances such legislation can become immediately effective or in substantially less than a year's period.
**This ordinance required stop signal arms and flashing lights on ice cream trucks. Motorists had to stop and then go if no pedestrians were crossing near a vending ice cream truck displaying these signals.

- Rate of compliance of buses with existing equipment requirements.

- Driver positioning of the bus on the roadway (as far right as possible) and inclination to relieve traffic build-ups behind the bus when it is feasible to do so.

Additional pre-test data to collect would be an enumeration of school bus related pedestrian accidents three years prior to the implementation of the model regulation. Jurisdictional police accident reports involving 19 year old and younger pedestrian victims should be screened and accident typed in cooperation jurisdictional school and public safety organizations. A three year average of the before accident experience in experimental and control jurisdictions should provide a stable estimate and a measure of protection against a regression-to-the-mean phenomenon.

During the pre-test period the recommended public information and education materials should be produced, to include the radio and television spots for the motoring public outlined above. In addition, the bus driver training film and pamphlet proposed are discussed above and in Chapter IV. These materials should be produced in sufficient quantities and be distributed to broadcast stations and school bus companies in the experimental jurisdiction(s) with sufficient lead time to be maximally effective throughout the one year "post-test or after" period of evaluation for the model regulation. The pre-test behavioral and accident data collected should also be collected during a one year or more post-test period at both the experimental and comparison sites.

The comparison site selected should be as comparable as possible in the nature and magnitude of school bus operations to the experimental site(s). Its traffic code should only permit the use of flashing red lights as signals for a required stop at a school bus.

C. Model Regulation for Pedestrians on Highways

1. Background of the Accident Problem

Within the rural and suburban pedestrian accident data base acquired and studied by Knoblauch (1977), "Walking Along the Roadway" predominated as the most frequently occurring accident type at 11.6%. This accident type involves a younger pedestrian (63% were 10-24 years old) walking along a two-lane roadway (70% in the roadway or on the edge, 26% on the shoulder) in a residential or country location. Sixty-five percent of the pedestrian victims were walking with traffic and 23.6% were walking against the traffic. Over 30% of the pedestrians were within 0.1 mile of home and 67.2% were within one mile of home when struck. That 55% of the accidents occurred after dark and that "poor light" was the most frequently cited precipitating factor for the involved drivers by the research field investigators strongly suggest that the nighttime visibility of pedestrians walking along suburban and rural roadways can be substantially improved.

2. The Model Regulation

a. Approach and Overview

It has long been recognized that the visibility or conspicuity of pedestrians walking along the road at night in rural and suburban areas is generally unsatisfactory. The results of Knoblauch's study (1977) and the incidence of the

accident type previously described bear witnesses to this statement. The exhortations of various safety organizations for decades to pedestrians to wear light colored or white outer garments at night have obviously not been heeded for one or more of the following reasons:

- Pedestrians do not perceive the risks in walking along the side of the roadway at night. In all likelihood, they overestimate their visibility to approaching motorists up to three times farther than it actually is (Allen, 1970). A pedestrian being bathed by a vehicle's headlights doesn't necessarily coincide with the motorists' perception of that pedestrian.

- Wearing high visibility outer garments may not always be convenient for the user.

- Few people, even researchers, are aware of how to make a pedestrian conspicuous at night.

Pedestrians are using the same highways and streets that motor vehicles, motorcycles, and bicycles are using. As these vehicles are "traffic units" operating in the traffic environment, so must pedestrians be considered traffic units. If it has been determined necessary for vehicular traffic units to have headlamps, running lights and reflectors to enhance their conspicuity why hasn't there been a similar concern for the most vulnerable highway traffic unit, the pedestrian! This is a difficult question to answer without a great deal of speculation. It would seem logical that if there were a need to develop Federal Motor Vehicle Safety Standard No. 108, "Lamps, Reflective Devices and Associated Equipment—Passenger Cars, Multipurpose Passenger Vehicles, Trucks, Buses, Trailers and Motorcycles," (NHTSA, 1970) that concomitantly a similar Federal Pedestrian Safety Standard No. ? might have been formulated.

The primary objective of this model regulation is to provide a regulatory structure for requiring pedestrians to employ eminently usable and effective materials or devices to enhance their visibility/conspicuity at night along our nation's highways. While quantitative research has yet to be conducted to specify the design and performance characteristics of such materials or devices, the legal context for requiring such items can now be usefully developed to serve as a spearhead for gaining support for the concept. To merely request that pedestrians use certain devices via public information and education (PI&E) channels alone will probably not compel the necessary pedestrian action. There is too much ignorance and intransigence to overcome. To require use of conspicuous materials or devices through the force of law (supported by PI&E) will not only be more effective in engendering the desired behavior but it will assure that an adequate supply of effective materials or devices will be on the market to meet a known consumer demand.

In summary, this model regulation will provide a framework for bringing the visibility/conspicuity of pedestrians at night along the highway up to a level commensurate with or superior to other traffic units. Additionally, provisions are included which related to a pedestrian's position and direction on the highway which are intended to minimize the risks identified by Knoblauch (1977). Many of these provisions exist presently in the Uniform Vehicle Code (NCUTLO, 1979).

b. Provisions of the Model Regulation

Figure 3 contains the provisions of the Model Pedestrian Travelling on Highways Regulation.

c. Annotation of the Provisions of the Model Regulation

§ 1—Use of highway elements by pedestrians

(a) This section is UVC § 11-506 (a) in its entirety with the substitution of the phrase "proceeding along" for the word "walking." Proceeding along covers the broad range of pedestrian activities now occurring alongside the roadway, i.e., walking, running, jogging. This subsection is common sense articulated in the form of a traffic regulation. Simply put, sidewalks are usually raised surfaces along streets and highways intended principally for the use of pedestrians. Under normal circumstances, sidewalks offer sanctuary to pedestrians and a reasonably secure pathway for travel which is visually distinct and physically separate (at a higher level) from the roadway and vehicular traffic. It is essential that a serviceable sidewalk facility be used by pedestrians in preference to either the roadway or shoulder. This section requires this preferential use.

(b) This provision is UVC § 11-506 (b) in its entirety with the phrase "proceeding along" for "walking" substituted again. The givens for this provision are that no sidewalks exist but shoulders are available. Under these conditions this section requires that pedestrians minimize their risk in the obvious way, namely by travelling on the shoulder... "as far as practicable from the edge of the roadway." To be sure a shoulder, which is a facility to be shared by motor vehicles, bicycles and pedestrians, is not a guaranteed sanctuary for pedestrians. While no collisions of this type occurred on sidewalks, 27% occurred on the shoulder and 69.7% on the roadway (Knoblauch, 1977). However, from a probability standpoint and a common sense standpoint the risks will be lower for pedestrians the farther they can remove themselves from the designated pathway for motor vehicles, namely the roadway. In the absence of a sidewalk, lateral placement as far away from the roadway on a walkable shoulder is the preferred strategy.

(c) This provision is derived in part from UVC § 11-506 (c). This UVC section requires walking on the left of a two-way roadway only in the absence of both a sidewalk and shoulder. The model regulation requires walking on the left of a undivided, two-way highway (roadway or shoulder) only if no sidewalk is available.

Knoblauch (1977) found that for the "Walking Along the Roadway" accident type that "64.6% of the pedestrians were walking in the road with traffic" and "...23.6% of the pedestrians were walking in the road against traffic." If there were no great differences between the number of people travelling on the right side of the highways versus the left side, and distances travelled then it would appear that those individuals walking on the right side of the road are clearly at greater risk of a collision than those moving on the left side.

However, the number of pedestrians being struck on each side of the road versus the number of pedestrians travelling on each side of the road is not presently known. Nor are the relative distances travelled by accident-involved pedestrians as a function of the side of the road traveled upon well understood. If a presumption could be made of any existing bias it seems likely that there

MODEL REGULATION FOR PEDESTRIANS ON HIGHWAYS

§ 1 — Use of highway elements by pedestrians

(a) Where a sidewalk is provided and its use is practicable, it shall be unlawful for any pedestrian to proceed along and upon an adjacent roadway except when crossing the roadway.

(b) Where no sidewalk is available but a usable shoulder is provided, any pedestrian proceeding along and upon such a highway shall travel only on a shoulder as far as practicable from the edge of the roadway.

(c) Where no sidewalk is available near a two-way highway, except on a divided highway, any pedestrian proceeding along and upon such a highway shall, where practicable, move only on the left side of the highway facing traffic.

(d) Where neither a sidewalk nor a shoulder is available, any pedestrian proceeding along and upon such a highway shall move as near as practicable to the outside edge of the roadway.

§ 2 — Pedestrians to use special nighttime equipment

(a) Any pedestrian proceeding along and upon a highway from sunset to sunrise shall have and display the equipment described in § 3.

(b) This section shall not apply to:

(1) A pedestrian on a sidewalk

(2) Police officers while on duty

§ 3 — Special nighttime equipment for pedestrians defined

(Pending further NHTSA sponsored research to study and propose conspicuous materials or devices for pedestrians and bicyclists, this section will describe or refer to as a minimum:

(a) Appearance and performance parameters for the required items;

Figure 3. Model Regulation for Pedestrians on Highways

(continued)

(b) Acceptable method(s) for displaying the conspicuous materials or devices;

(c) Required usable condition for the conspicuous materials or devices.)

§ 4 — Pedestrians to yield to vehicles

Except as otherwise provided, any pedestrian upon a roadway shall yield the right of way to all vehicles upon the roadway.

Figure 3. Model Regulation for Pedestrians on Highways

would be a greater proportion of pedestrians travelling on the right side of the road due to the right-sided preference in U.S. traffic movements. While no clear data exist as to the benefits of pedestrian travel on the left side of an undivided, two-way highway without sidewalks, the case can be made for doing so on several grounds.

First, the orientation of a pedestrian's senses and attention is in the direction of approaching traffic when moving on the left side of the highway. Such an orientation could give the pedestrian the life-saving margin of advance warning should a vehicle be moving too close to the edge of the roadway or moving off onto the shoulder, requiring evasive action by the pedestrian.

Second, for the most part, pedestrians travelling on the right side of the highway with traffic have their back to near lane approaching traffic. With hitchhikers the situation is somewhat better as they orient periodically towards traffic coming from the rear to solicit a ride. In Knoblauch's study (1977) hitchhikers represent only 1.5% of the accident cases studied versus 11.6% for "Walking Along the Roadway" accident type which is the focus for this regulation. With their backs to near lane traffic coming from the rear, pedestrians detect traffic approaching from the rear principally by sound (engine/exhaust noise, sound of tire tread on the pavement) and headlights (at night). Without turning around, these are relatively ambiguous cues for determining the track of any vehicle with respect to the pedestrian. To turn around and scrutinize each approaching vehicle is an inconvenient thing to do for a pedestrian who likely believes he is quite visibile to any approaching vehicle. As discussed earlier, a pedestrian's overestimation of his visibility is particularly pronounced at nighttime when the pedestrian is bathed in vehicle headlights (Allen, 1970). The dangerous misconception by a pedestrian travelling along the highway at night is that the illumination of any object by headlights coincides with the driver's perception of that object. Allen's study (1970) clearly disproves this presumption.

The requirements of this provision are limited to a two-way, undivided highway. Pedestrians who must travel along a divided highway, particularly the right side of a freeway, should not be required to cross to the left side and be exposed to the extreme hazards of such a crossing. Such hazards could be greater than those associated with standing or traveling on the right-hand shoulder.

In summary, the case is made that walking on the right side of the highway, generally, provides a pedestrian with inferior sensory data for vehicle localization and track prediction. These inferior sensory data make a potentially lethal combination with the dangerous sense of well-being and complacency which too many pedestrians on the highway seem to have regarding vehicular threats. Walking on the left side of the highway (shoulder or outside edge of roadway) lacking a sidewalk, where practicable, gives pedestrians a better opportunity to obtain threat information for evaluation.

(d) In substance, the words of this section are those of the first part of UVC § 11-506 (c). Unfortunately, there are highways which pedestrians may legally use which afford neither a sidewalk nor a usable shoulder. Admittedly, pedestrian travel upon such a highway is a risky undertaking, but nonetheless may

be necessary. Of necessity, the pedestrian must share the roadway with motor vehicles. It, therefore, stands to reason that under these circumstances the pedestrian be obliged to "...travel as near as practicable to an outside edge of the roadway."

§ 2—Pedestrians to use special nighttime equipment

(a) This provision sets the general requirement for pedestrians to employ the special equipment (conspicuous materials/devices) to be ultimately specified in § 5. The operative period for this provision is between sunset and sunrise, the period of most unfavorable illumination conditions for pedestrians on highways (twilight, nighttime and dawn). "Sunset to sunrise" are discernible compliance limits involving only the perception of whether the sun is above or below the horizon. In practice, law enforcement policies would probably employ a time tolerance such as "one half hour after sunset to one half hour before sunrise."

(b) Two notable exceptions to the requirement in subsection (a) can be specified. The first exempts pedestrians who are on a sidewalk. This is reasonable since the accident data do not point to a requirement to use conspicuous materials/devices in downtown or other developed areas where sidewalks (and likely other pedestrian facilities) are provided. This exclusion means that the requirement for use as stated in subsection (a) are applicable in areas of greatest risk to the pedestrian—namely highways where no sidewalk is available. In this situation pedestrians will be found to walk on shoulders or roadway edges of no shoulders exist, bringing them close to vehicular pathways. The second exception to subsection (a) relates to police officers on duty. Clearly, the case could be made where law enforcement personnel would wish to minimize their conspicuity while conducting a roadside police operation. Consequently, police personnel have been exempted from the requirements of subsection (a) in § 2 (b)(2).

§ 3--Special nighttime equipment for pedestrians defined

The nature of the conspicuous materials/devices to be donned by pedestrians cannot be specified at this time. Pending research to be conducted by NHTSA should ultimately specify conspicuous materials/devices. It is the intent of this section presently to identify such likely content as the appearance and performance parameters for the materials or devices, acceptable method(s) of employment and the required usable condition.

In regard to the performance parameters for the conspicuous materials/devices, it is likely that the detailed specifications will not reside ultimately within this provision. More appropriately, only the official designation or reference for the conspicuous materials/devices will be mentioned with the actual specifications appearing in a "Federal Pedestrian Safety Standard" or similar body of information.

§ 4--Pedestrians to yield to vehicles

Completing a comprehensive regulatory treatment of the critical aspects of pedestrians walking on highways is this close paraphrase of UVC § 11-506 (d). The need to admonish pedestrians travelling on the roadway to yield the right of way to vehicles is self-evident. Under the requirements of this regulation,

a pedestrian should only be travelling upon the outside edge of the roadway in the absence of a usable shoulder or sidewalk. The roadway is the primary pathway for vehicles. As such, drivers do not expect pedestrians to be sharing this facility. Consequently, pedestrians must realize that, even though no shoulders or sidewalks are provided, they are not exclusively entitled to a piece of the roadway as a pedestrian path. Drivers have not consciously ceded this territory to pedestrians and don't expect to find pedestrians on the roadway. Pedestrians travelling on the roadway must, therefore, be constantly on the alert and prepared to yield the right of way to vehicles.

3. Implementation

a. Enactment

The Model Regulation for Pedestrians on Highways (MRPH) is designed to be enacted in a state's traffic laws and its provisions to be controlling throughout the state. Many of the provisions concerning the position and direction of pedestrians on highways, in substance, are already a part of many state vehicle codes. Acceptance and enactment of this class of provisions are not seen to be major problems. The potentially problematic portions of the MRPH relate to the requirements for and description of the conspicuous equipment to be used at night by pedestrians on the highways. Assuming that the pending NHTSA research to identify, develop and pilot test conspicuous materials identifies a viable approach to enhancing the nighttime conspicuity of pedestrians, then legislative enactment problems may not be insurmountable in this regard. The conspicuity research must identify not only a perceptually effective means for enhancing the nighttime conspicuity of pedestrians on highways, but equally important, identify an approach which is accepted and readily used by the walking public. Given that the research is successful on both counts, then the documentation should be available which can be converted into an effective lobbying tool. With objective data to show that the conspicuous materials are both perceptually effective and acceptable to the public, an effective basis is available for gaining the necessary legislative support for enactment of the MRPH.

Presently, the MRPH is not in a form which is conducive to immediate enactment as the conspicuous materials have not been defined by the research yet to be conducted. Sections 1 and 4 are amenable to enactment and could be promulgated on their individual merits. However, as an integrated treatise on regulatory concepts governing the safe travel of pedestrians on highways, it is recommended that the MRPH be kept intact and promulgated as a package when completed.

b. Enforcement

Given a fully articulated and enacted regulation, it is anticipated that enforcement of any of the operational provisions (§ 1, 2 and 4) will present no problems. The behavioral requirements are straightforward involving mandated pedestrian positions and direction of movement on various well defined elements of the trafficway such as roadway, shoulder and sidewalk under clearly defined circimstances. All these compliance factors can be readily determined by law enforcement personnel. When § 2 and § 3 are ultimately completed,

these aspects of compliance will also be described in terms of readily observable requirements. The conspicuous materials, by definition, should be readily detectable or notably absent during the conditions of required use (sunset to sunrise, highways with no sidewalks available). Materials deployment and minimum usable condition requirements will be easily determined.

In summary, from a technical standpoint, no major problems of enforcement are foreseen for the MRPH once it can be fully and completely written and enacted. It remains to be seen whether the hearts and minds of law enforcement officials can be won over to employ a vigorous enforcement policy for a MRPH—particularly those provisions related to use of conspicuous materials. Given that the MRPH is enacted in the first place, it is likely that the amount of public debate likely to occur during early enactments should provide sufficient impetus to catalyze a "reasonable" level of police enforcement.

c. Public Education

Overall, the thrust of the public education foreseen in support of the MRPH should emphasize pedestrian oriented messages. Receiving principal emphasis should be 60 and 30 second television spots covering the following points:

- Show differences in pedestrian conspicuity at night with and without the required conspicuous materials (location shooting at night on various types of suburban and rural roadways)
- Emphasize the need for pedestrians walking at night to be at least as visible as motor vehicles and bicycles.
- Remind audience of the additional requirement for pedestrian use of the highway elements

A magazine presentation (size of Time magazine page) would also be appropriate on a local or national level. A split photo layout in black plus one color could show a pedestrian at night with and without the conspicuous materials. The copy should focus on the need to wear the materials.

Sixty and 30 second radio spots with a driver point of view would also be useful. Specifically, the following message components should be carried by such spots:

- In many suburban and rural settings, a shoulder is not always well defined. Pedestrians are, therefore, compelled to share the "roadway" (the outside edge!) with vehicles. Drivers should be especially alert to and prepared to account for a pedestrian (or bicyclist) at the edge of the roadway at night regardless of the side of the highway on which the pedestrian or bicyclist may be.

- Pedestrian threats in non-urban driving are to a large extent parallel to the motor vehicle's pathway versus crossing the motor vehicle's pathway as in the urban setting.

d. Cost Factors

No significant public costs are anticipated in connection with the enactment and enforcement with the MRPH. Adequate enforcement of the MRPH should be accomplished via normal state police/highway patrol, county and local motorized police patrol operations.

It will be a design goal for the conspicuous materials for pedestrians to have as nominal a cost as possible. This will be an important factor affecting the acceptance and use of these materials by the public. A numerical estimate of a nationally available unit cost is impossible to predict at this time without knowing the nature or design of the materials in question.

4. Field Testing Considerations and Risk Benefit Analysis

Two aspects of the MRPH, in particular, warrant the benefit of a full scale model regulation field test. The first aspect concerns a demonstration of the accident-reduction potential attributable to the widespread use of conspicuous materials by pedestrians at night. The second aspect concerns a demonstration of the advantages of requiring pedestrians to walk on the left side of two way, undivided highways, with no sidewalks. All rational arguments point to clearly anticipated benefits, but any substantial empirical evidence in support is presently lacking.

To test the effectiveness of these major provisions the following general scheme is proposed. A pre-post test in an experimental jurisdiction with a comparison jurisdiction would be ideal. The experimental jurisdiction would enact the MRPH, the comparison jurisdiction would not. The experimental and comparison jurisdictions should be state jurisdictions as similar as possible in the miles of interstate, state and local roads and the number and size of urban/suburban population centers. Climatology would be another variable to equate upon to standardize the typical attire to be used by pedestrians at various times of year as well as the condition and availability of highway elements for pedestrians to use. Both jurisdictions, if possible, should not have the requirement for pedestrians to walk on the left side of the highway, or as a minimum only require walking on the outside edge of the left side of a two way, undivided roadway where no sidewalk or shoulder exists (UVC § 11-506 (c)).

In the experimental jurisdiction, a two phase field test of the MRPH could be conducted. For the first phase, all of the MRPH would be enacted save the conspicuity provisions (§ 2, 3). This version of the MRPH would then be in effect for a year's period. Subsequently, the entire MRPH would be enacted, including the conspicuity provisions, and this version would be assessed for an additional one year period. Thus, the ability to assess the relative benefits of walking of the left side of the highway (plus the other pedestrian positioning requirements) versus use of the conspicuous materials by pedestrians would be afforded by a two phase test. The strategy for enactment of the MRPH in the experimental jurisdiction cannot be wholly forecasted at this time. Phased enactment may be practical to coincide with or properly anticipate the two phases of assessment.

Then again, a single enactment of the MRPH with staggered dates of effectiveness for the appropriate test phases may be preferable. The problem forseen with the latter approach is that the debate generated in enacting the total MRPH package with phased dates of effectiveness may trigger a significant amount of voluntary use of the conspicuous materials during the first phase test of left side walking requirements, confounding those results.

The two phase test of the MRPH will require two sets of public educational materials to account for the different version of the MRPH being in force for different periods of time. This will have additional cost implications for the field test.

Rather than having a two phase field test in one jurisdiction, two experimental jurisdictions could be employed. In one jurisdiction the entire MRPH would be enacted and assessed for a period of one year and in the other jurisdiction only the MRPH minus the conspicuity provisions (§ 2, 3) would be field tested. The difficulty presented by this design is to find two reasonably matched or comparable experimental state jurisdictions in addition to a comparison jurisdiction.

If a two experimental site plus one comparison site paradigm were to be used, two concurrent years would be needed to gain enactment and field test the MRPH in each experimental jurisdiction, tracked by the same period of time in the comparison jurisdiction.

If a two phase test were conducted in a single experimental jurisdiction, then a three year period would be needed—one year for initial enactment and one year of assessment for each enactment phase of the MRPH. Pre/post measurements taken in the experimental jurisdiction would have to be mirrored in frequency and timing in the comparison jurisdiction.

Principal data to be collected in the experimental and control jurisdictions include:

- Pretest or Before Enactment of the MRPH
  - Incidence of the "Walking Along the Roadway" accident type for three years immediately prior as a reasonably stable estimate of the baseline or "before" accident experience.
  - Frequency estimate of pedestrian conformity with major provisions of the MRPH, to include:
    - — Number of pedestrians walking on right versus the left side of the highway (day and night)
    - — Number of pedestrians using the roadway or shoulder when sidewalks are available (day and night)
    - — Number of pedestrians using conspicuous materials between sunset and sunrise.

- Post-Test or After Enactment of the MRPH

  - "Walking Along the Roadway" accident frequency during the program period(s).

  - Frequency estimates of pedestrian compliance with the major provisions of the MRPH (see items above)

  - Public awareness and acceptance of the model regulation. To be done effectively, some form of public survey would be required.

Public education materials should be produced in sufficient numbers for each experimental jurisdiction with sufficient lead time to be available for broadcast immediately prior to or at the start of the program period for the MRPH. As an additional planning consideration, conspicuous materials must be available in sufficient numbers and distributed at the appropriate time to coincide with the planned program test period. It is not recommended that the conspicuous materials be subsidized and made freely available to the public in the experimental jurisdiction. While this would facilitate the mechanics of the field test, it would destroy its validity and realism. However, field test funds may have to be temporarily provided to enable the manufacturers of the conspicuous materials to make sufficient quantities of the conspicuous materials available in time to meet field test requirements.

None of the operational aspects of the MRPH are seen to represent any increase in hazard over present pedestrian practices on suburban and rural highways. Each provision, in fact, clearly portends a net increase in pedestrian safety assuming proper compliance.

D. Model Freeway Walking Restrictions Regulation

1. Background of the Accident Problem

In the study of pedestrian accidents occuring on freeways, Knoblauch, Moore and Schmitz (1976) identified among others, the following accident types:

Pedestrian Accident Type	% of Sample Studied
Interchange Dash	8%
Dart Out and Dash	5%
Walking In the Travelled Way	5%
Interchange Walk	3%
Hitchhiking	9%
Total	30%

Of the total cases involved in all of the above accident types, approximately 20% were known for certain to be local residents using freeway facilities for their pedestrian trips. In many cases the involved pedestrian's trip origin was indeterminable. Clearly, an unacceptably large proportion of freeway pedestrian accidents can be attributed to the unessential use of freeway facilities by unauthorized pedestrians. This is an inescapable conclusion when one considers that

the 30% of the freeway pedestrian accident sample itemized above does not include those accident types involving legitimate or unavoidable pedestrian activity on freeways, i.e.:

Pedestrian Accident Type	% of Sample Studied
Disable Vehicle Related	(20%)
Walking to or From a Disabled Vehicle	(8%)
Working on the Roadway	(3%)
Emergency/Police Vehicle Related	(4%)
Total	(35%)

2. The Model Regulation

a. Approach and Overview

Simply put, the objective of this "Model Freeway Walking Restrictions Regulation" is to prohibit unessential pedestrian activity on freeways. The freeway is the intended domain of the motor vehicle. Because of its high vehicle speeds, it is an extremely hostile environment for pedestrians. Any but the most essential and unavoidable pedestrian activity must be prohibited on freeways. In no way can a freeway system be considered a legitimate pedestrian convenience.

b. Provisions of the Model Regulation

Figure 4 contains the provisions of the Model Freeway Walking Restrictions Regulation.

c. Annotation of the Provisions of the Model Regulation

§ 1—Definition

To minimize any ambiguity a definition of a freeway, or more formally a "controlled access highway," is necessary. The definition provided in this section is that found in UVC § 1-110.

§ 2—Restriction against walking on a controlled access highway

This is the heart of this regulation. Subsection (a) emphatically bars pedestrians from controlled access highways. Subsection (b) enumerates eight necessary exceptions to such an encompassing restriction. It is quite apparent that the eight exceptions listed identify pedestrian acitivity which could be required on freeways as a consequence of enforcing or complying with traffic laws, the preservation of life, limb or property, the summoning or rendering of assistance to disabled vehicles and the engineering or maintenance of the highway. A tolerance for the aforementioned pedestrian activity on freeways must be explicitly acknowledged.

MODEL FREEWAY WALKING RESTRICTIONS REGULATION

§ 1 — Definition

Controlled-access highway--Every highway, street or roadway in respect to which owners or occupants of abutting lands and other persons have no legal right of access to or from the same except at such points only and in such a manner as may be determined by the public authority having jurisdiction over such highway.

§ 2 — Restriction against walking on a controlled-access highway

(a) A person shall not be afoot on any controlled-access highway.

(b) This section shall not apply to:

(1) Any person who is afoot to comply with a legal requirement or the order of a police officer;

(2) Police officers, firemen and members of authorized road work crews;

(3) Physicians, nurses and medical specialists when their assistance is necessary at the scene of an accident or medical emergency;

(4) The driver and occupants of a road service truck while attending to a disabled vehicle;

(5) The driver or occupants of a vehicle who have stopped to render assistance to the driver or occupants of a disabled vehicle;

(6) The driver and occupants of a vehicle which is disabled;

(7) Any person who is authorized to be afoot by _____ (agencies with enforcement, engineering and maintenance responsibilities);

(8) A person walking along a part of the highway designed for pedestrian or bicycle traffic.

Figure 4. Model Freeway Walking Restrictions Regulation

(continued)

§ 3 — Restriction to be posted

A sign banning foot traffic shall be posted on a controlled-access highway at the beginning of all entrance ramps and the end of all exit ramps.

Figure 4. Model Freeway Walking Restrictions Regulation

§ 3—Restriction to be posted

To have a reasonable expectation of success in restricting unnecessary traffic on freeways, more than just public education in support of this regulation will be required. Specifically, the pedestrian prohibition on freeways should be posted in the given traffic environment. This is a fair measure, especially for itinerant, out-of-jurisdiction pedestrians, and will increase the chances for compliance.

The message or legend to appear on the prohibitive sign deserves some careful thought. It is recommended that the legend "NO FOOT TRAFFIC ON THIS HIGHWAY" be considered for this application. Rather than saying that "no pedestrians" are allowed on any freeway in question, which would not be true (see § 2 (b)), the term "foot traffic" is suggested instead. This terms seems to have a strong connotation of someone on foot and in transit from point A to point B—a routine trip. It is just this kind of pedestrian activity that must be prohibited on freeways. In lieu of any existing model regulatory sign or legend of this nature, the "NO FOOT TRAFFIC ON THIS HIGHWAY" legend is, therefore, recommended.

This section requires not only a prohibitive sign to be installed but specifies the location for posting the sign—namely, at the beginning of all entrance ramps and the end of all exit ramps. These locations are intended principally to warn itinerant pedestrians that their activities, e.g., ride sharing procurement, may not be conducted on the freeway itself, unless designated areas have been set aside expressly for this purpose. It was once considered feasible to suggest posting prohibitive signs at known points of pedestrian intrusion (e.g., location of cut chain-link fense along freeways, foot-worn pathways along or intersecting freeway roadways). However, the assumption made is that any pedestrians habitually using or crossing a freeway, probably are well aware of the hazards or illegality of these actions. In spite of either or both inhibitions, such individuals have probably consciously chosen to brave the hazards of an accident or encounter with the law to suit their traffic conveniences.

Because of a pervasive system of interstate freeways, this regulation is ideally suited to a body of traffic law which could be referred to as the "Federal Vehicle and Traffic Code." Unfortunately, such a body of nationally controlling traffic law does not exist.

3. Implementation Considerations

a. Enactment

The fact that several states presently ban unessential pedestrian traffic on freeways (Alaska, Delaware, Florida, Michigan to name a few) points to the viability of a statuatory ban. Such a ban should uniformly apply to the nationwide system of interstate highways or freeways. However, as pointed out, there is no body of national regulations wherein a nationwide prohibition could could reside. Thus, the Model Freeway Walking Restrictions Regulation (MFWRR) should be promulgated for enactment by state legislatures into their vehicle and traffic laws. Little difficulty is seen in gaining enactment. A modest statement of the accident problem, coupled with the patent logic of prohibiting unessential pedestrian traffic on highways, should have substantial appeal to state legislators.

b. Enforcement

Enforcement of this regulation will involve no extraordinary police measures. The normal jurisdictional motorized patrol of the interstate/freeway system will uncover unauthorized pedestrian travel—particularly the travel of unauthorized pedestrians along the length of the freeway (i.e., walkers and hitchhikers). To detect pedestrians crossing the freeway for their own convenience, police may need to observe places of frequent freeway crossings by pedestrians (e.g., interchanges, footworn pathways) to deter or detect this form of freeway walking violation. Moreover, certain types of freeway crossings by pedestrians cluster at particular times of day, for instance, at times of school or work dismissals near a freeway. A concentration of police surveillance at these time-bound locations could increase the likelihood of detecting freeway crossing infractions.

c. Public Education

Although the mechanics of police enforcement for the MFWRR do not appear problematic, the chances for a successful program of compliance being brought about by enforcement alone seem remote. Clearly the opportunities for police personnel to detect, deter or apprehend violators, especially freeway crossers, will be few as the illegal acts are not that frequently occurring over the course of a day. Thus, compliance will most profitably gain from sufficient public education on the risks of using any part of the freeway system as a pedestrian facility and increasing the physical inconvenience of using the freeway through the use of barriers and barricades.

Complimentary to the enforcement of the MFWRR, broadcast and print media public education are seen as absolutely necessary to achieve a satisfactory level of compliance. Thirty and 60 second television spots aimed at the principally involved accident population, adults 15 - 35 years of age, are recommended. The objectives of such spots will be to describe the extreme hazards of the freeway environment for transient pedestrians and that the freeway is the roadbed designed for motor vehicles not pedestrians. Location shooting at freeway sites should show that the typical stream of traffic where pedestrians like to cross is often an "unbreakable" chain of vehicles with little or no opportunity to break the chain without unacceptable risk to the pedestrian. The theme should be that any convenience perceived by pedestrians in using the freeway cannot be justified by the risks involved.

Newspaper and magazine pieces are also recommended for support of the model regulation. A piece of the magnitude of a "600 line ad" would be appropriate. Panoramic shots of a freeway with copy asking "Where do you see a sidewalk or crosswalk?" could form an effective creative approach.

d. Cost Factors

No extraordinary cost factors are associated with the implementation of this regulation. The signing requirements at freeway entrances and exits are not unreasonable. In many cases existing sign stanchions used for posting "WRONG WAY" warnings could be used to mount the foot traffic prohibitions. Where stanchions would have to be installed the cost for fabrication and installation should not exceed $100 per installation.

4. Field Testing Considerations and Risk Benefit Analysis

Considering all aspects of the MFWRR, it is recommended that a full scale field test not be conducted. The basic objective of this model regulation is to prohibit unnecessary pedestrian activity in an extremely hostile environment, namely the freeways. As such, this objective carries no uncertainty of accident reduction if compliance with the regulation is achieved through public education (posted prohibitions and media messages) and enforcement. The merit of the model regulation is not in question.

No aspect of the model regulation appears to have any potential negative side effects. Clearly if large scale compliance ensues from the enactment of this regulation, pedestrian accidents on freeways will be reduced.

E. Model Vehicle Hazard Warning Lights Regulation

1. Background of the Accident Problem

"Disabled Vehicle Related" (DVR) pedestrian accidents constituted 5.6% of the rural/suburban pedestrian accidents studied by Knoblauch (1977) and 20% of the cases of freeway pedestrian accidents (Knoblauch, Moore and Schmitz, 1976). Sixty-five percent of the DVR accidents in the rural/suburban context occurred during darkness and 74% of the DVR's in the freeway setting occurred during darkness. In the rural/suburban setting only 26.8% of the vehicles had both their vehicle hazard warning lights (VHWL) and headlights on and 8.2% just the VHWL's activated.

While a myriad of variables affect the degree of hazard inflicted upon the driver or passenger on foot in the vicinity of a disabled vehicle, the distinct identification of a disabled vehicle to passing motorists seems to be part of the solution to reducing associated hazards. It seems possible that VHWL's can at one time quickly draw the attention of motorists to the location of the disabled vehicle and simultaneously convey the message that the vehicle is disabled or moving slowly in locations were stopped or slow moving vehicles present obstructions or serious points of friction for traffic.

2. The Model Regulation

a. Approach and Overview

Presently, model legislation covering the use of VHWL's on passenger vehicles, a major concern for this regulation, is somewhat vague as to the specific situations warranting use of the lights. UVC § 12-220 authorizes the equipping of vehicles with these lights and states the purpose for use as "...warning the operators of other vehicles of the presence of a vehicular traffic hazard requiring the exercise of unusual care in approaching, overtaking or passing (NCUTLO, 1979)." This is excellent advice to motorists on how to treat a vehicle displaying the VHWL's. When and where passenger car operators should employ VHWL's is not currently specified. Great detail in this regard is provided the operators of stopped trucks, buses, truck tractors, trailers, semi-trailers and semi-trailers in the extensive provisions of UVC § 12-408.

While the safety benefits of using VHWL's in the disabled vehicle situation have yet to be fully quantified in research still underway (Knoblauch projected 1980), interim findings indicate no negative effects. Use of the VHWL's in the

slow moving vehicle situation have been shown effective in reducing the vehicle-to-vehicle accident potential (Lanman, Lum and Lyles, 1979). Hence, this regulation will endeavor to specify the meaning to be conveyed to motorists by the VHWL's and, importantly, the situations where the lights should and should not be used.

b. Provisions of the Model Regulation

Figure 5 contains the provisions of the Model Vehicle Hazard Warning Lights Regulation.

c. Annotation of the Provisions of the Model Regulation

§ 1--Vehicle hazard warning lights defined

(a) This section duplicates UVC § 12-220(a). It authorizes the equipping of "any vehicle" with the warning lights. Moreover, this provision delineates the message communicated by the VHWL's namely that a "vehicular hazard" is present and that motorists should "...exercise unusual care in approaching, overtaking or passing" such a vehicular traffic hazard. It is important to note that the concept of "vehicular traffic hazard" is not restricted in any sense to a stationary vehicle. It may embrace a vehicle which is moving so slowly with the stream of traffic as to constitute a hazard for vehicles approaching from the rear.

(b) This section reproduces UVC § 12-220 (c). Herein is a physical description of the permitted range of color for the front and rear lenses, the alignment and location of the lights, a specification of a synchronous, "four-way" flashing pattern for lights, and a minimum visibility standard of 500 feet. The synchronous or simultaneous flashing pattern for the lights is intended to present an "attention-getting" display without being confused with the alternately flashing lights employed by authorized emergency vehicles and school buses. The 500 foot minimum visibility distance is conservative and typical for vehicular warning lights providing a comfortable stopping distance for prevailing highway speeds of 55 miles per hour.

§ 2--When use of vehicle hazard warning lights is required on stopped or disabled passenger cars

This section addresses the use of VHWL's by stopped passenger vehicles. Requirements for use of VHWL's by stopped commercial vehicles are detailed in UVC § 12-408 and in the Federal Motor Carrier Safety Regulations.

(a) Herein is placed a specific requirement upon the passenger car driver to actuate the VHWL's when the vehicle stops on the roadway or shoulder and until such time as it resumes normal motion or is removed from the highway. Roadways and shoulders are pathways for vehicles. Any obstruction in these pathways, such as a stopped vehicle is a "...vehicular traffic hazard requiring the exercise of unusual care in approaching, overtaking or passing" (§ 1 (a)). That VHWL's can transmit such a message in the stopped vehicle case has yet to be demonstrated in research underway (Knoblauch, projected 1980).

MODEL VEHICLE HAZARD WARNING LIGHTS REGULATION

§ 1 — Vehicle hazard warning lights defined

(a) Any vehicle may be equipped with lamps for the purpose of warning the operators of other vehicles of the presence of a vehicular traffic hazard requiring the exercise of unusual care in approaching, overtaking or passing.

(b) Vehicle hazard warning signal lamps used to display such warning to the front shall be mounted at the same level and as widely spaced laterally as practicable, and shall display simultaneously flashing white or amber lights, or any shade of color between white and amber. The lamps used to display such warning to the rear shall be mounted at the same level and as widely spaced laterally as practicable and shall show simultaneously flashing amber or red lights or any shade or color between amber and red. These warning lights shall be visible from a distance of not less than 500 feet in normal sunlight.

§ 2 -- When use of vehicle hazard warning lights is required on stopped or disabled passenger cars

(a) The driver of any passenger car which stops upon a roadway or adjacent shoulder shall immediately actuate vehicle hazard warning lamps and shall continue to use such lamps until the vehicle resumes motion or is removed from the roadway or shoulder.

(b) Vehicle hazard warning lights need not be displayed by a passenger car parked lawfully in an urban district, stopped lawfully to receive or discharge passengers, stopped to avoid conflict with other traffic, or to comply with the direction of a police officer or any official traffic control device or when the passenger car is not equipped with such lights.

§ 3 — When use of vehicle hazard warning lights is required on slow moving vehicles

(a) The driver of every vehicle shall use vehicle hazard warning lights (when proceeding so slowly as to constitute a hazard to other traffic) (when proceeding more than 15 miles per hour below the maximum speed limit) and when proceeding at a rate of speed less than any minimum speed limit.

(b) This section shall not apply to:

Figure 5. Model Vehicle Hazard Warning Lights Regulation

(continued)

(1) The driver of any vehicle which is not equipped with vehicle hazard warning lights.

(2) Any driver proceeding at a slow speed because of substantial traffic congestion requiring all drivers to proceed at a slow speed, provided there is at least one following vehicle.

(3) Drivers on any highway where the speed limit is 30 miles per hour or less.

(4) Farm tractors and implements of husbandry.

Figure 5. Model Vehicle Hazard Warning Lights Regulation

The attention-getting value of flashing over steady state lights has long been an established fact (Gerathewohl, 1951, 1952). When the VHWL system is in a flash cycle, the brightness of the lamps is generally greater than when the same lamps are used as parking lights alone. The flashing brighter lights combine to increase the likelihood that any stopped vehicle employing the vehicle hazard warning system is likely to be detected before that same vehicle would be detected employing just parking lights or no lights at all, especially at night. Once detected it remains to be seen if the VHWL's generate the appropriate cautionary response in approaching motorists. Knowledge of and compliance with § 2 (a) of this model regulation will promote that outcome.

(b) The possible exceptions for § 2 (a) are contained within this provision. Several of the limitations or exceptions are found already within UVC § 12-408 (a). The first possible exception concerns the situation where hazard warning lights need not be displayed when a passenger car is parked lawfully in an urban district. This is a generally normal setting to find a stopped or parked vehicle, not involving a moving lane of traffic and thus not creating a vehicular hazard. When a vehicle is "...stopped lawfully to receive or discharge passengers..." is an instance where the VHWL's may or may not be necessary. Situational factors would determine the driver's perception of any hazard generated by the passenger handling operation and thus the need to use the VHWL's. When a vehicle is "...stopped to avoid conflict with other traffic..." is another case for discretionary use of the VHWL's. Factors to be considered in using the VHWL's in this case include any unusual location for the stop, short sight distances and higher speeds for approaching traffic. When a vehicle has stopped "...to comply with the direction of a police officer or any official traffic control device..." are additional possible exceptions. In the case of a police officer functioning as a traffic control device here is little or no need to use the VHWL's. Where a police officer in a police vehicle has motioned a vehicle to the side of the highway, the wording of this section does allow for motorist discretion in the use of the VHWL's. When a vehicle stops for an official traffic control device is a clear example of where the VHWL's would not serve a useful purpose. Finally, the fact that some elderly vehicles still legally operating on the highways are not equipped with VHWL's must be acknowledged. Such vehicles, therefore, would be exempt from compliance with § 2 (a).

§ 3—When use of vehicle hazard warning lights is required on slow moving vehicles

While the previous section was restricted to passenger vehicles, this section is intended to extend to all vehicles as existing regulatory language covering the use of VHWL's by slow moving vehicles is quite limited. Specifically, use of VHWL's by such slow moving and potential vehicular hazards as farm tractors and implements of husbandry is detailed in UVC § 12-215. Employment of the "slow-moving vehicle emblem" is also detailed in UVC § 12-215 and UVC § 12-216 (animal-drawn vehicles). However, the aforementioned vehicles could be said to represent only an important minority of the potential slower-moving vehicles operating on the highway. For all other vehicles, there is no model regulatory language empowering the use of VHWL's or the slow moving vehicle emblem on vehicles other than tractors, implements of husbandry, animal-drawn vehicles, etc. Clearly, there are instances where vehicles are forced to move slowly for periods of time in their trip profile. Examples of this situation would be commercial vehicles ascending grades, vehicles experiencing mechanical difficulties which limit speed and perturbations in the normal traffic flow (construction, traffic accidents, hazardous road

surfaces, etc.). These situations can cause collision producing speed differentials between the slowly moving traffic and approaching traffic. Soloman (1964) and Hall and Dickenson (1974) have shown as the speed differential increases, the rate of rear-end collision increases on both rural roads and interstate highways. In 1966 the National Safety Council in their policy statement on slow-moving vehicles said:

> "...slow moving vehicles frequently cause conflict with faster moving traffic and it is necessary for drivers of fast-moving vehicles to take extra precautions when overtaking slow-moving vehicles. However, the driver of a fast-moving vehicle must be able to perceive and recognize a slow-moving vehicle in time to take the necessary action to avoid a collision. There is need that the slow-moving vehicle be identified as such."
> (King, et al. 1978)

If slow moving vehicles are inherently slow (e.g., house trailers, constructions vehicles, tractors, etc.) and incapable of highway speeds, then the slow moving vehicle emblem and VHWL's should be employed as per UVC § 12-215. However, the case where a vehicle capable of highway speeds is reduced to a slow moving vehicle for any one of the aforementioned reasons needs to be covered by model traffic provisions.

(a) The language of this section specifically mandates the use of VHWL's in the slowly moving vehicle situation which is clearly "...a vehicular traffic hazard requiring the exercise of unusual care in approaching, overtaking and passing" (§ 2 (a)). The intent of this section is to require employment of VHWL's to signify that a vehicle capable of highway speeds is no longer attaining or maintaining such speeds. This is identification of the conditionally slow vehicle rather than the inherently slow moving vehicle requiring the slow moving emblem in addition to VHWL's. The defined situations for employing the VHWL's included two optional phrases for a legislative body to consider. The first is a qualitative descriptor "...when proceeding so slowly as to constitute a hazard to other traffic." This wording has value in that it involves a range of approximate situations. The second optional phrase cites a quantitative condition bound to a speed differential below a maximum speed limit. The data of Solomon (1964) and Hall and Dickenson (1974) suggest that appreciable risk of rear-end collision generally starts when the speed differential between a leading and following vehicle is in the 15 - 20 mph range. An assumption is made that the pace of traffic on highways, especially interstate highways, will be at the speed limit, or greater. Thus, a speed differential of 15 mph or more below the speed limit is perceived as a requisite condition for using the VHWL's. It may be desirable from the standpoint of being as comprehensive as possible that a jurisdiction consider enacting both optional phrases. What is clearly non-optional is the phrase "...when proceeding at a rate of speed less than any minimum speed limit." Minimum speed limits are carefully considered before they are posted and thought to represent an absolute lower threshold for a safe speed. To fall below a minimum speed is seen as a clear requirement for use of the VHWL's. For example, on Interstates 95, 84 and 91 in Connecticut, the minimum posted speed of 40 mph is 15 mph below the 55 mph maximum speed limit. In this case, any speed below 40 mph satisfies both quantitative requirements for use of the VHWL's namely more than 15 mph

below the maximum speed limit and below the minimum speed limit. It should be noted that VHWL's have been demonstrated to be an effective means for reducing the accident potential when slow-moving trucks are overtaken by faster moving vehicles. The overtaking maneuver was examined in terms of reaction distance, speed reduction and vehicle following characteristics. Moreover, VHWL's were found to be as effective during the day as at night (Lanman, Lum and Lyles, 1979).

(b) Reasonable exceptions to the provisions of § 3 (a) above are necessary. The first obvious exception is the case where a vehicle is not equipped with VHWL's as discussed in § 2 (b). This condition must be anticipted in some of the older vehicles still in operation. The second exception is warranted on the grounds that use of VHWL's, in general, by a group of drivers forced to proceed at a slow speed due to traffic congestion is not meaningful and a waste of energy. The important provision for this second exception is that at least one "buffer" vehicle must be following the vehicle(s) moving slowly due to traffic. This acknowledges the likely need to employ VHWL's by the last or trailing vehicle in a formation or body of slowly moving traffic. Obviously the trailing vehicle is at risk of a rear-end collision if sight distances are poor (i.e., the traffic formation is located just around a curve) or the speed differential between approaching traffic and the slowly moving traffic body is great. Trailing or buffer vehicles in a formation of slow-moving vehicles in business or residential areas where speed limits are 30 mph or less are at minimal risk because of overall lower speeds and speed differentials involved. Farm tractors and implements of husbandry are the fourth exception to § 3 (a) as these slowly moving vehicles are covered in UVC § 12-215, stipulating the use of VHWL's and the slow-moving vehicle emblem. If a jurisdiction has not enacted a provision similar to UVC § 12-215, then § 3 (b)(4) should not be adopted.

3. Implementation Considerations

a. Enactment

As of 1979, 38 state jurisdictions and the District of Columbia have laws which expressly authorize VHWL's. One state only authorizes the use of flashing red lights as a warning signal on disabled or parked vehicles and the remaining states have no laws which prohibit or authorize VHWL's (English and Want, 1979). Thus, a basically favorable legislative environment exists for enactment of the Model Vehicle Hazard Warning Lights Regulation (MVHWLR) at the state level.

Regarding the use of VHWL's, presently the UVC does not require use of VHWL's on passenger cars under any circumstances, although their use for stopped, disabled or slowly moving vehicles is clearly condoned by the wording of UVC § 12-220 (a). Thirty-two states presently, like UVC § 12-220 (a), allow use of VHWL's to signal an unspecified vehicular traffic hazard; eight states allow use of the lights only while a vehicle is stopped; the remaining eleven states have no statutes concerning the permissive use of VHWL's (English and Want, 1979). In

consideration of the foregoing, it would appear that the overall national legislative climate is favorably disposed towards enactment of this model regulation. National enactment of the MVHWLR will provide the public with clear, circumscribed guidelines for the use of VHWL's. Such guidelines do not presently exist which unfortunately permits VHWL's to be misused as well as underused.

b. Enforcement

The matter of enforcing the VHWL equipment installation is largely obviated since motor vehicle manufacturers have been required to install VHWL's (FMVSS No. 108) on most motor vehicles designed for highway travel since 1 January 1969 (English and Want, 1979).

With regard to the stopped or disabled vehicle and slow moving vehicle situation, each presents a clearly definable in-situ traffic situation wherein a violation of the model regulation can be readily detected by a police officer. In one case the stopped or disabled vehicle on a roadway or shoulder must display the flashing VHWL's and in the other case specific "slow" speeds and "traffic frictions" will identify the potential MVHWLR offenders.

No special or selective enforcement is seen as practical or necessary. The situations in which the VHWL's must be used occur spontaneously in unpredictable locations. Police personnel must therefore enforce the MVHWLR as the applicable situations occur during routine patrol.

c. Public Education

As part of a national public education campaign, both broadcast and print media are seen as valuable support for compliance with the MVHWLR. In general, the objectives of media materials developed should be to:

- Familiarize the motoring public with the location, operation of the VHWL switch and the capabilities of the VHWL system.
- Identify the situations requiring use of the VHWL's
- Describe the appropriate cautionary response(s) when approaching and passing a vehicle displaying activated VHWL's.

Thirty and 60 second television spots are recommended for development, employing nighttime location shots and in-vehicle shots with a driver's point of view. The spots should satisfy the above mentioned objectives.

In addition, 60 and 30 second radio spots should be produced for "drive-time" airing, which tell the driver what the "little button on the steering column" is all about.

Finally, a print piece is recommended for preparation (the size of a Time magazine page), employing two shots. One shot should be an in-vehicle shot showing the VHWL flasher button and the other shot should show the displayed result of activating the VHWL's. The copy should describe the situations requiring use of the VHWL's.

d. Cost Factors

Simply put, enactment and implementation of the MVHWLR will involve no extraordinary expenditures of public funds. The VHWL system is already in place in the preponderance of motor vehicles currently on the road. Vehicles which do not have VHWL's are likely to be very few in number and probably rather aged and in need of decommissioning very soon.

4. Field Testing Considerations and Risk Benefit Analysis

Recent research indicates that the risks (from a behavioral standpoint) of approaching and passing a slow moving vehicle employing VHWL's can be minimized (Lauman, Lum and Lyles, 1979). VHWL's in the stopped or disabled vehicle situation are unproven behaviorally as of this report's date of publication. Research to be published soon should help tell the story (Knoblauch, est. 1980). However, VHWL's in the disabled or stopped vehicle situation seem at worst to have the potential for a neutral or insignificant effect, but more likely a positive effect in terms of accident reduction. Any natural field testing or implementation of the MVHWLR, therefore, will not involve any increased risk to any of the principals involved.

It may be of value to NHTSA to measure the extent of benefits attributable to this model regulation. A large scale field test wouldn't be necessary to justify any equipment costs as these costs are already factored into the vehicle buyer's purchase costs.

However, to measure the extent of any accident reduction benefits on the part of motorists approaching and passing disabled, or slow moving vehicles, a pre-post experimental design with comparison would be appropriate.

The MVHWLR should be enacted in an "experimental" state jurisdiction which is in verbatim or substantial conformity with UVC § 12-220 (i.e., generalized permissive use of VHWL's to indicate a vehicular traffic hazard). A "comparison" state, similar in legislation, road system development and usage and climatology to the experimental state should also be selected.

In the experimental and control sites, the following measures should be taken:

- Before Enactment of the MVHWLR
  - Incidence of disabled vehicle related pedestrian accidents three years prior as a stable estimate of the baseline accident experience
  - Incidence of vehicle-to-vehicle accidents involving a slow moving vehicle three years prior to create a stable baseline
  - Estimate of the level of use of VHWL's in the disabled vehicle situation (if any)

- Estimate of the level of use of VHWL's in the slow moving vehicle situation (if any)

- After Enactment of the MVHWLR

  - The two types of accident data above should be acquired during a program year of field test assessment after enactment of the model regulation

  - The two types of behavioral data above (now basically compliance data) should be acquired during the program year of field test assessment following enactment of the regulation

  - Public awareness and acceptance of the model regulation

While it may be of general interest to measure the behavior of motorists approaching and passing disabled/stopped or slow moving vehicles with and without activated VHWL's, this information has or will have been published already in separate studies (respectively Knoblauch, projected 1980, Dunlap and Associates, Inc., work in progress, and Lanman, Lum and Lyles, 1979). It is, therefore, not recommended that these data be collected during any field test of the model regulation. Rather, the behavioral or compliance data and the accident data outlined previously seem most appropriate on a cost-effective basis.

As with previously outlined field test plans, the following administrative procedures are recommended for implementation:

- Allow about a year's lead time for enactment of model regulation and gathering of pre-test behavioral and accident data* prior to the planned start of the program year of field test assessment

- Time synchronize all measurements as closely as possible between the experimental and comparison jurisdictions

- During the pre-test period, produce the recommended public educational materials in sufficient quantities for dissemination during the program period

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*As before accident data will involve scrutiny of police accident reports and accident typing (disabled vehicle related, slowly moving vehicle) by study research. personnel.

IV. PUBLIC INFORMATION AND EDUCATION MATERIALS DEVELOPMENT

A. Introduction

Presented within this chapter are preliminary concepts for public information and education (PI&E) materials dealing with the following accident types:

- School Bus Related
- Disabled Vehicle Related
- Mailbox Related
- Working on the Roadway

For the School Bus Related, Mailbox Related and Working on the Roadway accident types, printed public education materials are recommended and what is presented in each case are "initial layouts" for the printed materials. Initial layouts include the text or copy envisioned as well as rough or schematic illustrations supporting the copy. These materials are not in final, reproducible form, i.e., "mechanicals." Mechanicals embody finished artwork in multicolor form and typeset copy. In addition, both the artwork and copy are merged into a scale, prototype version of the printed piece.

For the Disabled Vehicle Related accident type, a shooting script for a 60 second television public service announcement (PSA) and the line copy (script) for 60 second and 30 second radio PSA's are provided. From their present form, finished PSA's could be easily and quickly produced.

The background and content for the following public education materials will be presented:

- School Bus Driver Pamphlet
- Dismounted Motorist Public Service Announcements
- Mailbox Safety Mailing to Parents
- Road Worker Pamphlet

As with the model regulation development effort, all content for these materials was derived from a detailed analysis of the accident data (predisposing situations, behavioral errors) for the subject accident types.

B. School Bus Driver Pamphlet

1. Informational Objectives and Sources

Fundamentally, the informational objectives for this PI&E module were two:

- To inform school bus drivers of the behavioral requirements of the Model Regulation for School Bus Pedestrians (MRSBP) without specifically referring to it and thereby requiring its passage
- To promulgate basic guideline procedures for supporting the pedestrian safety of school bus passengers.

The source material for this module has been drawn from the Model Regulation for School Bus Pedestrians itself, NHTSA's School Bus Driver Instructional Program (NHTSA, 1974), and Bus Driver's Manual for the PEDSAFE On-Bus Program (NHTSA, 1979).

While this module has definite value as public education support for a portion of the MRSBP, it can have value as a stand-alone training aid for school bus drivers. As a basic training aid (as opposed to primary support for the MRSBP) it could support any school bus driver training program from the nonexistent or loosely structured program (in this case, the pamphlet by itself would be much better than nothing) to a formalized program.

2. Media Selection Decision

The printed medium of a pamphlet was selected as the means for informing school bus drivers of the requirements of the MRSBP for several reasons:

- It appeared to be the most cost-effective means for reaching a well-defined, but modest sized audience in terms of mass media (i.e., school bus drivers)
- It could serve both as a means for supporting the school bus driver requirements of the MRSPB, and as a basic training aid for school bus drivers

Versatility, cost and maximum potential effectiveness seemed most attainable via a printed pamphlet as the public educational medium.

3. Description of the Materials

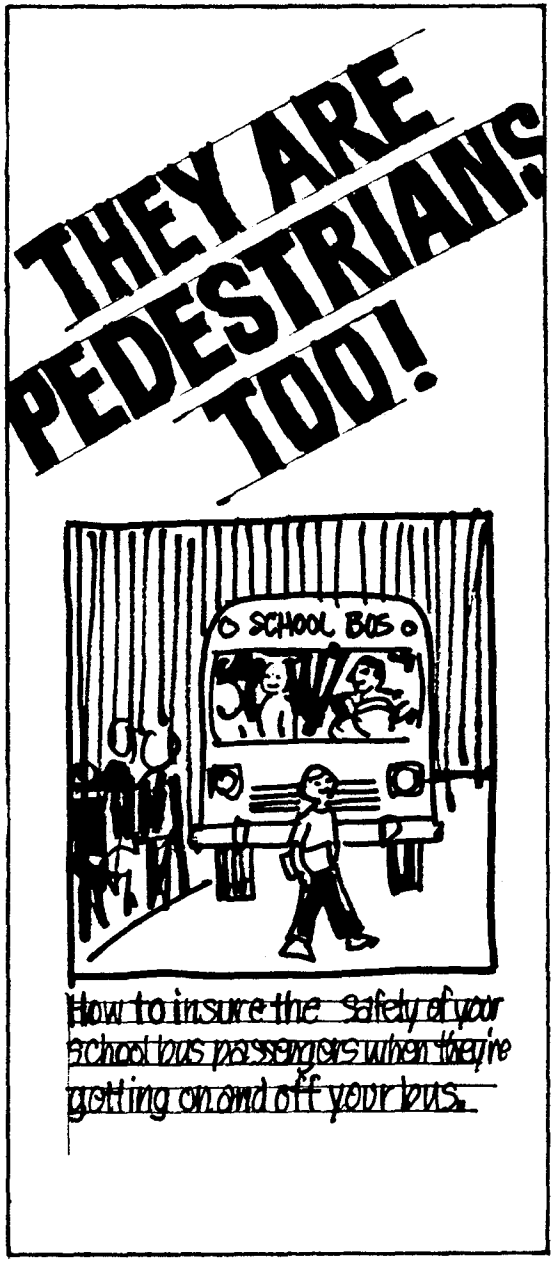
The artist's concepts for the school bus driver pamphlet appear in Figures 6, 7 and 8. It is a two-fold pamphlet measuring approximately 8-1/2" x 3-5/8" closed and 8-1/2" x 11" fully opened. Reproductions of the artist's renderings in Figures 6 through 8 are shown in 77% full scale.

Figure 6 shows the front and back panels of the pamphlet unopened. The text printed on the rear panel of the pamphlet is as follows:

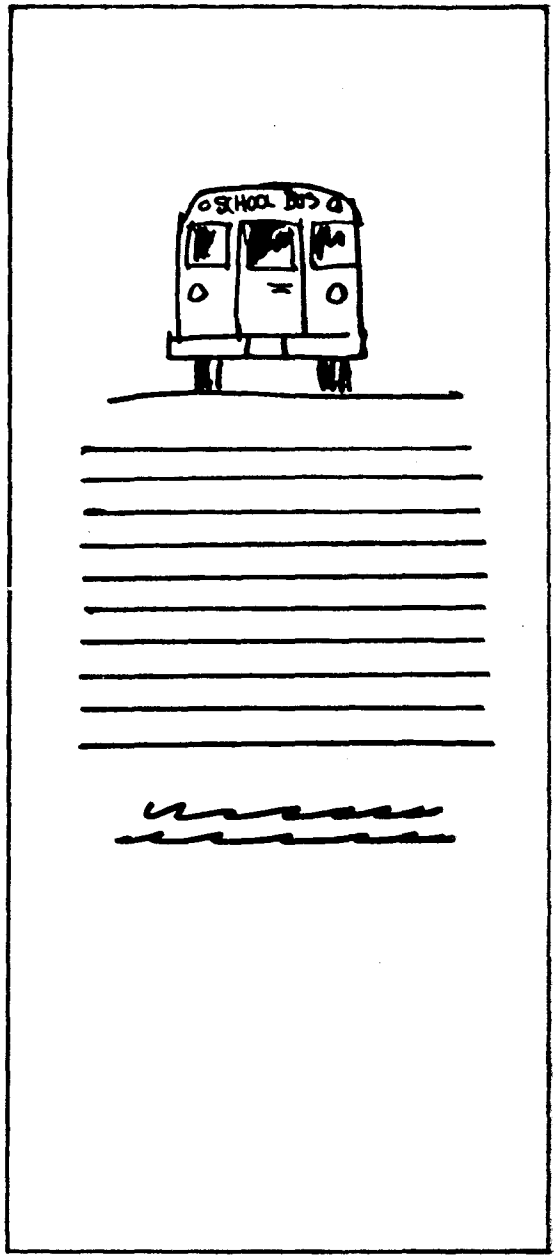
> *It's that easy. Remember that the children on your bus are more than just passengers. They are pedestrians, too. And by following these six simple steps you'll be doing all you can to make their journey as safe as possible.*
>
> *A public safety message from the National Highway Traffic Safety Administration.*

Figure 7 shows the pamphlet with the first panel opened from left to right. The right hand panel that has now been exposed contains the following copy:

> *Having good driving habits is just one way to insure the safety of your school bus passengers. But what happens when they become pedestrians? It happens each time they get off your bus. Does your responsibility to them end at the folding doors? Of course not. Yet how can you, the driver, protect them outside your bus? It's easy if you follow these six easy steps.*

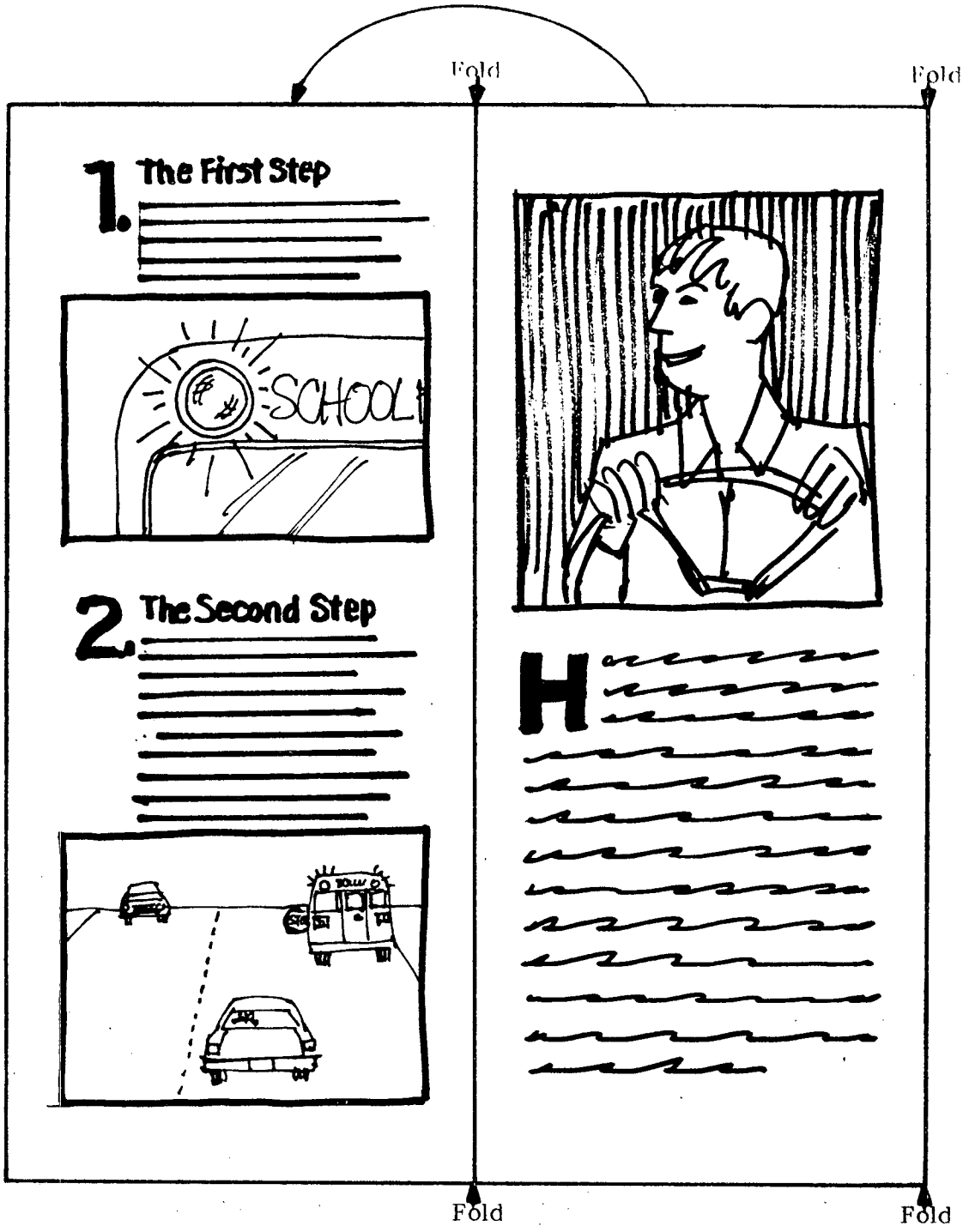


Front Panel Unopened



Rear Panel Unopened

Figure 6. School Bus Driver Pamphlet (77% full scale)



1st Panel Opened

Figure 7. School Bus Driver Pamphlet (77% full scale)

Figure 8 shows the pamphlet fully opened with all three interior panels exposed. The accompanying text is as follows:

The First Step

From 100 feet to 500 feet before every stop to pick up or let off passengers, the amber lights on your bus should be turned on. This tells nearby motorists that you intend to stop.

The Second Step

Always stop the bus as far to the right side of the road as is possible and safe. When stopping to pick up passengers or release them, use your flashing red lights and the stop signal swing arm. These tell approaching motorists to stop from both directions.

Give motorists time to react to your signals. When they have stopped from both directions, open your doors and release or take on passengers. Use your warning signals until all the children are safe.

The Third Step

Make sure all the children leaving your bus are calm and alert to the danger around them. A simple reminder from you to "stop and look left-right-left" will help reduce any unsafe behavior.

The Fourth Step

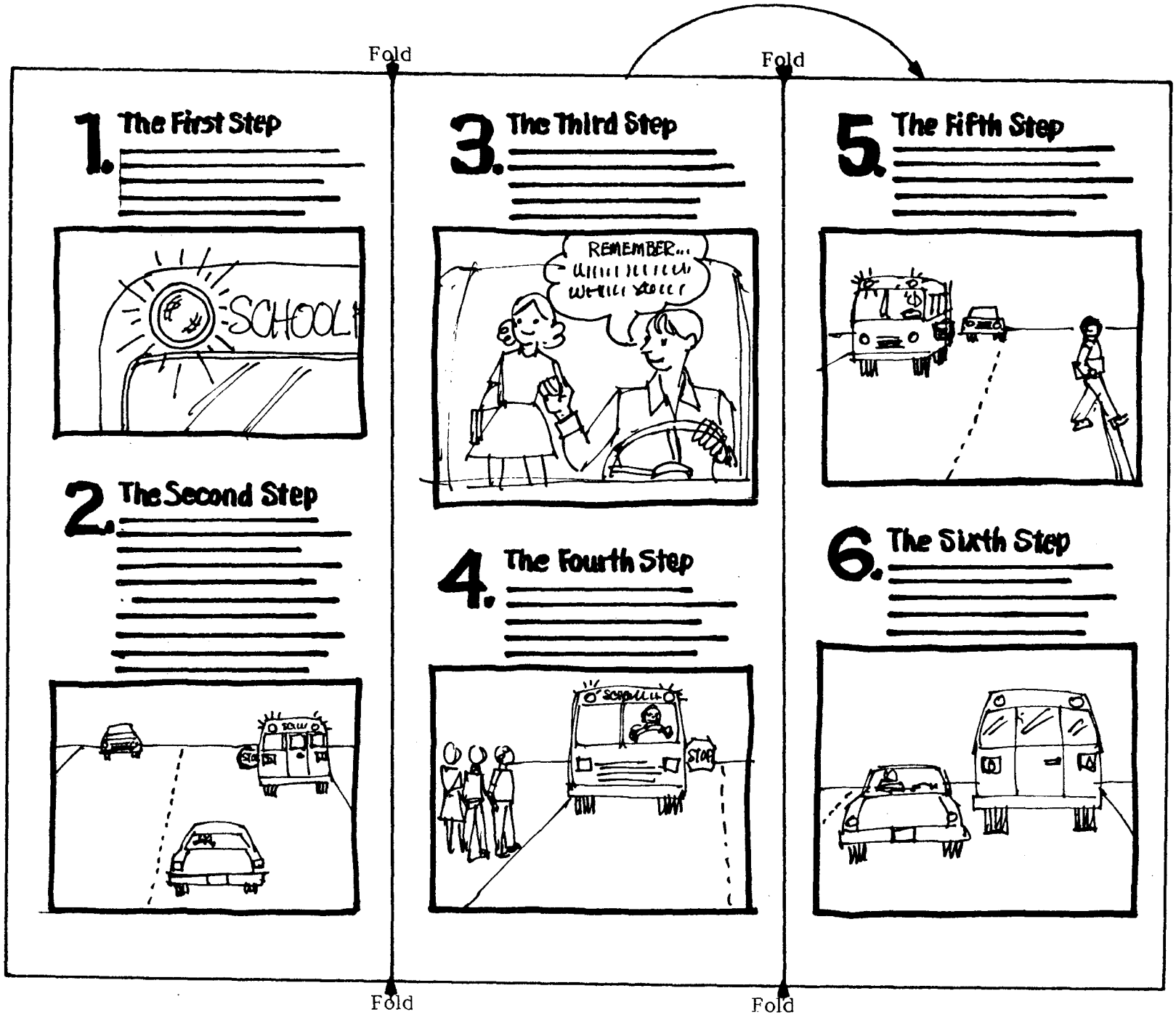
Those children who must cross the street should line up "five giant steps" away from the front of your bus and wait for your signal. After you've checked to see that no cars are passing in either direction, signal the children to look and then cross the street.

The Fifth Step

Be sure the children are safely across the street and no one is lurking in front of the bus. Then turn off your flashing red lights and stop signal.

The Sixth Step

When you can, allow any following vehicles to pass by staying stopped for a while as far to the right as possible, with the signals turned off. Motorists who have been following you for some distance can become impatient and try to pass the bus when it's dangerous to do so.



Fully Opened

Figure 8. School Bus Driver Pamphlet (77% full scale)

Before moving out into traffic again, turn on the left turn signal and take a last look for any kids who might be lurking in front of the bus.

When the reader finishes reading the "sixth step" he/she should fold up the pamphlet and turn it over. The reader would then see the graphics and text shown in Figure 6 for the rear panel of the pamphlet (actual text appearing on page 64).

4. Recommendations for Production and Dissemination

Two possible courses of disposition are feasible for this bus driver education pamphlet. The pamphlet could be fully developed and produced as a companion piece for the Model Regulation for School Bus Pedestrians (MRSBP), mentioning the specific equipment (both amber and red flashing lights and the stop signal arm) required by the MRSBP. Alternatively or additionally, the pamphlet could be immediately produced with generic wording describing merely "bus signals" to be activated or deactivated. Such wording would not be dependent upon the MRSBP being in force for its validity enabling the pamphlet to be used immediately nationwide.

The latter approach for fully developing this pamphlet could serve a current need for nationally available, quality educational materials for school bus drivers. Such a pamphlet would be a self-contained individualized form of instruction which could have great benefit in jurisdictions where little or no formal training is provided school bus drivers in matters related to the pedestrian safety of their passengers.

The most efficient means for distributing any finally produced school bus driver pamphlets appears to be the various state education departments which in turn could make the pamphlets available to the boards of education in the various counties, cities and towns within each state. The boards of education in turn should supply the school bus companies serving their jurisdiction with an adequate supply of the pamphlets. Whatever distribution approach is followed only a few months would be required for full development and an initial printing.

C. Dismounted Motorist Public Service Announcements

1. Informational Objectives and Sources

Operators of vehicles which become disabled due to a mechanical problem or prior collision are the targets of these public service announcements. Knoblauch (1977) identified 5.6% of the rural/suburban accidents studied involved motorists near disabled vehicles and 20% of freeway pedestrian accidents studied (Knoblauch, Moore and Schmitz, 1976) were Disabled Vehicle Related.

From a close study of the narratives for the accident reports available for the aforementioned studies, distinct classes of behavioral errors were repeatedly committed by dismounted motorists. The errors committed seemingly were induced by a preoccupation of motorists with the need to either directly attempt to fix the problem or summon assistance. For whichever reason, a dangerous preoccupation (and fear from being isolated on a remote roadway in some cases) can overcome the disabled motorist. Apparently this temporary form of mental impairment provides the conducive state of mind for committing such pedestrian accident producing behaviors as:

- Not steering the vehicle off the roadway when it was possible to do so (even while not under power, but coasting)

- Not illuminating the taillamp or four-way flashers of a vehicle which was stopped on or near the roadway (particularly at night)

- Pedestrian(s) pushing a vehicle at night or loitering at the trunk of a disabled vehicle at night (apparently covering up one or more taillamps, reflectors, or four-way flashers) and being struck by a vehicle approaching from the rear

- Standing near vehicle waiting for assistance often in the following locations:

  - Rear of vehicle in roadway or near roadway edge

  - On the outside edge of a disabled vehicle in the roadway or near the roadway edge

  - At the front of a vehicle or between two stopped vehicles. The vise-like action which can result from the rear car being struck has severely injured or killed pedestrians

  - Working on vehicles such that all or part of one's body is in the roadway, e.g.:

    — while kneeling to change a tire (part of the body frequently sticks out into the roadway, if not the whole body)

    — while bending or leaning over into the engine compartment on the side of the vehicle nearest the roadway

This set of behavioral errors committed in the disabled vehicle situation constitutes the informational objectives for transmission to the target group, namely, any driver passenger or passerby who, as a pedestrian, may be involved with a disabled vehicle.

2. Media Selection Decision

The audience for dismounted motorist messages is the entire population of drivers nationwide. Clearly, any driver can have the misfortune of becoming a dismounted motorist. Thus, the media channel for delivering dismounted motorist messages must be pervasive and persuasive. Broadcast media seem ideally suited to the purpose. Television and radio PSA's, well conceived and well placed in air time can reach the large nationwide audience that should be reached.

3. Description of the Materials

Three scripts are presented: a 60 second television PSA (Figure 9), a 60 second radio PSA (Figure 10) and a 30 second radio PSA (Figure 11). The 60 second television and radio scripts involve characterization and inventive settings to deliver the messages. The 30 second radio spot, being more constrained in time, takes a more didactic approach to delivering message content and employs only an announcer. The scripts are producible in their present form.

4. Recommendations for Production and Dissemination

As these spots are presently written they could be put into production at any time. The content for the spots is derived from accident data and is not contingent upon any yet to be acted legislation for validity. Early production of any or all of these PSA's is recommended as there is a conspicuous lack of public education material currently available on this subject. The dismounted motorist risk situation is well defined, and one to which the motoring public can easily relate. Promulgation of simple, effective behavioral advice to would-be dismounted motorists could be instrumental in reducing disabled vehicle-related pedestrian accidents.

Given production of these spots, the following recommendations can be made as far as goals for air time:

- 60 second television spot--prime time, adult viewing hours
- 60, 30 second radio spot—emphasis on "drive time" broadcasts to reach motoring commuters, scattered adult listening times throughout the day, heavy holiday weekends

D. Mailbox Safety Flyer

1. Informational Objectives and Sources

Accident data (Knoblauch, 1977) show that 62% of the mailbox-related pedestrian accidents involved children between the ages of 0 and 10 years. While only 1.4% of the rural/suburban pedestrian accidents studied by Knoblauch (1977) were mailbox-related, it is a quite specific accident type which could be well controlled via the proper education of parents and in turn their children.

Considering the young age of the child pedestrian accident victims involved, public education of the parents on the hazards facing a young child crossing the street to retrieve mail seems most appropriate. A very wide audience of parents could be reached via simple, effective production and dissemination techniques.

Informational objectives for transmission to parents include the following:

- Children under 10 years of age are not good street crossers
- Such children are easily preoccupied with the task of getting the mail or inspecting it or easily distracted by such things as a parent or playmate on the street. Attention to traffic hazards has to suffer.

DISMOUNTED MOTORIST PSA--60 SECOND TELEVISION

TITLE: *"WHAMO"*

VIDEO	*AUDIO*
(played like an electronic television game program)	*(filtered to sound like a deep, computerized voice)*
The screen is dark except for small, computerized cars whizzing by. Two cars collide. A tiny computerized man exits each car as other cars steer around the accident. The men move around their disabled cars.	*Disabled Motorist. Game One.* *(SFX)** *Accident. Crash. Accident.* *(SFX)* *Danger, danger. Don't leave your car on a busy roadway. Don't stand or stick out on the roadway or near your car.*
A passing cars hits one of the tiny men. He blows apart. The remaining figure scurries onto the shoulder.	*Ouch! Others might not see you. If you can't move your car, get as far away from the roadway as possible.*
The little man nods affirmatively.	*Did you remember your four-way flashers? Good. Some people don't.*
He steps back onto the roadway surface. *He returns quickly to the shoulder.*	*Danger. Remember what happened to the other guy.* *Don't just think about your car.* *Think about your life--and watch out for oncoming traffic.*
He paces up and down along the highway shoulder, this time farther from the roadway edge.	
The figure stops moving.	*Remember!*
He nods. (ZOOM in on him until he fills the picture.) Then he disappears with a popping noise.	*When you're playing with your own life or the lives of others...it isn't just a game.* *Pop!*
The screen goes black.	

SUPER: A message from the National Highway Traffic Safety Administration.

*Abbreviation for "sound effects."

Figure 9. Dismounted Motorist PSA--60 second television

DISMOUNTED MOTORIST PSA--60 SECOND RADIO

TITLE:	*"WHERE'S DADDY?"*
SFX:	*(We hear a door opening and closing, then a bouncing basketball.)*
JIMMY:	*"Hey Mom, we won the game! I got the winning basket, too!"*
SFX:	*(The basketball bounces again. Another door opens and closes.)*
JIMMY:	*"Mom! Where's Daddy?"*
MOTHER:	*"He's not here."*
JIMMY:	*"Oh? Whatsamatter, Mom?"*
MOTHER:	*"Daddy had a car accident."*
JIMMY:	*"But...Daddy's such a good driver."*
MOTHER:	*"It wasn't his fault. His engine conked out and he was trying to push his car off the roadway."*
JIMMY:	*"Oh?"*
MOTHER:	*"Then another car hit him."*
JIMMY:	*"Didn't the other driver see him?"*
MOTHER:	*"I guess not."*
JIMMY:	*"Is he gonna be okay?"*
MOTHER:	*"No, Jimmy, he isn't."*
JIMMY:	*Then...when is he coming home?"*
ANNOUNCER:	*"Thousands of dismounted motorists have been killed due to carelessness and forgetting to keep an eye on passing traffic. If your car develops a problem, drive it off the roadway. If you can't drive it, get yourself as far off the roadway as possible...before another motorist does it for you...the hard way."*
	"Brought to you as a public service by this station and the National Highway Traffic Safety Administration."

Figure 10. Dismounted Motorist PSA--60 second radio

DISMOUNTED MOTORIST PSA--30 second radio

TITLE: *"SURVIVING CAR BREAKDOWNS"*

SFX: *(Background sounds of passing vehicles on a highway.)*

ANNOUNCER: *"Car broken down? The big problem is mental, not mechanical. You can't afford to focus on your mechanical problem. Staying alive is your No. 1 problem!"*

"When it happens, steer as far off the roadway as possible. Turn on the fourway flashers. Don't stand or stick out in the roadway. Avoid walking in or crossing the roadway."

"And watch out for oncoming cars...they can't see you that well and they certainly don't expect you!!"

"Brought to you as a public service by this station and the National Highway Traffic Safety Administration."

Figure 11. Dismounted Motorist PSA--30 second radio

Derivative behavioral advice which could be offered is to only allow "older" children to obtain the mail or for parents to get the mail themselves.

2. Media Selection Decision

A description of the problem and conveyance of the behavioral advice will take some presentation time. Moreover, there is a need to package this information and advice so that the parent can in turn act as an instructor of the child. To best satisfy the foregoing criteria, a printed message to parents seemed most appropriate. Hard copy material would then be made available to parents which could serve as teaching aid to the child learning process. A great potential for widespread distribution is also afforded by this format.

More specifically, this printed message seemed most appropriately configured as a one-page piece. Such a piece could be promulgated as a "flyer" or "stuffer" mailing directly to parents, or as a handout in post offices, supermarkets, and other places frequented by parents (principally mothers).

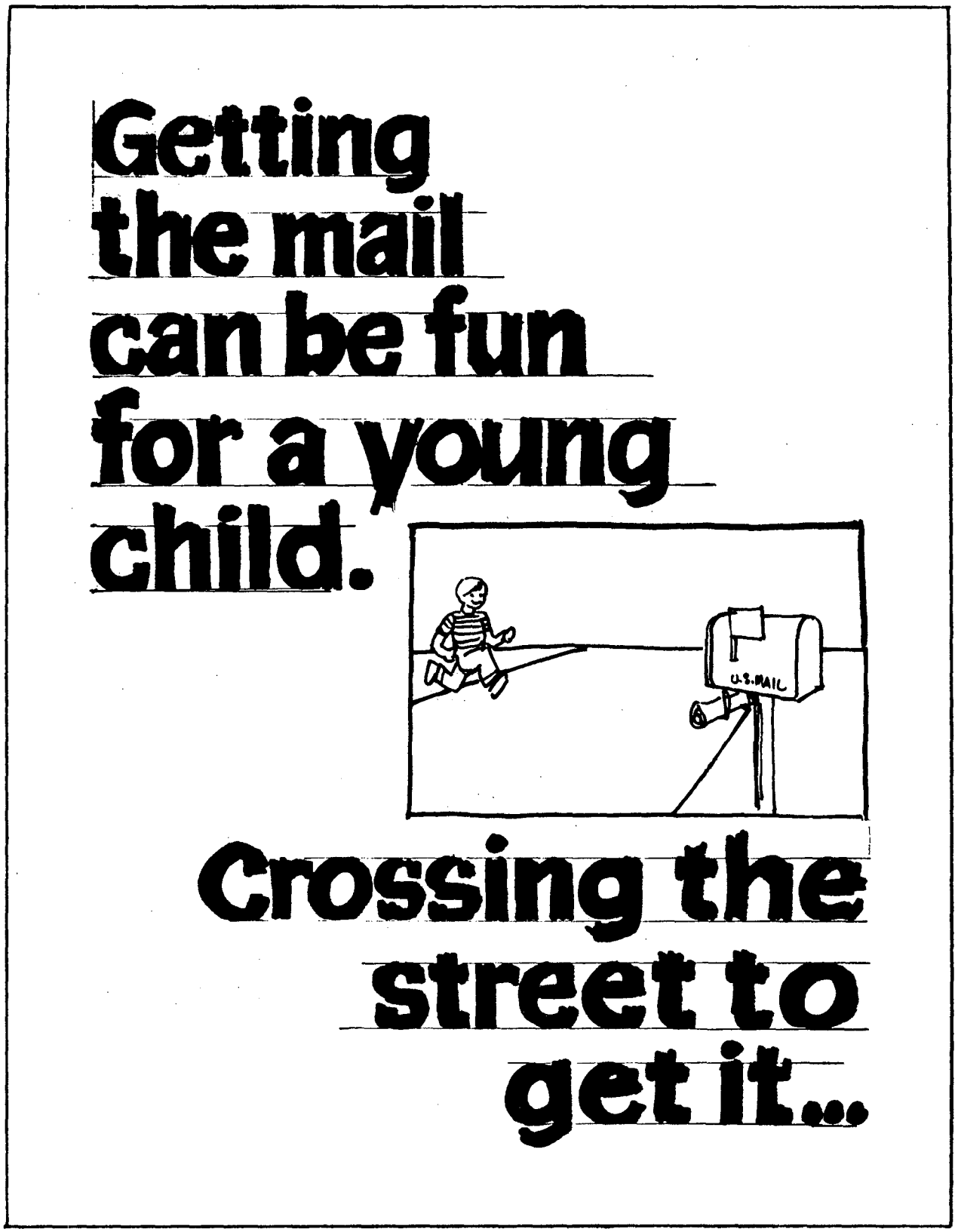
3. Description of the Materials

Figures 12 and 13 show (at 77% full scale) an initial artist's concept of an 8-1/2" x 11" one-page piece on mailbox safety. All the content envisioned for the obverse side of the piece is shown boldly in Figure 12. The main body of the content for this printed message is located on the reverse side of the piece (Figure 13) and reads as follows:

> *It's a sad fact. Kids under ten just aren't good street crossers. They can easily be distracted-- by playmates, parents, even pets on either side of the street and forget to look for cars.*
>
> *Sending your child for the mail can really complicate things. Childish fascination with the contents of a mailbox or newspaper box can be dangerous. It can even be deadly.*
>
> *If you must send a child for the mail, send an older child; one who knows enough to always look left-right-left before crossing the street. Better yet, go get the mail yourself.*
>
> *Don't be swayed by a child who fusses over not being allowed to get the mail. A pouting child is much better than no child at all.*
>
> *A public service message from the National Highway Traffic Safety Administration.*

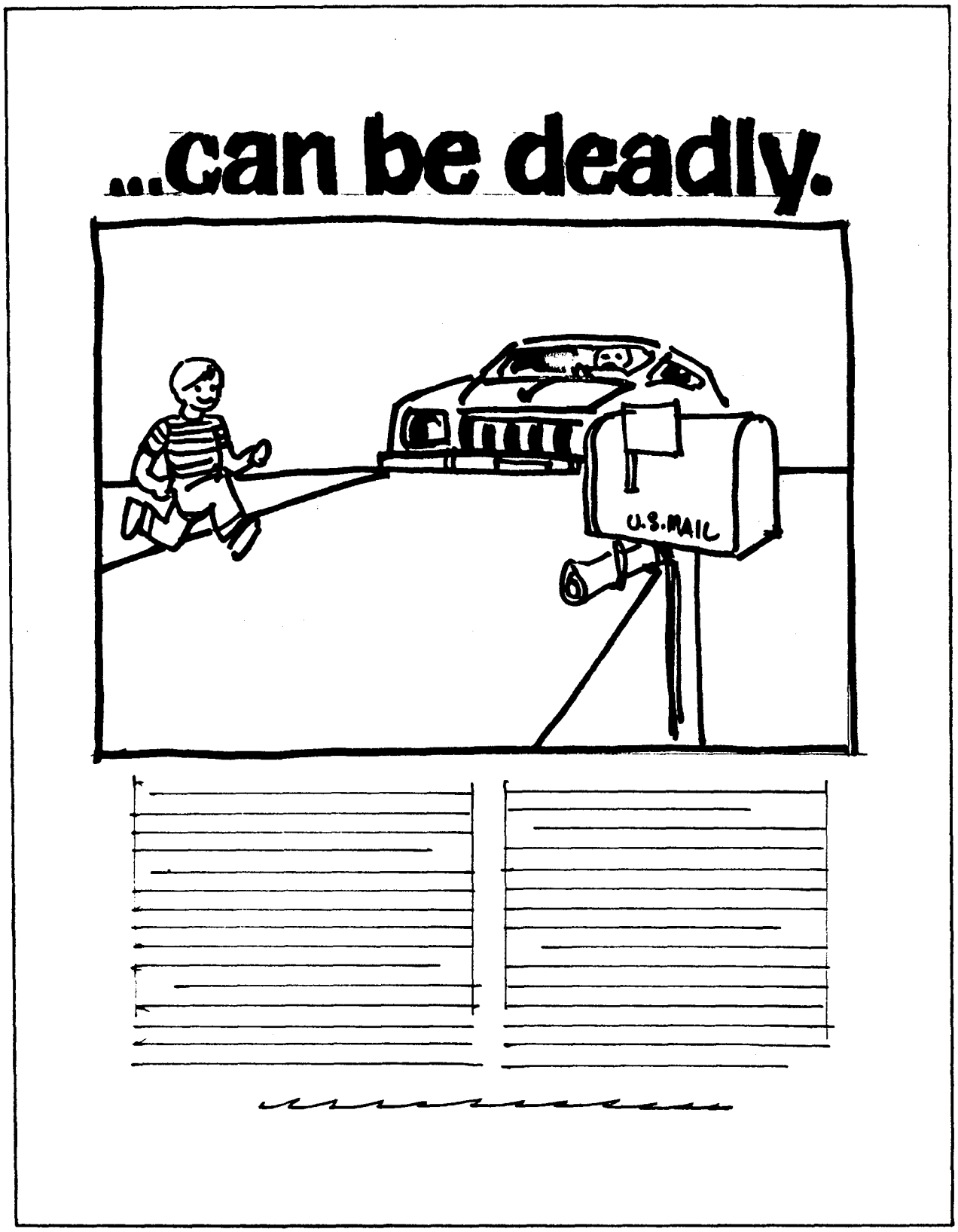
4. Recommendations for Production and Dissemination

It is recommended that this one page flyer on mailbox safety be considered for immediate production and dissemination. Production costs will be modest compared to other media, especially broadcast media.



Obverse Side

Figure 12. Parental Mailer on Mailbox Safety (77% full scale)



Reverse Side

Figure 13. Parental Mailer on Mailbox Safety (77% full scale)

One strategy might be for NHTSA to make camera-ready reproducible version of a mailbox flyer available to various jurisdictional safety authorities who would then bear the burden of printing costs.

Ideally, a massive printing of flyers under quality controlled conditions would probably yield the highest quality product for local consumption. However, printing costs are to be handled, final production of the flyer could be accomplished within a few months.

E. Road Worker Pamphlet

1. Informational Objectives and Sources

"Working on the Roadway" type pedestrian accidents composed 1.7% of the rural/suburban data base (Knoblauch, 1977) and 3% of the freeway pedestrian accident data base (Knoblauch, Moore and Schimitz, 1976). Inspection of the narratives for these accident reports describing various pedestrians working on or near the roadway being struck by motor vehicles, revealed recurring predisposing situations and behavioral errors committed by the road workers. Principal among these were the following:

- Workers near the roadway edge are often struck by protruding cargo, and side mirrors on passing vehicles
- Flagmen despite conspicuous attire, required by OSHA, are frequently struck or brushed by passing vehicles
- Workers standing or walking along the pathways of construction or "work vehicles" are frequently injured by these vehicles
- Workers crouching, kneeling or bending over on or near the roadway are frequently struck by vehicles passing the worksite
- Drivers passing worksites can be tired, anxious or otherwise impaired
- Barricades, cones, barrels and other worksite safety and channeling devices are frequently struck by passing vehicles and these devices in turn can become lethal projectiles for road workers
- Workers, seemingly preoccupied with what they are doing are lulled into a false sense of security by the on-site traffic control devices and commit senseless acts like:
  - — Suddenly walking out into a lane of traffic
  - — Walking backwards into a lane of traffic

Keeping in mind the recurring specific instances of documented road worksite pedestrian accidents, and the need to raise the general level of worker awareness to the hostility of the roadside work environment, the body of content was developed for the road worker safety message.

2. Media Selection Decision

The audience for road worker safety information is a rather limited subset of the general population. It is an easily identifiable as well as reachable audience via an economical medium, namely a printed delivery.

The print medium offers the opportunity to transmit a large amount of content to a select audience more reliably and economically than via broadcast media.

3. Description of the Materials

Figure 14 shows the front view (unopened) of an initial concept for a road worker safety pamphlet. The pamphlet measures approximately 10" x 4" closed, and 16.5" x 4" fully opened and is shown at 64% full scale.

In Figure 15, where the pamphlet is fully opened, the content developed for each of the major sections is as follows:

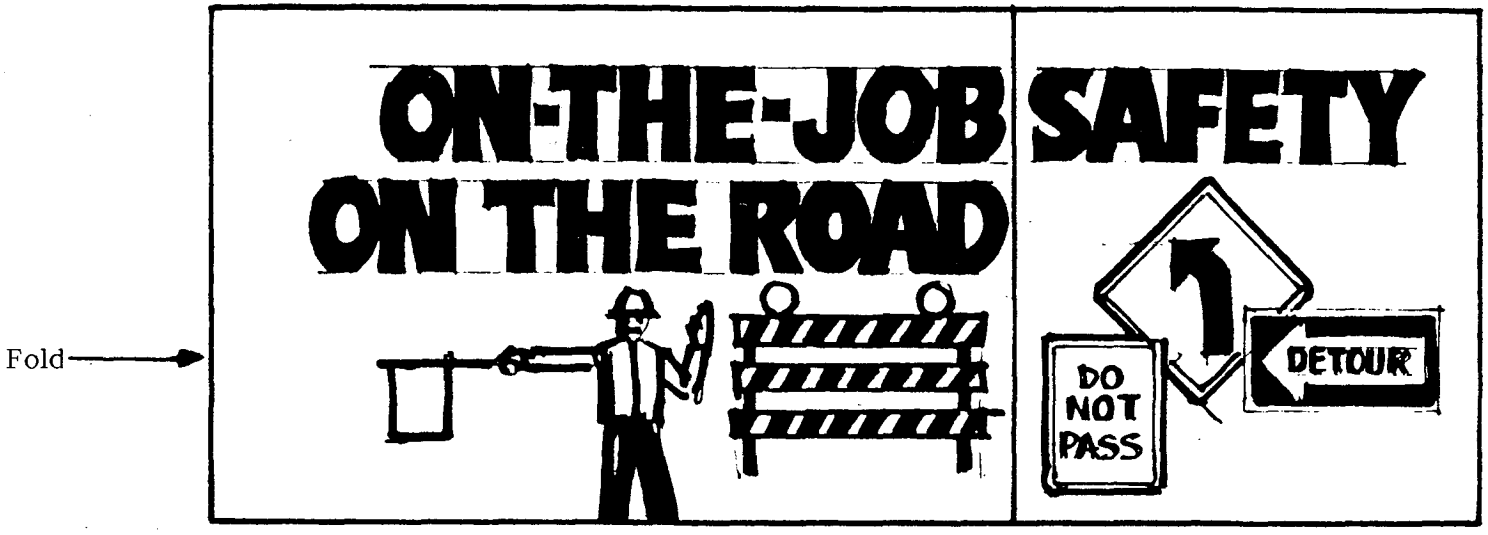
PAGE ONE: *(Lead In):*

Face it. No matter what you do, there are times when your job requires you to work on or near the roadway. You might not be aware of all the hazards you face at these times. Or how you can avoid them. It's really easy if you follow some basic safety measures.

Whose Right of Way is It?
If you think because you work on or near the roadway that you have the right of way, think again. The roadway belongs to every driver and vehicle that passes over it, even construction, surveyor and road-worker vehicles of every type. Accept this as part of your working attitude and you're taking the first step toward your own safety.

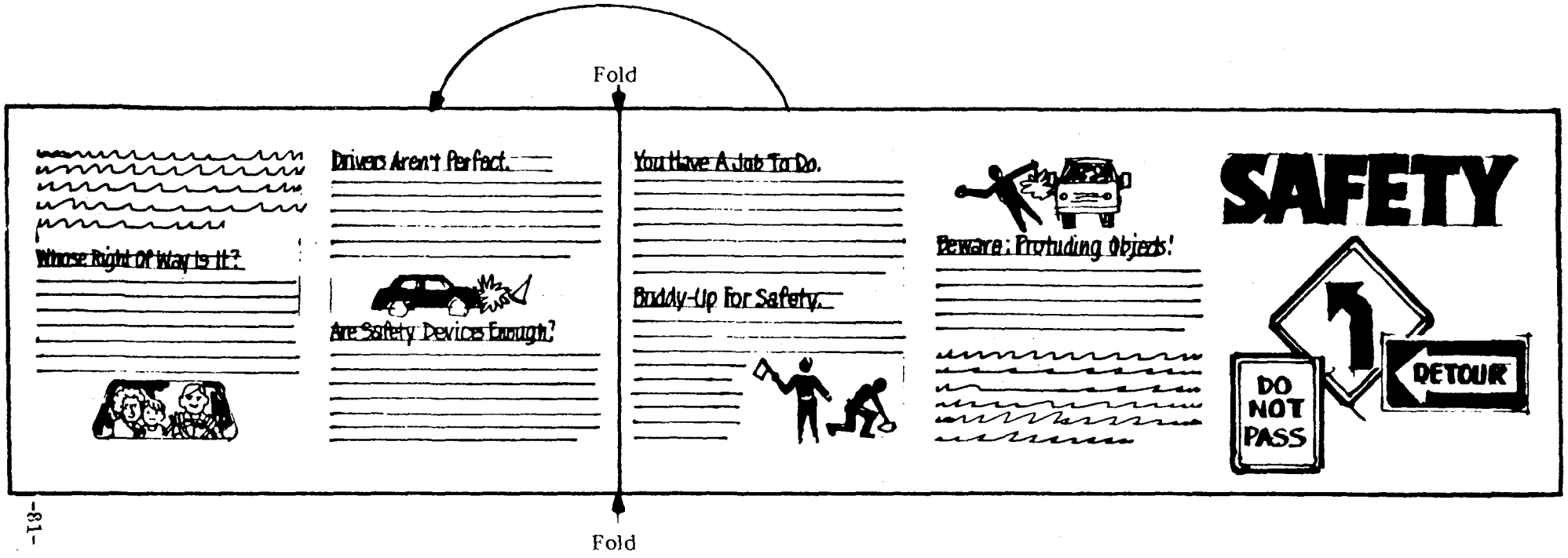
Drivers Aren't Perfect.
Drivers who pass your work site can be tired, drunk or on drugs, distracted by your equipment or traffic safety devices, even angry. Under these conditions, drivers may not see you even though you're wearing high visibility clothes. Even flagmen get hit! To stay alive, you must assume that you aren't seen until proven otherwise. Remember that you are also a pedestrian--not just a road worker.

Are Safety Devices Enough?
Barriers, barricades, traffic cones and flashing warning lights are all designed to protect you. But even these safety devices aren't foolproof. Drivers have driven through barriers into road



Front View Unopened

Figure 14. Road Worker Pamphlet (64% full scale)



Fully Opened

Figure 15. Road Worker Pamphlet (64% full scale)

workers. Safety devices can become dangerous projectiles when they are hit by a passing vehicle. Remember that you are a pedestrian as well as a road worker, and tune in to everything around you. Think about your safety near the road at all times.

PAGE TWO: ***You Have a Job to Do...***

But you are in a dangerous place. You can't get so involved in your work that you forget about the hazards around you. You can do your job as long as you remember a few simple safety measures--measures that can save your life. If you can, avoid standing behind large barriers. Always look before you step out into the open. And avoid walking backwards at any time.

Buddy-Up for Safety.

Crouching, bending or kneeling on or near the roadway is very dangerous. In these positions you are a smaller target and much harder for drivers to see. If you have to work in one of these positions, have a co-worker stand guard near you.

Beware: Protruding Objects!

Objects that stick out from cars, buses, trucks or recreational vehicles are deadly to road workers. Workers have been struck and seriously hurt by protruding cargo and side-mirrors on passing vehicles. If you must work near passing traffic, allow extra room for the safe passage of these objects.

(Closing)

Regardless of your reasons for working on the road, remember that you are a pedestrian first, a road worker second. Though much has been done to protect you, you must always protect yourself. If you follow these simple safety measures, you can avoid road work site accidents.

A public safety message from the National Highway Traffic Safety Administration.

4. Recommendations for Production and Dissemination

It is recommended that the production and dissemination of the road worker pamphlet be carried out immediately. Once produced, the pamphlet should be made available to jurisdictional highway authorities and other agencies which issue permits for work to be performed on or near the roadway. These agencies should in turn ensure that sufficient quantities of the pamphlets are made available

to the worksite permittee and his work crews during the permit granting process. Reproducibles and/or copies of the pamphlets should be sent to public utility companies which frequently must open work sites on or near the roadway so that these organizations may promulgate them to the workers.

Clearly a market exists for a generally available road worker safety pamphlet such as the one herein proposed. Full development and an initial production run could be accomplished rather quickly (within 3 months) making such a pamphlet a reality.

V. SUMMARY AND CONCLUSIONS

Four model regulations and four media packages are proposed to reduce rural-suburban and freeway pedestrian accidents. In the case of the model regulations, readily enactable legislation is provided as models for state jurisdictions. The model regulations offer the following basic opportunities for accident reduction:

- Model Regulation for School Bus Pedestrians

  Standardizes the appearance of school buses, optimizes the signalling equipment used to warn motorists not to pass a stopped school bus, specifies obligations for school bus drivers and motorists and establishes minimum training and educational requirements for school bus drivers and school bus passengers. All these provisions are designed to reduce the number of children being struck crossing to or from a stopped school bus or by the school bus itself.

- Model Regulation for Pedestrians on Highways

  Regulates the position and direction of pedestrian movements on various elements of the highway (sidewalk, shoulder, roadway edge) to minimize the hazards for pedestrians walking along rural and suburban roadways. Also, provides a framework for increasing the conspicuity of pedestrians at night along the roadway.

- Model Freeway Walking Restrictions Regulation

  Bans all unessential pedestrian activity on controlled access highways.

- Model Vehicle Hazard Warning Lights Regulation

  Principally as an aid to dismounted motorists requires use of vehicle hazard lights whenever a vehicle is stopped or disabled on the highway (with exceptions). Also requires use of the lights on slow moving vehicles.

These model regulations have been formulated to counteract specific pedestrian accident types. Analyses of the predisposing situations and driver and pedestrian behavioral errors documented for each of the accident types was instrumental in forming the content of these regulations. Although the regulations for the most part are implementable in their present form, field testing is recommended for all but the Model Freeway Walking Restrictions Regulation to gauge the effectiveness of the regulations prior to promulgating them to the states.

Continuing the approach of using detailed accident data to develop pedestrian accident countermeausres, four public education media packages are proposed in preliminary form. Again an analysis of the situational descriptors and behavioral errors associated with the accident types in question provided the informational content for media packages which include a school bus driver pamphlet, dismounted motorist public service announcements, a mailbox safety flyer, and a road worker pamphlet. Although the materials presented are in early conceptual form, they can be converted into finished form in a relatively short time. It is recommended that the media materials be produced and disseminated as soon as possible.

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APPENDIX A

Glossary of Terms

The following definitions of vehicle and traffic terms have been reprinted from Chapter 1 of the Uniform Vehicle Code as ammended by all supplements up to and including the 1979 supplement thereto. These terms and definitions have been basically adhered to throughout this report.

UNIFORM VEHICLE CODE

NOTE: This act or any portion thereof should be prefaced by a descriptive title conforming to the requirements of the constitution or statutes of the state enacting it.

Be it enacted, * * *

CHAPTER 1

Words and Phrases Defined

§ 1-101—Definition of words and phrases

The following words and phrases when used in this act shall, for the purpose of this act, have the meanings respectively ascribed to them in this chapter, except when the context otherwise requires.

§ 1-102—Alley.—A street or highway intended to provide access to the rear or side of lots or buildings in urban districts and not intended for the purpose of through vehicular traffic. (NEW, 1968.)

§ 1-103—Arterial street.—Any U.S. or State numbered route, controlled-access highway, or other major radial or circumferential street or highway designated by local authorities within their respective jurisdictions as part of a major arterial system of streets or highways. (NEW, 1954; RENUMBERED, 1968.)

§ 1-104—Authorized emergency vehicle.—Such fire department vehicles, police vehicles and ambulances as are publicly owned, and such other publicly or privately owned vehicles as are designated by the commissioner (or other appropriate state official) under § 15-111 of this act. (REVISED AND RENUMBERED, 1968.)

§ 1-105—Bicycle.—Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except such vehicles with a seat height of no more than 25 inches from the ground when the seat is adjusted to its highest position, and except scooters and similar devices. (REVISED, 1975 & 1979.)

§ 1-106—Bus.—Every motor vehicle designed for carrying more than 10 passengers and used for the transportation of persons; and every motor vehicle, other than a taxicab, designed and used for the transportation of persons for compensation. (RENUMBERED, 1968.)

§ 1-107—Business district.—The territory contiguous to and including a highway when within any 600 feet along such highway there are buildings in use for business or industrial purposes, including but not limited to hotels, banks, or office buildings, railroad stations and public buildings which occupy at least 300 feet of frontage on one side or 300 feet collectively on both sides of the highway. (RENUMBERED, 1968.)

§ 1-108—Cancellation of driver's license.—The annulment or termination by formal action of the department of a person's driver's license because of some error or defect in the license or because the licensee is no longer entitled to such license, but the cancellation of a license is without prejudice and application for a new license may be made at any time after such cancellation. (RENUMBERED, 1968.)

§ 1-109—Commissioner.[1]—The commissioner of motor vehicles of this State.

§ 1-110—Controlled-access highway.—Every highway, street or roadway in respect to which owners or occupants of abutting lands and other persons have no legal right of access to or from the same except at such points only and in such manner as may be determined by the public authority having jurisdiction over such highway, street or roadway.

§ 1-111—Crosswalk.—(a) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or, in the absence of curbs, from the edges of the traversable roadway; and in the absence of a sidewalk on one side of the roadway included within the extension of the lateral lines of the existing sidewalk at right angles to the centerline. (REVISED, 1975.)

(b) Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.

§ 1-112—Dealer.—Every person in the business of buying, selling or exchanging vehicles. (REVISED, 1971.)

§ 1-113—Department.[2]—The department of motor vehicles of this State.

§ 1-113.1—Divided highway.—A highway divided into two or more roadways by leaving an intervening space or by a physical barrier or by a clearly indicated dividing section so constructed as to impede vehicular traffic. (NEW, 1971.)

§ 1-113.2—Driveaway-towaway operation.—Any operation in which any motor vehicle, trailer or semitrailer, singly or in combination, new or used, constitutes the commodity being transported, when one set or more of wheels of any such vehicle are on the roadway during the course of transportation, whether or not any such vehicle furnishes the motive power. (NEW, 1962; RENUMBERED, 1971.)

§ 1-114—Driver.—Every person who drives or is in actual physical control of a vehicle.

§ 1-114.1—Driver's license.—Any license to operate a motor vehicle issued under the laws of this State. (NEW, 1968.)

§ 1-115—Essential parts.—All integral and body parts of a vehicle of a type required to be registered hereunder, the removal, alteration or substitution of which would tend to conceal the identity of the vehicle or substantially alter its appearance, model, type or mode of operation.

§ 1-116—Established place of business.—The place actually occupied either continuously or at regular periods by a dealer or manufacturer where his books and records are kept and a large share of his business is transacted.

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[1]If the term "commissioner" is not appropriate in a particular state, then the appropriate term and definition should be substituted.

[2]If the administration of this act is not vested in the department of motor vehicles within a particular state, the above definition should be revised to designate the appropriate department or bureau of the state government to administer this act.

§ 1-117—Explosives.—Any chemical compound or mechanical mixture that is commonly used or intended for the purpose of producing an explosion and which contains any oxidizing and combustive units or other ingredients in such proportions, quantities or packing that an ignition by fire, by friction, by concussion, by percussion or by detonator of any part of the compound or mixture may cause such a sudden generation of highly heated gases that the resultant gaseous pressures are capable of producing destructive effects on contiguous objects or of destroying life or limb.

§ 1-118—Farm tractor.—Every motor vehicle designed and used primarily as a farm implement, for drawing plows, mowing machines and other implements of husbandry.

§ 1-119—Flammable liquid.—Any liquid which has a flash point of 70°F., or less, as determined by a tagliabue or equivalent closed-cup test device.

§ 1-120—Foreign vehicle.—Every vehicle of a type required to be registered hereunder brought into this State from another state, territory or country other than in the ordinary course of business by or through a manufacturer or dealer and not registered in this State.

§ 1-121—Gross weight.—The weight of a vehicle without load plus the weight of any load thereon.

§ 1-122—Highway.—The entire width between the boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel.[3]

§ 1-123—House trailer.—(a) A trailer or semitrailer which is designed, constructed and equipped as a dwelling place, living abode or sleeping place (either permanently or temporarily) and is equipped for use as a conveyance on streets and highways, or

(b) A trailer or a semitrailer whose chassis and exterior shell is designed and constructed for use as a house trailer, as defined in paragraph (a), but which is used instead permanently or temporarily for the advertising, sales, display or promotion of merchandise or services, or for any other commercial purpose except the transportation of property for hire or the transportation of property for distribution by a private carrier. (NEW SECTION, 1956.)

§ 1-123.1—Human powered vehicle.—Every vehicle designed to be moved solely by human power. (NEW, 1979.)

§ 1-124—Identifying number.—The vehicle number assigned by the manufacturer or by the department for the purpose of identifying the vehicle. The term shall include any numbers or letters assigned by the manufacturer for the purpose of identifying a part of a vehicle and any such number placed on a part in accordance with this act or regulations of the department for the purpose of identifying it. (REVISED, 1979.)

§ 1-125—Implement of husbandry.—Every vehicle designed or adapted and used exclusively for agricultural operations and only incidentally operated or moved upon the highways. (REVISED, 1971.)

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[3]By the above definition the terms "street" and "highway" are synonymous and interchangeable.

§ 1-126—Intersection.—(a) The area embraced within the prolongation or connection of the lateral curb lines, or, if none, then the lateral boundary lines of the roadways of two highways which joint one another at, or approximately at, right angles, or the area within which vehicles traveling upon different highways joining at any other angle may come in conflict.

(b) Where a highway includes two roadways (3) feet or more apart, then every crossing of each roadway of such divided highway by an intersecting highway shall be regarded as a separate intersection. In the event such intersecting highway also includes two roadways (30) feet or more apart, then every crossing of two roadways of such highways shall be regarded as a separate intersection.

(c) The junction of an alley with a street or highway shall not constitute an intersection. (NEW, 1968.)

§ 1-127—Laned roadway.—A roadway which is divided into two or more clearly marked lanes for vehicular traffic.

§ 1-128—License or license to operate a motor vehicle.—Any driver's license or any other license to permit to operate a motor vehicle issued under, or granted by, the laws of this State including: (REVISED, 1968.)

1. Any temporary license or instruction permit;
2. The privilege of any person to drive a motor vehicle whether or not such person holds a valid license;
3. Any nonresident's operating privilege as defined herein.

§ 1-129—Lienholder.—A person holding a security interest in a vehicle. (NEW, 1956.)

§ 1-130—Local authorities.—Every country, municipal and other local board or body having authority to enact laws relating to traffic under the constitution and laws of this State.

§ 1-131—Mail.—To deposit in the United States mail properly addressed and with postage prepaid. (NEW, 1956.)

§ 1-132—Manufacturer.—Every person engaged in the business of constructing or assembling vehicles of a type required to be registered hereunder at an established place of business in this State.

§ 1-133—Metal tire.—Every tire the surface of which in contact with the highway is wholly or partly of metal or other hard, nonresilient material.

§ 1-133.1—Moped.—A motor-driven cycle both with pedals to permit propulsion by human power and with a motor which produces not to exceed two brake horsepower and which is not capable of propelling the vehicle at a speed in excess of 30 mph on level ground. If an internal combustion engine is used, the displacement shall not exceed 50 cubic centimeters and the moped shall have a power drive system that functions directly or automatically without clutching or shifting by the operator after the drive system is engaged. (NEW, 1979.)

§ 1-133.2—Motor home.—Every motor vehicle designed, used or maintained primarily as a mobile dwelling, office or commercial space. (NEW, 1971; RENUMBERED, 1979.)

§ 1-134—Motor vehicle.—Every vehicle which is self-propelled, and every vehicle which is propelled by electric power obtained from overhead trolley wires but not operated upon rails, except vehicles moved solely by human power. (REVISED, 1975.)

§ 1-135—Motorcycle.—Every motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, but excluding a tractor.

§ 1-136—Motor-driven cycle.—Every motorcycle, motor scooter or motorized bicycle having an engine with less than 150 cubic centimeters displacement or with five brake horsepower or less. (REVISED, 1975.)

§ 1-137—Nonresident.—Every person who is not a resident of this State.

§ 1-138—Nonresident's operating privilege.—The privilege conferred upon a nonresident by the laws of this State pertaining to the operation by such person of a motor vehicle, or the use of a vehicle owned by such person, in this State.

§ 1-138.1—Odometer.—An instrument for measuring and recording the actual distance a motor vehicle travels while in operation, other than any auxiliary odometer designed to be reset by the operator of the motor vehicle for the purpose of recording mileage on trips. (NEW, 1979.)

§ 1-139—Official traffic-control devices.—All signs, signals, markings and devices not inconsistent with this act placed or erected by authority of a public body or official having jurisdiction, for the purpose of regulating, warning or guiding traffic.

§ 1-140—Owner.—A person, other than a lienholder, having the property in or title to a vehicle. The term includes a person entitled to the use and possession of a vehicle subject to security interest in another person, but excludes a lessee under a least not intended as security. (REVISED, 1956; RENUMBERED, 1968.)

§ 1-141—Park or parking.—Means the standing of a vehicle, whether occupied or not, otherwise than temporarily for the purpose of and while actually engaged in loading or unloading property or passengers. (REVISED, 1971.)

§ 1-142—Passenger car.—Every motor vehicle, except motorcycles and motor-driven cycles, designed for carrying 10 passengers or less and used for the transportation of persons. (NEW, 1962; RENUMBERED, 1968).

§ 1-143—Pedestrian.—Any person afoot.

§ 1-144—Person.—Every natural person, firm, copartnership, association or corporation.

§ 1-144.1—Personal identification card.—A document issued by the department for the sole purpose of identifying the bearer and not authorized for use as a driver's license. (NEW, 1979.)

§ 1-145—Pneumatic tire.—Every tire in which compressed air is designed to support the load.

§ 1-146—Pole trailer.—Every vehicle without motive power designed to be drawn by another vehicle and attached to the towing vehicle by means of a reach or pole, or by being boomed or otherwise secured to the towing vehicle, and ordinarily used for transporting long or irregularly shaped loads such as poles, pipes or structural members capable, generally, of sustaining themselves as beams between the supporting connections.

§ 1-147—Police officer.—Every officer authorized to direct or regulate traffic or to make arrests for violations of traffic regulations.

§ 1-148—Private road or driveway.—Every way or place in private ownership and used for vehicular travel by the owner and those having express or implied permission from the owner, but not by other persons.

§ 1-149—Railroad.—A Carrier of persons or property upon cars (, other than streetcars,) operated upon stationary rails. (REVISED, 1968.)

§ 1-150—Railroad sign or signal.—Any sign, signal or device erected by authority of a public body or official or by a railroad and intended to give notice of the presence of railroad tracks or the approach of a railroad train.

§ 1-151—Railroad train.—A steam engine, electric or other motor, with or without cars coupled thereto, operated upon rails (except streetcars). (REVISED, 1971.)

§ 1-152—Reconstructed vehicle.—Every vehicle of a type required to be registered hereunder materially altered from its original construction by the removal, addition or substitution of essential parts, new or used.

§ 1-153—Registration.—The registration certificate or certificates and registration plates issued under the laws of this State pertaining to the registration of vehicles.

§ 1-154—Residence district.—The territory contiguous to and including a highway not comprising a business district when the property on such highway for a distance of 300 feet or more is in the main improved with residences or residences and buildings in use for business.

§ 1-155—Revocation of driver's license.—The termination by formal action of the department of a person's license or privilege to operate a motor vehicle on the highways, which terminated license or privilege shall not be subject to renewal or restoration except that an applciation for a new license may be presented and acted by the department after the expiration of the applicable period of time prescribed in this act. (REVISED, 1975.)

§ 1-156—Right of way.—The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian approaching under such circumstances of direction, speed and proximity as to give rise to danger of collision unless one grants precedence to the other. (REVISED, 1962.)

§ 1-157—Road tractor.—Section deleted in 1971.

§ 1-158—Roadway.—That portion of a highway improved, designed or ordinarily used for vehicular travel, exclusive of the sidewalk, berm or shoulder even though such sidewalk, berm or shoulder is used by persons riding bicycles or other human powered vehicles. In the event a highway includes two or more separate roadways the term "roadway" as used herein shall refer to any such roadway separately but not to all such roadways collectively. (REVISED, 1975.)

§ 1-159—Safety zone.—The area of space officially set apart within a roadway for the exclusive use of pedestrians and which is protected or is so marked or indicated by adequate signs as to be plainly visible at all times while set apart as a safety zone.

§ 1-159.1—Salvage vehicle.—A vehicle which is sold for the purpose of being scrapped, destroyed or salvaged for parts and any vehicle for which a total loss settlement of $1,000 or more has been made by an insurance company, other than an unrecovered, stolen vehicle. (NEW, 1979.)

§ 1-160—School bus.—Every motor vehicle that complies with the color and identification requirements set forth in the most recent edition of *Minimum Standards for School Buses*[4] and is used to transport children to or from school or in connection with school activities, but not including buses operated by common carriers in urban transportation of school children. (REVISED, 1962.)

§ 1-161—Security agreement.—A written agreement which reserves or creates a security interest. (NEW, 1956.)

§ 1-162—Security interest.—An interest in a vehicle reserved or created by agreement and which secures payment or performance of an obligation. The term includes the interest of a lessor under a lease intended as security. A security interest is "perfected" when it is valid against third parties generally, subject only to specific statutory exceptions. (NEW, 1956.)

§ 1-163—Semitrailer.—Every vehicle with or without motive power, other than a pole trailer, designed for carrying persons or property and for being drawn by a motor vehicle and so constructed that some part of its weight and that of its load rests upon or is carried by another vehicle.

§ 1-164—Sidewalk.—That portion of a street between the curb lines, or the lateral lines of a roadway, and the adjacent property lines, intended for use by pedestrians.

§ 1-165—Solid rubber tire.—Every tire of rubber or other resilient material which does not depend upon compressed air for the support of the load. (REVISED, 1971.)

§ 1-166—Special mobile equipment.—Every vehicle not designed or used primarily for the transportation of persons or property and only incidentally operated or moved over a highway, including but not limited to: ditch digging apparatus, well boring apparatus and road construction and maintenance machinery such as

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[4]Produced and sponsored by the National Commission on Safety Education of the National Education Association, Washington, D.C. 20036.

asphalt spreaders, bituminous mixers, bucket loaders, tractors other than truck tractors, ditchers, levelling graders, finishing machines, motor graders, road rollers, scarifiers, earth moving carry-alls and scrapers, power shovels and drag lines, and self-propelled cranes and earth moving equipment. The term does not include house trailers, dump trucks, truck mounted transit mixers, cranes or shovels, or other vehicles designed for the transportation of persons or property to which machinery has been attached. (REVISED, 1956.)

§ 1-167—Specially constructed vehicle.—Every vehicle of a type required to be registered hereunder not originally constructed under a distinctive name, make, model or type by a generally recognized manufacturer of vehicles and not materially altered from its original construction.

§ 1-168—Stand or standing.—Means the halting of a vehicle, whether occupied or not, otherwise than temporarily for the purpose of and while actually engaged in receiving or discharging passengers. (NEW, 1956.)

§ 1-169—State.—A state, territory or possession of the United States, the District of Columbia, the Commonwealth of Puerto Rico or a province of Canada. (REVISED, 1968.)

§ 1-170—Stop.—When required means complete cessation from movement.

§ 1-171—Stop or stopping.—When prohibited means any halting even momentarily of a vehicle, whether occupied or not, except when necessary to avoid conflict with other traffic or in compliance with the directions of a police officer or traffic-control sign or signal. (REVISED, 1956.)

§ 1-172—Street.—The entire width between boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel.[5]

§ 1-173—Streetcar.—A car other than a railroad train for transporting persons or property and operated upon rails principally within a municipality.[6]

§ 1-174—Suspension of driver's license.—The temporary withdrawal by formal action of the department of a person's required or privilege to operate a motor vehicle on the public highways, which temporary withdrawal shall be for a period of specifically designated by the department. (REVISED, 1968.)

§ 1-175—Through highway.—Every highway or portion thereof on which vehicular traffic is given preferential right of way, and at the entrances to which vehicular traffic from intersecting highways is required by law to yield the right of way to vehicles on such through highway in obedience to a stop sign, yield sign, or other official traffic-control device, when such signs or devices are erected as provided in this act. (REVISED, 1968.)

§ 1-176—Trackless trolley coach.—Every motor vehicle which is propelled by electric power obtained from overhead trolley wires but not operated upon rails.

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[5]By the above definition the terms "street" and "highway" are synonymous and interchangeable.

[6]This definition should be omitted by states in which streetcars are not in operation.

§ 1-177—Traffic.—Pedestrians, ridden or herded animals, vehicles, streetcars and other conveyances either singly or together while using any highway for purposes of travel.

§ 1-178—Traffic-control signal.—Any device, whether manually, electrically or mechanically operated, by which traffic is alternately directed to stop and permitted to proceed. (REVISED, 1962.)

§ 1-179—Trailer.—Every vehicle with or without motive power, other than a pole trailer, designed for carrying persons or property and for being drawn by a motor vehicle and so constructed that no part of its weight rests upon the towing vehicle.

§ 1-180—Transporter.—Every person engaged in the business of delivering vehicles of a type required to be registered hereunder from a manufacturing, assembling or distributing plant to dealers or sales agents of a manufacturer.

§ 1-181—Truck.—Every motor vehicle designed, used or maintained primarily for the transportation of property.

§ 1-181.1—Truck camper.—Any structure designed, used or maintained primarily to be loaded on or affixed to a motor vehicle to provide a mobile dwelling, sleeping place, office or commercial space. (NEW, 1971.)

§ 1-182—Truck tractor.—Every motor vehicle designed and used primarily for drawing other vehicles and not so constructed as to carry a load other than a part of the weight of the vehicle and load so drawn.

§ 1-183—Urban district.—The territory contiguous to and including any street which is built up with structures devoted to business, industry or dwelling houses situated at intervals of less than 100 feet for a distance of a quarter of a mile or more. (NEW, 1954.)

§ 1-184—Vehicle.—Every device in, upon or by which any person or property is or may be transported or drawn upon a highway, excepting devices used exclusively upon stationary rails or tracks. (REVISED, 1975.)

§ 1-185—Vehicle identification number.—The numbers and letters, if any, designated by the department for the purpose of identifying the vehicle or the unique identifier assigned to each vehicle by the manufacturer pursuant to regulations. (NEW, 1979.)