

PEDESTRIAN AND BICYCLE SAFETY STUDY

Highway Safety
Act of 1973
(Section 214)



MARCH 1975

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

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CONTENTS

Page

SECTION I: SYNOPSIS

A. Introduction	1
B. Executive Summary	2
C. Background	4
D. Study Methodology	7
E. Congressional Recommendations	12

SECTION II: PEDESTRIAN SAFETY

Introduction	13
A. Review and Evaluation of State and Local Ordinances, Regulations, and Laws Pertaining to Pedestrian Safety	14
B. Review and Evaluation of Enforcement Policies, Procedures, Methods, Practices and Capabilities for Enforcing Pedestrian Rules	35
C. Relationship Between Alcohol and Pedestrian Safety	36
D. Evaluation of Ways and Means of Improving Pedestrian Safety Programs	43
E. Analysis of Present Funding Allocation of Pedestrian Safety Programs and an Assessment of the Capabilities of Federal, State and Local Governments to Fund Such Activities and Programs	45
F. Findings	59
G. Recommendations	61

SECTION III: BICYCLE SAFETY

Introduction	65
A. Review and Evaluation of State and Local Ordinances and Regulations Pertaining to Bicyclist Safety	66

CONTENTS (Continued)

	<i>Page</i>
B. Review and Evaluation of Bicycle Law Enforcement Policies, Procedures, Methods and Practices	79
C. Alcohol Involvement in Bicycle/Motor Vehicle Crashes	81
D. Evaluation of Ways and Means of Improving Bicycle Safety Programs	85
E. Analysis of Present Funding Allocation of Bicycle Safety Programs and an Assessment of the Capabilities of Federal, State and Local Governments to Fund Such Activities and Programs	89
F. Findings	95
G. Recommendations	98

TABLES

SECTION I

Sites Surveyed for Laws and Ordinances, Law Enforcement, and Funding Information	10
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SECTION II

A-1 Definition of Pedestrian/Pedestrian Obedience	17
A-2 Pedestrian Control Signals/Pedestrian Crossing Roadway	20
A-3 Pedestrian Right-of-Way at Signed Locations	23
A-4 Pedestrians Outside Crosswalks/Miscellaneous Crossing Rules	24
A-5 Drivers' Duties Toward Pedestrians	27
A-6 Other Pedestrian Duties and Laws	32
A-7 Miscellaneous Pedestrian Laws	34
C-1 Indication of Pedestrian Drinking by Accident Type	40
C-2 Indication of Pedestrian Drinking by Primary Precipitating Factors	40
C-3 Indication of Pedestrian Drinking by Pedestrian Age	41

CONTENTS (Continued)

TABLES (Continued)

	<i>Page</i>
C-4 Indication of Pedestrian Drinking by Severity of Pedestrian Injury	42
D-1 Summary of Countermeasures for Pedestrian Safety	46
E-1 Pedestrian and Bicycle Expenditures, Patterns, and Funding Sources by Region	48
E-2 Annual Work Program Summary by Level of Expenditure	49
E-3 Annual Work Program Pedestrian and Bicycle Expenditures and Funding Sources by State	51

SECTION III

A-1 Legal Status of Bicycle/Traffic Laws Applicable to Bicyclists	68
A-2 General Bicycle Riding Rules	73
A-3 Special Requirements for Bicyclists and Equipment	76
C-1 Availability of Data on Alcohol Involved Bicycle/Motor Vehicle Crashes	83
D-1 Summary of Countermeasures for Bicyclist Safety	86

MAPS

SECTION II

E-1 Annual Work Programs Levels of Expenditures for All Programs	50
E-2 Response to Questionnaire	55

SECTION I: SYNOPSIS

A. INTRODUCTION

This report describes the results of study efforts in accordance with the requirements of Section 214 of the Highway Safety Act of 1973 (Pub. Law 93-87).

Requirements of the Act are as follows:

The Secretary of Transportation shall make a full and complete investigation and study of pedestrian and bicycle safety. Such an investigation and study shall include, but not be limited to, the following:

- (1) A review and evaluation of State and local ordinances, regulations, and laws and the enforcement policies, procedures, methods, practices, and capabilities for enforcing them.
- (2) The relationship between alcohol and pedestrian and bicycle safety, with special emphasis on problem drinkers, both drivers and pedestrians.
- (3) An evaluation of ways and means of improving pedestrian and bicycle safety programs.
- (4) An analysis of present funding allocations for pedestrian and bicycle safety programs and an assessment of the capabilities of Federal, State, and local government to fund such activities and programs.

In the conduct of such investigation and study, the Secretary shall cooperate and consult with other agencies of the Federal Government, the States, and their political subdivisions and other interested private organizations, groups, and individuals.

The Secretary shall, not later than January 31, 1975, report to the Congress the results of this investigation and study together with his conclusions and recommendations for appropriate legislation.

This report presents an introduction to and background information on the problem of pedestrian-bicyclist safety, an overview of Federal, State, and local activity, the methods employed in the development of the current report, an executive summary, and a Congressional recommendation. Separate sections of the report delineate details on pedestrian-bicyclist safety as they relate to the following topics: State and local ordinances; enforcement policies, procedures, methods, practices, and capabilities of responsible authorities for enforcing rules; the relationship between alcohol and pedestrian-bicycle safety; ways and means of improving programs; an analysis of present funding allocation of

safety programs; and an assessment of the capabilities of Federal, State, and local governments to fund such activities and programs.

It should be noted that the Department of Transportation (DOT) jurisdiction applies to pedestrian-bicyclist safety. Bicycle safety in terms of the bicycle itself falls within the jurisdiction of the Consumer Product Safety Commission (CPSC). Pursuant to their authority, CPSC issued a bicycle safety standard on June 28, 1974 (39 F.R. 26099), which would become effective during 1975.* Therefore, this report pertains to pedestrian-bicyclist safety—particularly, the safety of individuals riding bicycles or walking on streets, highways, and sidewalks.

B. EXECUTIVE SUMMARY

This report is in response to the Highway Safety Act of 1973, Section 214, p. 93-97, which requires the Secretary of Transportation to submit to Congress the results of his investigation, findings, and recommendations for appropriate legislation concerning pedestrian-bicycle safety. The research conducted for this study consisted of several distinct operations. The pedestrian and bicycle laws of the 50 States and the ordinances of 50 randomly selected communities were reviewed and evaluated. Thirty police jurisdictions were visited to gather information on pedestrian-bicyclist enforcement policies and procedures. Data were also obtained from two literature surveys on the role of alcohol in bicycle-motor vehicle crashes, and the involvement of alcohol in pedestrian collisions resulting in death and injury. Federal, State, and local pedestrian-bicycle safety funding and funding capabilities were assessed through an analysis of FY 74 Annual Work Programs (AWP) submitted by the States, and through a survey questionnaire, distributed to each State, the District of Columbia, and selected localities, which provided a more detailed picture of State and local expenditures.

B.1 Pedestrians

Findings:

- 1) There is a serious lack of uniformity among pedestrian laws which causes confusion on the part of both motorists and pedestrians. The lack of formal policy and procedure concerning pedestrian violations results in little or no enforcement of regulations.
- 2) There is a scarcity of data on the types of pedestrian accidents, the effects of enforcement on accident rates, and the involvement of alcohol in pedestrian collisions.
- 3) Traffic safety efforts are usually directed toward the education of children, rather than the enforcement of regulations violated by adults.
- 4) Insufficient attention has been paid to pedestrians, considering the magnitude of the pedestrian safety problem relative to other program areas.

*Effective date of standard suspended indefinitely by Consumer Product Safety Commission, December 1974.

- 5) Funding limitations are usually the greatest hindrance to providing adequate safety programs. Extensive planning and staff activities in all program areas are frequently absent because of insufficient funding.

Recommendations:

- 1) Effort should be made to provide uniform pedestrian laws across the nation to reflect the way "reasonable" pedestrians walk.
- 2) Statements of policy and/or directives relating to pedestrians should be established and police officers apprised of the importance of appropriate countermeasure activity. Pedestrian enforcement should be increased and made a higher priority item in traffic enforcement.
- 3) Accident records should be kept for pedestrians, and major epidemiological studies should be conducted to fill the gaps in knowledge on nonfatally injured pedestrians and victims of alcohol-related crashes.
- 4) Allocations of public funds for the creation and maintenance of pedestrian safety programs should be accelerated, and pedestrian safety should be made a significant component of all State highway safety programs.
- 5) Pedestrian-bicyclist safety educational programs should be broadened to include all ages and should be directed toward target groups with special messages for specific accident types.

B.2 Bicycles

Findings:

- 1) The legal status of the bicycle and the bicyclist in relation to motor vehicles and pedestrians needs to be defined more precisely in order to avoid confusion over rights-of-way and legal liabilities associated with traffic laws.
- 2) Within law enforcement agencies, there is a lack of formal statements describing violations, and of policies and procedures for dealing with bicyclists.
- 3) Few data exist on the frequency, type, location, and other characteristics of crashes and on the effects of enforcement on frequency of violations and accidents.
- 4) Bicycle programs are often low priority items in most States, cities, and counties. The allocation of staff time and funds is not consistent with safety requirements and needs. Extensive activity in most program areas is absent because of insufficient funding allocations.

Recommendations:

- 1) Police agencies should develop and promulgate written procedures describing methods of dealing with bicyclist violations and motorists who violate the rights of bicyclists. Police officers should be informed of the importance of their taking appropriate action against violations.

- 2) Uniform criteria for recording and reporting accident data should be established nationwide. This is particularly essential for the further study of patterns of alcohol usage and development of countermeasures.
- 3) Major emphasis should be placed on research design to delineate specific causal/severity factors in bicyclist accidents and to devise effective, specific countermeasures where none currently exist.
- 4) A substantial commitment of funds should be made by all levels of government to establish and maintain a bicyclist safety program, expand research, evaluate current activities, and plan future programs.

B.3 Congressional Recommendation

The study did not reveal any voids that could be filled by national legislation. Rather, it revealed the need for State and local action on the pedestrian-bicycle safety problem. The study also showed that such action can best be constructed around needs identified by analysis of traffic records and programmatic activities.

Although national legislation is not recommended at present, the National Highway Traffic Safety Administration (NHTSA) is currently considering a Highway Safety Program Standard for bicyclists, which requires Congressional approval pursuant to the Highway Safety Act of 1973.

C. BACKGROUND

C.1 Problem Definition

Excluding motor vehicle occupants, pedestrian fatalities are the single largest type of transportation fatality within DOT's purview. These fatalities have risen almost 30 percent since 1963, are now numbering about 11,000 annually (20 percent of the total highway death toll), and involve 400,000 accidents each year.

The pedestrian problem is primarily urban, where two-thirds of the fatalities and 85 percent of the accidents occur. Research has indicated a number of specific urban pedestrian accident types accounting for more than one-half of the urban problem. The rural pedestrian problem is also being addressed.

Bicyclist fatalities accounted for approximately 1,100 deaths in 1973, an increase of almost 100 percent since 1963. Approximately 100,000 bicycle-motor vehicle accidents occur annually. Over 15 million bicycles were sold during 1973, more than half of these for adult use.

With the advent of the fuel shortage, it is anticipated that there will be a change in modes of transportation—shifts toward car pools, two-wheeled vehicles, greater use of smaller cars, and mass transportation. This may result in a significant upward shift in the percentage of fatalities and injuries resulting from pedestrian-bicyclist accidents.

C.2 Highway Safety Research Within the Department of Transportation

Pedestrian-bicyclist safety research activities within DOT are the joint responsibility of the National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA). NHTSA is vested with responsibility for research in the many functional areas of highway safety and motor vehicle programs (except for the bicycle itself, which falls within the purview of the Consumer Product Safety Commission). FHWA investigates highway related aspects of pedestrian-bicyclist safety, e.g., physical specifications such as roadway design, modification and delineation, traffic control devices, and pedestrian-bicyclist facilities.

NHTSA's research has focused on the identification of specific types of pedestrian-bicyclist accidents. All pedestrian accidents are not alike, nor are they effectively described solely by demographic variables. Beyond the surface differences, such as the sex and age of victims, the location of the accident, and the time of day, there is a set of factors relating to the dynamics of the accident. These factors involve the behavioral errors of both drivers and nondrivers and how these critical errors are related to features of the vehicle and the environment. From such information, specific types of accidents have been identified on the basis of similarity of causal factors. The importance of these accident types for an organized, effective approach to the bicyclist-pedestrian accident problem stems from the specificity which this approach brings to all aspects of the problem-solving effort, both in the research and operational areas. An accident type provides a relatively complete description of the critical human errors occurring in the accident situation; it identifies those elements of the highway and vehicular environment which predispose or contribute to the accident occurrence; and it details the nature of the target group involved.

The accident typology approach was applied by NHTSA in 1969 to urban pedestrian accidents. From this effort, several types of accidents have been identified as accounting for approximately 57 percent of urban accidents. These types are:

- **Dartout:** A short time exposure to the driver, not at intersection. (33 percent)
- **Intersection dash:** A quick crossing attempt at or near an intersection. (9 percent)
- **Vehicle turn—attention conflict:** Driver attempting to turn into traffic attends to traffic in one direction and strikes pedestrian in other direction. (8 percent)
- **Multiple threat:** Pedestrian is struck after other cars, which blocked the vision of the striking vehicle, stopped to permit the pedestrian to cross. (3 percent)
- **Bus stop related:** Pedestrian is struck after stepping out from the front of a bus at a stop. (3 percent)
- **Vendor—ice cream truck:** Pedestrian is struck going to or from street vendor. (2 percent)
- **Backing up:** Pedestrian fails to detect a vehicle backing up. (2 percent)

Each of the foregoing seven accident types is being addressed by NHTSA's Research and Development with specific countermeasures in the areas of training, safety regulations, and public information materials. Problem analysis (the identification of specific accident types) is currently proceeding in the rural pedestrian and bicycle/motor vehicle areas.

Altogether about 30 specific pedestrian accident types have been defined. The characteristics of many accident types have been described sufficiently to permit countermeasure approaches to be established. For other accident types, the areas have been identified that will require further investigation before adequate countermeasures can be determined.

NHTSA is currently conducting research on a number of promising countermeasures directed at identified pedestrian accident types. One project is aimed at developing training programs for kindergarten through third grade children to reduce the occurrence of the dartout accident. The course content is based directly on research identifying the behavioral errors leading to this accident type. The training program, which involves film, real-world practice under safe conditions, and the use of a street-traffic simulator in the classroom, is now undergoing field test. Prototype pedestrian safety messages based on knowledge of certain of the urban accident types have been developed and are also being tested in field trials. A third project focused on the development of model pedestrian safety regulations for selected accident types. Nine model regulations were developed and are scheduled for test and evaluation.

FHWA has formulated a research project to improve both the safety and accommodations of pedestrians through traffic engineering methodologies. The feasibility and cost-effectiveness of physical separation of pedestrians and vehicles has been investigated. Included was a preliminary feasibility study of isolated pedestrian facilities, such as overpasses, underpasses, skyways, and malls. Subsequent to this study, the design criteria for these facilities will be investigated, considering the characteristics of the pedestrian population using the facility, as well as its effect on traffic and the environment. Following the investigation of isolated facilities will be the development of criteria for community-wide separate pedestrian networks in both new and existing communities. Essential inputs into this area are special provisions for the elderly and handicapped. Results of the foregoing research efforts will provide guidelines for determining where, when, and what types of separate pedestrian facilities are needed to ensure the safe and convenient accommodation of pedestrians.

Complete and entire separation of pedestrians and vehicles is an ideal situation that would take many years to implement. Moreover, in many cases these separations might be too costly to install in terms of benefits derived.

A specialized area of concern under investigation is the protection of school age children. Efficient strategies are needed to accommodate children traveling to and from school and while at neighborhood play. This research is expected to: evaluate and recommend standardized school crossing protection devices; improve techniques for routing school buses with particular emphasis on pickup and dropoff locations; develop criteria for school walk trip routing; and provide guidelines for use and implementation of play streets.

In addition, several States and the Federal Government, through the Federal Aid Highway Program and local programs, have constructed bicycle paths. Information is needed to determine safe design criteria for these paths and develop control strategies to minimize vehicle-bicycle conflicts and guide the bicyclists through conflicts that do exist. Application of results of this research will improve the environment for the bicyclist, thus encouraging the use of bicycles for transportation as well as recreation.

C.3 State and Local Operational Activity

Project titles presented here represent selected examples of State responses to an NHTSA survey conducted as part of the Section 214 study. The projects are intended to serve as examples of the variety, direction, and approaches of pedestrian-bicyclist safety programs now ongoing nationally at the State and local level. Projects run the gamut as follows: State public information programs; bike rodeos; kindergarten through grades 3, 6, or 12 traffic safety education in schools; local and/or Statewide distribution of highly visible or retroreflective materials; adult education; school crossing guards; inservice police training to increase awareness and motivation related to pedestrian-bicyclist safety; increased enforcement coupled with public education. Other activities include: Statewide bicycle committee activities, public meetings, and legislative hearings on countermeasures; bicycle education programs legislated for the public in city and county; special engineering efforts to protect pedestrians; special provision for the elderly and handicapped pedestrian; expanded driver's manual to include pedestrians and bicyclists; bikeway and footpath programs initiated; special emphasis patrol to remove intoxicated pedestrians from roadways; and Statewide distribution of model pedestrian-bicyclist program manual.

Under Section 402 of the Highway Safety Act of 1966, as amended, approximately \$5.5 million were planned for obligation by States during FY 75 to meet Federal, State, and local needs for impacting the pedestrian problem. Since the Standard was promulgated in 1969, some \$8.9 million were obligated for State and local pedestrian-bicyclist safety programs.

A synthesized listing of program suggestions received from States as part of the study survey is listed here: public education regarding traffic laws pertaining to pedestrian-bicyclist; stricter enforcement; increased accident analysis; use of pedestrian-bicyclist task forces; revision and updating of "Manual on Uniform Traffic Control Devices"; provision of bikeway specification; standardization of school curriculum from kindergarten through 12th grade; improvement of equipment and reflectivity requirements; publicizing potential hazards; separation of pedestrians-bicyclists from motor vehicles; testing and licensing of bicyclists; mandatory teacher preparation; initiation of programs for adult bicyclists; training of engineering and planning personnel; more Federal action to identify countermeasures; bike registration, inspection, and flags; and uniform rules of the road for pedestrians and bicyclists.

D. STUDY METHODOLOGY

The development and completion of the study and report were accomplished through a combination of inhouse staff work and employment of six contractors. Two of the contracts were set aside for minority enterprises under the Small Business Administration 8-A program.

The following sections identify each element of the requirement as set forth in Section 214 of the Highway Safety Act of 1973 (Pub. Law 93-87). A short narrative after each element describes the study effort.

"The Secretary of Transportation shall make a full and complete investigation and study of pedestrian and bicycle safety. Such an investigation and study shall include, but not be limited to, the following:

- (1) A review and evaluation of State and local ordinances, regulations, and laws and the enforcement policies, procedures, methods, practices, and capabilities for enforcing them.”

The pedestrian and bicyclist laws of the 50 States and the ordinances of 50 communities selected at random were reviewed by the National Committee on Uniform Traffic Laws and Ordinances (NCUTLO). The laws and ordinances reviewed were those adopted before January 1, 1974. No attempt was made to include State laws or local ordinances adopted during 1974.

Using the same random selection process in conjunction with NCUTLO, the International Association of Chiefs of Police (IACP) visited 30 jurisdictions to gather information on the review and evaluation of pedestrian-bicyclist enforcement policies, procedures, methods, practices, and capabilities for enforcing them. IACP staff examined actual field practices at the operational level as compared with managerial directives. Difficulty was encountered in the data analysis because of limited operational data recorded by police agencies, areas in which police had concurrent jurisdiction, and inadequacy and nonuniformity of available data. This study cannot be considered a complete analysis of the pedestrian-bicyclist problem from the police perspective.

- “(2) The relationship between alcohol and pedestrian and bicycle safety, with special emphasis on problem drinkers, both drivers and pedestrians.”

Because NHTSA had ongoing contracts related to examining other aspects of the highway safety and alcohol problem, it was decided to expand the contracts then in effect.

- (a) A summary of the literature and existing state of knowledge regarding alcohol and pedestrian safety was undertaken. Attention was focused upon the frequency and possible overinvolvement of alcohol in pedestrian accidents and alcohol as a causative element in these accidents.

- “(3) An evaluation of ways and means of improving pedestrian and bicycle safety programs.”

Staff activity in NHTSA’s Traffic Safety Programs, Research and Development, and FHWA resulted in identifying ways and means of improving pedestrian-bicycle safety programs. This review of research and literature identified additional safety programs and a compendium of possible countermeasures. Some 14 persons, representing a nationwide diversity of pedestrian-bicyclist interests and knowledge, met during a 2-day advisory panel conference to assist with input to the study by evaluating the effectiveness of the previously identified programs and countermeasures.

- “(4) An analysis of present funding allocations for pedestrian and bicycle safety programs and an assessment of the capabilities of Federal, State, and local governments to fund such activities and programs.”

The following tasks were undertaken for this assignment:

- (a) Analysis of the FY 74 Annual Work Programs. [Each year the States submit a summary of planned expenditures in highway safety (AWP’s) to the

Department of Transportation. These documents detail Federal, State, and local spending in each of DOT's safety standards. Periodically, the States also submit and revise Comprehensive Program (CP's) Plans which record planned expenditures and usually encompass a 4-year period.] In this review as well as in the analysis of the survey data, two general types of analyses were done. The first was a State by State, the second a regional analysis based on NHTSA's grouping of States. It became apparent early in the study that although the AWP's are the only comparative data source on pedestrian-bicycle safety, the data presented shortcomings which affected the analyses. Bicycle and, to a lesser degree, pedestrian programs are often incorporated within other safety categorizations. Some data can be neither identified nor tabulated. Only those program standards specifically mentioning pedestrian or bicycle and detailing expenditures were included. Where accompanying dollar figures were not present, States and programs were not included in the analysis. Although separate analyses were planned for pedestrian-bicycle programs, there was essentially a joint analysis. The programs for each State were combined and represent all such programs in the State.

- (b) Survey Questionnaire. The survey questionnaire was designed to fill in the gaps left by the AWP analysis and provide a more detailed picture of State and local expenditures and sources of funding. Overall response to the questionnaire survey was only fair—a 44-percent return nationally. Moreover, most respondents were unable to provide adequate information.

The questionnaire requested information on: Planning; Facilities; Public Information/Education; Research, Development, and Evaluation (RD&E); Accident Investigation and Analysis; Traffic Law Enforcement; Registration; and Licensing and Inspection (bicycles only). The questionnaire was distributed to each State, the District of Columbia, Puerto Rico, and 12 selected localities.

- (c) Site Visits. The contractor visited 21 representative sites in the United States and its territories for the purpose of indepth studies of safety programs.

The following combination chart identifies the 50 local sites selected at random for the NCUTLO study involving laws and ordinances, the 30 sites visited for the IACP law enforcement review, and the 21 sites surveyed for funding data.

Sites Surveyed for Laws and Ordinances, Law Enforcement, and Funding Information

Laws and Ordinances Reviewed in 50 States Plus These Political Subdivisions	Law Enforcement Site Visits	Funding Site Visits
Dothan, Ala.	Dothan, Ala.	Dothan, Ala.
Mesa, Ariz.	Mesa, Ariz.	Mesa, Ariz.
Phoenix, Ariz.	Arizona Department of Public Safety	Arizona State
Scottsdale, Ariz.		
Tucson, Ariz.		
Azusa, Cal.		
Burlingame, Cal.		
Oakland, Cal.	Oakland, Cal.	
Sacramento, Cal.	Sacramento, Cal.	
San Diego, Cal.		
San Francisco, Cal.	San Francisco, Cal.	San Francisco, Cal.
San Jose, Cal.		
Washington, D.C.		
Dade County, Fla.	Dade County, Fla.	Dade County, Fla.
Jacksonville, Fla.	Jacksonville, Fla.	Jacksonville, Fla.
Atlanta, Ga.		
	Idaho State Police	Idaho State
Chicago, Ill.		
Decatur, Ill.		
South Bend, Ind.	South Bend, Ind.	South Bend, Ind.
Wichita, Kan.	Wichita, Kan.	Wichita, Kan.
	Kansas Highway Patrol	Kansas State
New Orleans, La.	New Orleans, La.	
	Louisiana State Police	Louisiana State
Leominster, Mass.		
	Mississippi Highway Patrol	Mississippi State
Holland, Mich.		
St. Paul, Minn.	St. Paul, Minnesota	
Kansas City, Mo.		
St. Louis, Mo.	St. Louis, Missouri	St. Louis, Missouri
St. Louis County, Mo.	St. Louis County, Missouri	St. Louis County, Mo.
Omaha, Neb.	Nebraska State Patrol	Nebraska State
Rochester, N.Y.		
Akron, Ohio	Birmingham, Alabama	

Sites Surveyed for Laws and Ordinances, Law Enforcement, and Funding Information

Laws and Ordinances Reviewed in 50 States Plus These Political Subdivisions	Law Enforcement Site Visits	Funding Site Visits
Toledo, Ohio	Toledo, Ohio	
Oklahoma City, Okla.		
Tulsa, Okla.		
Portland, Ore.	Portland, Oregon	
Pittsburgh, Pa.	Pittsburgh, Pennsylvania Pennsylvania State Police	Pittsburgh, Pa. Pennsylvania State
Columbia, S.C.		
Greenville, S.C.		
	Rhode Island State Police Knoxville, Tennessee	Rhode Island State
Knoxville, Tenn.		
Memphis, Tenn.		
Austin, Tex.		
Port Arthur, Tex.	Port Arthur, Tex.	
San Antonio, Tex.		
Wichita Falls, Tex.		
Henrico County, Va.	Henrico County, Va.	Henrico County, Va.
Norfolk, Va.		
Bellevue, Wash.		
King County, Wash.	King County, Wash.	King County, Wash.
Seattle, Wash.		
Fond du Lac, Wis.	Fond du Lac, Wis.	
		Puerto Rico

E. CONGRESSIONAL RECOMMENDATION

As a result of this study, specific recommendations for legislative action on the part of the U.S. Congress were not identified. The study did not reveal voids which could be filled by national legislation. Rather, what was revealed was the need for State and local actions.

Therefore, national legislation will not be recommended at this time, but the National Highway Traffic Safety Administration is currently considering a Highway Safety Program Standard in this area which must be approved by the Congress pursuant to Section 229 of the Highway Safety Act of 1973, Pub. Law 93-87; subsection (h) section 402, title 23, United States Code.

SECTION II: PEDESTRIAN SAFETY

INTRODUCTION

The pedestrian problem is primarily urban, with two thirds of the fatalities and 85 percent of the accidents occurring on city and suburban streets. Fatalities have risen almost 30 percent since 1963 and now number about 11,000 annually, or 20 percent of the total highway death toll. Pedestrian accidents currently exceed 400,000 per year.

It is important that society have some way to protect pedestrians from endangering themselves and others and to prevent their interference with the traffic flow. Motor vehicle and pedestrian laws, ordinances, and regulations are designed to accomplish this task. These laws and ordinances, however, often lack uniformity, and pedestrians who view them as unreasonable impediments to their movements often violate them.

Citations involving pedestrians are very rare. Those issued are usually given for hitchhiking, jaywalking, or crossing a street against a red traffic signal. The lack of written police policies and procedures concerning the enforcement of pedestrian laws hampers effective safety programs. Police efforts are generally devoted to educational programs for school children.

The role played by alcohol in pedestrian deaths is not well known. Limited data indicate that alcohol-related pedestrian deaths make up less than one third of the total adult pedestrian fatalities. More research in this area could add to the existing knowledge of the problem, allow a more quantitative assessment of the extent and nature of the problem, and provide guidelines for formulating effective countermeasures.

Research has been devoted primarily to identifying a number of accident types accounting for over one-half of the urban pedestrian problem. These accident types provide a relatively complete description of the critical human errors occurring in the accident situation and identify those elements of the physical and vehicular environment which predisposes or contribute to the accident occurrence. They also detail the nature of the target group. Similar research is now ongoing in the rural/suburban pedestrian area to identify specific accident types and develop countermeasures for them.

Pedestrian safety can be enhanced by implementing identified and proven countermeasures. A comprehensive pedestrian safety program should include some combination of such countermeasures related to education, engineering, and enforcement. The creation and maintenance of pedestrian safety programs is justified in light of the number of pedestrian fatalities and casualties.

Limited funds place a restriction on the maintenance of present programs and the creation of new programs. Many pedestrian programs are part of other safety programs and

funds allocated to the pedestrian portion are difficult to identify. Expenditures for pedestrian safety programs are shown as less than \$100,000 in each of 30 States in their AWP's and only six States indicate expenditures of \$500,000 or more a year. For a problem area that makes up 20 percent of the highway fatality total, this level of funding can be considered minimal at best.

A. REVIEW AND EVALUATION OF STATE AND LOCAL ORDINANCES, REGULATIONS, AND LAWS PERTAINING TO PEDESTRIAN SAFETY

It is important to stress that a substantial degree of nonuniformity remains in pedestrian laws. Uniformity for State and local laws regulating pedestrians is equally as desirable as uniformity for laws regulating vehicular traffic. There are instances where a local ordinance differs from a statute in the same State. Pedestrians often travel just as far from home as the drivers of vehicles, and as both drivers and pedestrians, visiting highway users need and deserve uniform traffic laws.

Pedestrian laws should be feasible, effective in reducing accidents, and reflect the way that reasonable pedestrians walk. Such laws should not subject pedestrians to unnecessary dangers, nor should they unreasonably interfere with the pedestrian's progress. Pedestrians who view laws as constituting an unreasonable impediment to their movement will probably violate them unless rigorous enforcement activity makes the burden of violating the law greater than that of compliance. If a particular pedestrian law is frequently violated, this may be an indication that the law imposes an unreasonable burden on pedestrian travel and may be symptomatic of problems that could be solved by means other than legislation. Such laws need not necessarily be repealed, because they may be essential to pedestrian safety. What may be necessary, however, is greater enforcement to bring about compliance, resulting in greater pedestrian safety. If a large percentage of pedestrians violate laws, and do so without interfering with other traffic or endangering themselves, those laws may be unreasonable. In some parts of the nation, laws relating to pedestrian compliance with traffic control devices are frequently violated. It is necessary to determine which laws are effective in reducing accidents and which produce unnecessary violations of the law.

In drawing the conclusion above, it should be noted that a basically sound law can become unreasonable in its implementation. There undoubtedly are intersections where pedestrians should comply with "don't walk" signals and wait for the "walk" signal before crossing. In addition, great care should be exercised in developing pedestrian laws to assure that the laws which are intended to protect the pedestrian do not in effect increase his real danger. It has been observed that the pedestrian's right-of-way in a crosswalk may give pedestrians a false sense of security which will in no way protect him from injury when struck by a motor vehicle. The concept of right-of-way for pedestrians in the crosswalk needs study to make certain it is not an example of a traffic law intended to protect pedestrians but which actually increases their peril.

A recent development in traffic law, that of allowing a right turn on a red signal, is intended in part to promote pedestrian safety but can create a very hazardous situation for pedestrians. The conflict between right-turning drivers and pedestrians crossing the roadway is not new. At a signalized intersection, both vehicles and pedestrians are held until a large number of each is collected; then both groups are released to enter the cross street together. This conflict often results in long delays for right-turning drivers, as well as a substantial danger for the pedestrians when frustrated right-turning drivers try to move.

One potential solution has been to allow the drivers, after stopping and when it is safe to do so, to make their turn against the red signal. The Uniform Vehicle Code and a number of jurisdictions allow such turns only when a sign is in place permitting the movement. An approximately equal number of jurisdictions allow the turn against a red signal at any intersection unless there is a sign prohibiting the maneuver. A somewhat smaller number of jurisdictions prohibit any turns through the red signal.

Another possible solution to the problem is to let pedestrians cross against the red light when they can do so safely and without interfering with traffic. This rule was part of the Code until 1962 and is still the law in a minority of the States. The number of jurisdictions that allow a right turn on red is increasing, whereas the number that allow pedestrians to cross on a red signal is decreasing.

Without commenting on the merits of either particular rule, it should be noted that a combination of both rules creates a serious danger for the pedestrian. Where a jurisdiction allows pedestrians to cross against a red light and allows drivers to turn against a red light, the pedestrian crossing must watch for traffic from three directions, including the rear. The driver must not only assess the cross street traffic but also must watch to assure that pedestrians on his right are not moving into the street. This burden is too great upon both drivers and pedestrians. The laws of a few States presently have this serious problem. They allow pedestrians to cross against a red signal and allow vehicles to turn right against a red signal.

Although none of the municipalities surveyed appear to have this problem wholly within their own ordinances, some have the problem to the extent that State laws are applicable within the municipality.

A.1 Definition of Pedestrian

The definition of a pedestrian is basically a simple matter—a person afoot. Complication is added, however, when push carts, wheel chairs, toy vehicles, or bicycles are considered. A person propelling a push cart is a pedestrian, but when he enters the roadway he must be treated like the driver of a vehicle. A person walking with a bicycle, on the other hand, remains a pedestrian wherever he goes. A person on roller skates or riding on a toy vehicle may not fall within the normal definition of “pedestrian,” yet when crossing the road in a crosswalk, such a person is entitled to all the rights and is subject to all the duties of a pedestrian. At other locations such as side walks, however, such a person may neither be entitled to pedestrian rights nor subject to pedestrian duties. A person riding in a wheel chair is neither a pedestrian (a person afoot) nor a vehicle driver (since devices propelled by human power are not vehicles). Such a person has no rights or duties specified in the vehicle codes and ordinances of most States and municipalities.

The Uniform Vehicle Code (UVC) defines the term “pedestrian” as “any person afoot” (Section 1-143). The Model Traffic Ordinance (MTO) does not contain a definition of “pedestrian,” but it does provide as follows:

Whenever any words and phrases used herein are not defined herein but are defined in the State laws regulating the operation of vehicles, any such definition therein shall be deemed to apply to such words and phrases used herein, except when the context otherwise requires (Section 1-16).

Thus, the UVC definition of “pedestrian” is applicable whenever the term is used in the MTO. As shown in Table A-1, the laws of 39 States and 39 of the municipalities reviewed are in substantial conformity with the Code definition. Three other State laws¹ and three additional municipal ordinances define “pedestrian” to include certain human-powered devices, such as a wheel chair or a toy vehicle.

Although neither the UVC nor the MTO contains any provision specifically addressing this point, a person walking with a bicycle is a person afoot and, thus, a pedestrian. While riding a bicycle, however, the person is not a pedestrian and has most of the responsibilities, rights and duties of a vehicle driver.

The Model Traffic Ordinance [Section 3-4(a)] provides that a person propelling a push cart upon a roadway is governed by the provisions applicable to any driver of a vehicle. Only two States² have similar laws on this matter. Two other States,³ like the Uniform Vehicle Code [Section 3-4(a); 1968], authorize county or local authorities to regulate persons propelling push carts. One State law⁴ provides that no person operating a push cart shall occupy a “space within the limits of the right-of-way of a freeway.” The remaining 45 States have no laws which specifically pertain to persons propelling push carts.

The Uniform Vehicle Code (Section 11-105; Supp. I, 1972) provides that pedestrians working in the construction and maintenance of highways do not have to comply with rules applicable to other pedestrians. The laws of 46 States (See Table A-1) and 17 municipalities have provisions that exempt construction crews from certain traffic regulations. Two of these States (See Table A-1) have laws that exempt construction workers from certain pedestrian provisions. Five other States (See Table A-1) exempt construction workers from some traffic laws, but not from any of the pedestrian regulations.

A.2 Pedestrian Obedience

Although aids to pedestrians crossing streets, for example, differ from one locality to another, most laws place a responsibility on pedestrians for obedience. In other words, drivers of vehicles, bicyclists, and pedestrians must all obey the same laws.

A.2.1 Traffic Laws

The Uniform Vehicle Code (Section 11-102), laws in 30 States (See Table A-1), and ordinances in 25 municipalities require pedestrians to obey traffic laws applicable to persons or to pedestrians.

A.2.2 Officers Directing Traffic

The Uniform Vehicle Code requires every person, and hence every pedestrian, to obey a police officer or fireman directing traffic:

“No person shall willfully fail or refuse to comply with any lawful order or direction of any police officer or fireman invested by law with authority to direct, control or regulate traffic” (Section 11-103; Supp. I, 1973).

¹ California, Hawaii, and Massachusetts.

² South Carolina and Wisconsin.

³ Colorado and Hawaii.

⁴ Ohio.

SECTION II

Table A-1

Definition of Pedestrian/Pedestrian Obedience

STATES	Laws conform with UVC definition of pedestrian	Exempt construction workers from certain traffic regulations	Requires pedestrians obey laws applicable to persons or pedestrians	Pedestrians to police officers directing traffic	Prohibit willful disobedience or official directing traffic	Obey official pedestrian control devices	Obey traffic control signals	Conform with UVC about crossing a street if light doesn't work green	May not cross against green light if "don't walk" signal is displayed	Prohibit crossing against yellow	Allow crossing with yellow if pedestrian yields to vehicles	Must obey red	Pedestrians may cross at red if yield to vehicles
Alabama	X	X	X	X	X	X	X	X	X	X	X	X	X
Alaska	X	X	X	X	X	X	X	X	X	X	X	X	X
Arizona	X	X	X	X	X	X	X	X	X	X	X	X	X
Arkansas	X	X	X	X	X	X	X	X	X	X	X	X	X
California	X ^a	X	X	X	X	X	X ^c	X	X	X	X	X	X
Colorado	X	X	X	X	X	X	X	X	X	X	X	X	X
Connecticut	X	X ^c	X	X	X ^d	X	X	X	X	X	X	X	X
Delaware	X	X	X	X	X	X	X	X	X	X	X	X	X
Florida	X	X	X	X	X	X	X ^e	X	X	X	X	X	X
Georgia	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Hawaii	X ^a	X	X	X	X	X	X ^g	X	X	X	X	X	X
Idaho	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Illinois	X	X	X	X	X	X	X ^g	X	X	X	X	X	X
Indiana	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Iowa	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Kansas	X	X	X	X	X	X	X ^g	X	X	X	X	X	X
Kentucky	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Louisiana	X	X	X	X	X ^d	X	X ^f	X	X	X	X	X	X
Maine	X	X ^b	X	X	X ^d	X	X ^f	X	X	X	X	X	X
Maryland	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Massachusetts	X ^a	X	X	X	X	X	X	X	X	X	X	X	X
Michigan	X	X	X	X	X ^d	X	X	X	X	X	X	X	X
Minnesota	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Mississippi	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Missouri	X	X	X	X	X	X	X	X	X	X	X	X	X
Montana	X	X ^c	X	X	X	X	X ^f	X	X	X	X	X	X
Nabraska	X	X	X	X	X	X	X ^g	X	X	X	X	X	X
Nevada	X	X	X	X	X	X	X	X	X	X	X	X	X
New Hampshire	X	X	X	X	X	X	X ^a	X	X	X	X	X	X
New Jersey	X	X	X	X	X ^d	X	X	X	X	X	X	X	X
New Mexico	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
New York	X	X ^c	X	X	X ^d	X	X ^f	X	X	X	X	X	X
North Carolina	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
North Dakota	X	X	X	X	X ^d	X	X ^f	X	X	X	X	X	X
Ohio	X	X	X	X	X	X	X	X	X	X	X	X	X
Oklahoma	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Oregon	X	X	X	X	X ^d	X	X	X	X	X	X	X	X
Pennsylvania	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Rhode Island	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
South Carolina	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
South Dakota	X	X	X	X	X	X	X	X	X	X	X	X	X
Tennessee	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Texas	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Utah	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Vermont	X	X ^c	X	X	X	X	X	X	X	X	X	X	X
Virginia	X	X ^c	X	X	X	X	X	X	X	X	X	X	X
Washington	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
West Virginia	X	X	X	X	X	X	X ^f	X	X	X	X	X	X
Wisconsin	X	X ^b	X	X	X ^d	X	X	X	X	X	X	X	X
Wyoming	X	X	X	X	X	X	X ^f	X	X	X	X	X	X

^aIncludes human-powered devices such as wheelchair or child on toy vehicle

^bExempt construction workers from certain pedestrian provisions

^cExempt construction workers from some traffic laws but not from pedestrian regulations

^dDo not specify willful disobedience, but prohibit all disobedience

^eSpecifically refer to pedestrian control signals

^fOnly at intersections

Forty-five States (See Table A-1) and 43 of the municipalities have laws comparable to the Uniform Vehicle Code which apply to pedestrians, either by direct reference to pedestrians or by requiring obedience of any “person.” All 45 States and 42 of the 43 municipalities with laws comparable to the Code, require that pedestrians obey police officers. (Some use the term “peace officer” or “traffic officer.”)

Four States⁵ and several municipalities, in conformity with the Code, also require that pedestrians comply with directions given by firemen. In addition, five States⁶ require obedience to certain other persons directing traffic—flagmen, school crossing guards, members of a rescue squad, or any person authorized to direct traffic. The Code only prohibits willfully disobeying the order of an officer directing traffic. The laws of 34 (See Table A-1) of the 45 States and 27 of the 43 municipalities with comparable laws also conform with the Code in this respect. The laws of two States⁷ prohibit knowingly disobeying such an order, while the remaining nine States do not specify willful disobedience, but prohibit all disobedience.

A.2.3 Certain Official Traffic Control Devices

Only 12 States (See Table A-1) and 15 municipalities have a law or ordinance similar to the Code [Section 11-501(a)] provision, which generally requires pedestrians to obey all official traffic-control devices that are specifically applicable to them. They need not obey stop signs, left-turn signs, one-way signs, or lane markings, for example, but they are required to heed signs such as those prohibiting use of the sidewalk on one side of a street or prohibiting crossing a street at certain places.

A.2.4 Traffic Control Signals

Like the Code [Section 11-501(b)], 36 States (See Table A-1) and 31 municipalities have a law or ordinance generally requiring compliance with traffic-control signals. However, compliance is required only with respect to such signals at intersections in 28 of these States and 16 of these municipalities. Only seven of the State laws (See Table A-1) and two of the municipal ordinances specifically refer to pedestrian control signals, as well as to traffic-control signals in general.

A.2.5 Green Signals

Almost all States and municipalities allow pedestrians (or all traffic) to enter and cross an intersection on the green signal. But only 20 States (See Table A-1) and 11 municipalities restrict, as does the Code [Section 11-202(a), (3)], pedestrians from crossing against a green light when a “don’t walk” signal is displayed at the same time. These 20 States (See Table A-1) and 10 municipalities conform to the Code by prohibiting crossing when the only green signal displayed is an arrow turn signal.

A.2.6 Yellow Signals

The Uniform Vehicle Code [Section 11-202(b), (2)], laws in 26 States (See Table A-1), and ordinances in 20 municipalities prohibit pedestrians from crossing against a yellow light;

⁵ Alaska, California, Florida, and North Carolina.

⁶ Alaska, California, New York, North Carolina, and Washington.

⁷ Nebraska and Vermont.

however, 18 State laws (See Table A-1) and 10 municipal ordinances specifically allow such crossings provided that the pedestrians yield to vehicles.

A.2.7 Red Signals

The Uniform Vehicle Code [Section 11-202(c), (3)], laws in 29 States (See Table A-1), and ordinances in 25 municipalities prohibit pedestrians from crossing against a red signal, but 18 State laws (See Table A-1) and six municipal ordinances specifically allow such crossings provided that the pedestrians yield to vehicles.

A.2.8 Pedestrian Control Signals

The Uniform Vehicle Code (Section 11-203), laws in 44 States, as shown in Table A-2, and ordinances in 29 municipalities define the meaning of special pedestrian control signals, such as “walk” and “don’t walk” signals. The only major variation is that 25 of the State laws and 22 of the ordinances still provide for the meaning of a “wait” signal instead of or in addition to a “don’t walk” signal.

A few States and municipalities continue to provide in their laws and ordinances for the use of certain pedestrian control devices which are out of step with prevailing national standards. For example, some Massachusetts residents may understand that a combination red and yellow traffic light display is a pedestrian crossing signal, but it is extremely unlikely that a driver or pedestrian from California who is visiting Massachusetts will understand what such a signal means. Most out-of-State visitors will probably assume that the signal device is broken. Nor will they be likely to understand that a flashing green light is a pedestrian crossing signal in Rhode Island. It is certainly unlikely that visitors would be aware that as pedestrians in Toledo, they may enter and cross the roadway on a yellow signal, but may not cross on a yellow signal following a green.

Two States⁸ and three municipalities have laws and ordinances describing the meaning of a simultaneous display of red and yellow traffic signal lights. In one of the two States,⁹ drivers may not enter the intersection on such a signal; the intersection is reserved for the exclusive use of pedestrians. In the other State and in one municipality, pedestrians facing such a signal may proceed to cross the roadway in the direction of the signal only, but the law states nothing about a driver’s conduct when facing such a signal. In one municipality, pedestrians are not allowed to enter the roadway on a combination red and yellow signal unless a “walk” signal allows them to do so. In another municipality, pedestrians may cross on such a signal if they can do so safely and without interfering with vehicular traffic.

A.3 Pedestrians Crossing the Roadway

Legally, the pedestrian has the right-of-way when crossing the roadway; however, when faced with a steady stream of traffic, it is usually impossible for him to even attempt to exercise this right.

⁸Maine and Massachusetts.

⁹Maine.

SECTION II

Table A-2

Pedestrian Control Signals/Pedestrian Crossing Roadway

STATES	Define pedestrian signals in conformity with UVC	Drivers must yield to pedestrian in crosswalks at unsignalized intersections	Driver proceeding on circular green must yield to pedestrian in crosswalk	Driver proceeding on green arrow must yield to pedestrian in crosswalk
Alabama	X ^a	X	X	X
Alaska	X	X	X	X
Arizona	X	X	X	X
Arkansas	X ^a	X	X	X
California	X ^a	X	X	X
Colorado	X	X	X	X
Connecticut	X	X	X	X
Delaware	X ^a	X	X	X
Florida	X	X	X	X
Georgia	X	X	X	X
Hawaii	X	X	X	X
Idaho	X ^a	X	X	X
Illinois	X	X	X	X
Indiana	X ^a	X	X	X
Iowa	X	X	X	X
Kansas	X ^a	X	X	X
Kentucky	X	X	X	X
Louisiana	X ^a	X	X	X
Maine	X	X	X	X
Maryland	X ^a	X	X	X
Massachusetts	X	X	X	X
Michigan	X ^a	X	X	X
Minnesota	X	X	X	X
Mississippi	X	X	X	X
Missouri	X	X	X	X
Montana	X ^a	X	X	X
Nebraska	X	X	X	X
Nevada	X ^a	X	X	X
New Hampshire	X	X	X	X
New Jersey	X	X	X	X
New Mexico	X	X	X	X
New York	X	X	X	X
North Carolina	X	X	X	X
North Dakota	X ^a	X	X	X
Ohio	X ^a	X	X	X
Oklahoma	X ^a	X	X	X
Oregon	X ^a	X	X	X
Pennsylvania	X	X	X	X
Rhode Island	X ^a	X	X	X
South Carolina	X ^a	X	X	X
South Dakota	X	X	X	X
Tennessee	X ^a	X	X	X
Texas	X ^a	X	X	X
Utah	X ^a	X	X	X
Vermont	X	X	X	X
Virginia	X	X	X	X
Washington	X	X	X	X
West Virginia	X ^a	X	X	X
Wisconsin	X ^a	X	X	X
Wyoming	X ^a	X	X	X

^aAlso define "wait" signals

A.3.1 Right-of-Way at Unsignalized Locations

Forty-seven States (See Table A-2), 33 municipalities, and the Uniform Vehicle Code (Section 11-502) require drivers to yield the right-of-way to pedestrians in crosswalks at unsignalized intersections. However, a few of the laws and ordinances differ somewhat in terms of just what kinds of crosswalks are covered by the requirement.

A.3.2 Right-of-Way at Signalized Locations

Forty-three States (See Table A-2), 31 municipalities, and the Uniform Vehicle Code [Section 11-202(a)], require a driver proceeding on a circular green signal to yield to pedestrians lawfully within the intersection or crosswalk. The Code [Section 11-202(a)], 42 States (See Table A-2), and 27 municipalities specifically apply the same rule to a driver proceeding on a green arrow signal.

Section 11-202(c), (2) of the Code allows a vehicle to turn on a red signal where a sign is in place authorizing such a turn. The Code requires such turning drivers to yield the right-of-way to pedestrians lawfully within the crosswalk as follows:

“When a sign is in place permitting a turn, vehicular traffic facing a steady red signal may cautiously enter the intersection to make the turn indicated by such sign after stopping as required by Subsection (c), 1. Such vehicular traffic shall yield the right-of-way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection.”

Since the pedestrian must be lawfully within the crosswalk, there would be no duty to yield to such a pedestrian who has started to cross against a yellow, red, or “don’t walk” signal, unless a “walk” signal had already authorized him to proceed, or unless the law in the jurisdiction allows pedestrians to cross against a red or yellow light. There would, of course, be a duty to avoid colliding with such a pedestrian, regardless of who has the right-of-way.

Some jurisdictions, like the Code [Section 11-202(c), (2)], permit turns against a red signal only when a sign authorizes a turn. Others permit such turns at all intersections unless a sign prohibits such turns. Laws in some jurisdictions do not allow turns against a red signal under any circumstances. Some jurisdictions allow only right turns, while some also allow left turns under certain circumstances.

A.3.3 Right-of-Way at Signed Locations

Drivers facing a yield sign are not required to yield the right-of-way to pedestrians under the Uniform Vehicle Code [Section 11-403(c)]. The Code does not use the yield sign as a means of indicating preferential right-of-way between vehicles and pedestrians. If a driver facing a yield sign is required to stop for safety, he must do so before entering the crosswalk, if there is a crosswalk at the location. Such a driver must yield to a pedestrian crossing in that crosswalk, but this is because Section 11-502 of the Code requires it; the presence of a yield sign does not affect pedestrians.

Under provisions of the 1956 edition of the Code [Section 11-705(e)], however, drivers were required to yield to pedestrians at a yield sign, and colliding with a pedestrian after passing such a sign without stopping was deemed to be prima facie evidence of a violation. These provisions were deleted from the Code in 1962.

As shown in Table A-3, 18 States and seven municipalities require drivers at yield signs to yield to pedestrians. Three municipalities require drivers at stop signs to yield to pedestrians.

A.3.4 Pedestrians In Crosswalks

The Uniform Vehicle Code [Section 11-502(d); 1968], the laws of 44 States (See Table A-3) and the ordinances of 31 municipalities prohibit overtaking and passing a vehicle that is stopped at a crosswalk to allow a pedestrian to cross.

Section 1-111 of the Uniform Vehicle Code defines the term “crosswalk” as follows:

“(a) That part of the 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;

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

As is apparent from the definition, there are two types of crosswalks: unmarked, and marked. Unmarked crosswalks can exist only at intersections, and only when there is a sidewalk on each side of the roadway. Unmarked crosswalks are not a part of the “intersection,” as that term is defined by Section 1-126 of the Code, but are generally adjacent to the intersection.

The laws of 46 States (See Table A-3) and the ordinances of 35 municipalities recognize the concept of an unmarked crosswalk at an intersection.

A.4 Pedestrians Outside Crosswalks

The Uniform Vehicle Code [Section 11-503(a)], the laws of 47 States, as shown in Table A-4, and the ordinances of 30 municipalities require pedestrians crossing outside crosswalks to yield to vehicles. Where a pedestrian bridge or tunnel has been provided, a pedestrian crossing on the roadway must yield to vehicles under the Code [Section 11-503(a)], the laws of 40 States (See Table A-4), and the ordinances of 19 municipalities.

Pedestrians are forbidden to cross between adjacent intersections at which traffic control signals are in operation under the Code [Section 11-503(c)], 40 State laws (See Table A-4), and 25 municipal ordinances. The Code [Section 15-102(a), (18)] and 23 States (See Table A-4) authorize local authorities to prohibit pedestrians from crossing outside a crosswalk in a business district, or on designated highways. Twenty municipalities have similar ordinances. In two States,¹⁰ laws specifically prohibit such pedestrian crossings.

A.5 Miscellaneous Crossing Rules

The Uniform Vehicle Code [Section 11-502(b); Supp. I, 1972], 37 State laws (See Table A-4), and 20 municipal ordinances make it illegal for a pedestrian to suddenly walk or run into the path of a vehicle that is too close to yield.

¹⁰Alaska and New Jersey.

SECTION II

Table A-3

Pedestrian Right of Way at Signed Locations

STATES	Drivers at yield signs must yield to pedestrians	Illegal to pass vehicle yielding to pedestrians at crosswalk	Describe unmarked crosswalks in conformity with UVC
Alabama		X	X
Alaska		X	X
Arizona		X	X
Arkansas	X	X	X
California	X	X	X
Colorado		X	X
Connecticut			X
Delaware	X	X	
Florida	X	X	X
Georgia		X	X
Hawaii		X	X
Idaho	X	X	X
Illinois		X	X
Indiana	X	X	X
Iowa	X		X
Kansas		X	X
Kentucky	X	X	
Louisiana	X	X	X
Maine		X	X
Maryland		X	X
Massachusetts		X	X
Michigan			X
Minnesota	X	X	X
Mississippi		X	X
Missouri			
Montana		X	X
Nebraska		X	X
Nevada		X	X
New Hampshire		X	X
New Jersey		X	X
New Mexico		X	X
New York	X	X	X
North Carolina		X	
North Dakota	X	X	X
Ohio	X	X	X
Oklahoma	X	X	X
Oregon		X	X
Pennsylvania			X
Rhode Island		X	X
South Carolina		X	
South Dakota	X		X
Tennessee		X	X
Texas		X	X
Utah	X	X	X
Vermont		X	X
Virginia		X	X
Washington		X	X
West Virginia		X	X
Wisconsin		X	X
Wyoming	X	X	X

SECTION II

Table A-4

Pedestrians Outside Crosswalks/Miscellaneous Crossing Rules

STATES	Require pedestrians outside crosswalks to yield to vehicles	If pedestrian bridge or tunnel exists, pedestrian must yield to vehicle on road	Pedestrians may not cross between adjacent intersections when signals are inoperative	Prohibit crossing in business district except in crosswalk	Forbid suddenly leaving safe place	Pedestrians must keep to right in crosswalks	Pedestrians must cross at right angle
Alabama	X	X	X	X	X	X	
Alaska	X		X		X		X
Arizona	X	X	X	X	X	X	
Arkansas	X	X	X			X	
California	X	X	X			X	
Colorado	X	X	X		X	X	X
Connecticut							
Delaware	X	X	X	X	X	X	X
Florida	X	X	X	X	X	X	X
Georgia	X	X	X	X	X	X	
Hawaii	X	X	X	X	X	X	X
Idaho	X	X	X	X	X	X	
Illinois	X	X		X		X	
Indiana	X	X	X	X	X	X	
Iowa	X	X		X		X	
Kansas	X	X	X	X	X	X	X
Kentucky	X	X	X			X	
Louisiana	X		X	X	X	X	
Maine	X	X	X		X		X
Maryland	X	X	X	X	X	X	X
Massachusetts	X		X		X	X	
Michigan							
Minnesota	X	X	X		X	X	
Mississippi	X	X	X			X	
Missouri							
Montana	X	X	X	X	X	X	
Nebraska	X	X	X	X	X	X	X
Nevada	X	X	X		X	X	X
New Hampshire	X	X	X	X	X	X	X
New Jersey	X	X			X	X	
New Mexico	X	X	X	X	X	X	
New York	X	X			X	X	X
North Carolina	X	X	X				
North Dakota	X	X	X	X	X	X	
Ohio	X	X	X			X	
Oklahoma	X	X	X	X	X	X	
Oregon	X	X			X	X	
Pennsylvania	X						
Rhode Island	X	X	X	X	X	X	
South Carolina	X	X	X	X	X	X	
South Dakota	X		X	X			
Tennessee	X	X	X	X	X	X	
Texas	X	X	X	X	X	X	X
Utah	X	X	X	X	X	X	X
Vermont	X	X	X		X	X	X
Virginia	X		X				X
Washington	X	X	X		X		X
West Virginia	X	X	X	X	X	X	
Wisconsin	X			X	X		
Wyoming	X	X	X		X	X	

The Uniform Vehicle Code (Section 11-505), 38 States (See Table A-4), and 24 municipalities require pedestrians to keep to the right in crosswalks whenever practicable.

The Code [Section 11-503(d)], 17 State laws (See Table A-4), and 10 municipal ordinances generally require pedestrians to cross intersections at a right angle unless authorized by traffic control devices to cross diagonally. Likewise, the Model Traffic Ordinance [Section 11-1; 1968], two States¹¹ and 27 municipalities generally require right angle crossings at nonintersection locations.

A.6 Review of Pedestrian Crossing Laws

Most States and municipalities have laws or ordinances requiring drivers to yield to pedestrians within a crosswalk where traffic control signals are not in operation. That the pedestrian has the right-of-way under such circumstances is a long standing and generally well known principle. Unless there is some additional aid, such as a traffic light or a policeman, however, this right-of-way situation may be difficult to assert.

Common experience tells us, for example, that except in jurisdictions where extensive enforcement activity has created a unique attitude about this right-of-way conflict (California is reputed to be one such jurisdiction), drivers of vehicles generally do not yield unless the pedestrian forces the issue by stepping into the paths of the vehicles. Few pedestrians are so audacious as to demand their right-of-way in this manner. Pedestrians generally wait on the curb, yielding to the vehicles until there is a sufficient gap in traffic to allow a safe crossing. Pedestrians usually cross at crosswalks in the same manner in which they cross at other locations—cautiously and with respect for the injury-causing potential of motor vehicles. It is questionable that giving pedestrians this legal protection, which in no way shields them from injury or death if a driver, for whatever reason, fails to yield, really serves the best interests of pedestrian safety. The problem arises when there are not sufficient gaps in traffic at reasonable intervals to permit safe and convenient crossings. When faced with such difficult crossings, in frustration and against their better judgment, some pedestrians do attempt to demand the right-of-way. Frequently, they are injured or killed in the attempt.

Only a few States have no laws requiring drivers to yield to pedestrians in crosswalks where signals are not controlling traffic. Pedestrians may not be any more or less safe where they do have the right-of-way in crosswalks. Although the conduct of pedestrians and drivers is frequently dependent upon the concept of “crosswalk,” it is not always easy to determine exactly where an unmarked crosswalk is located.

A.7 Drivers' Duties Toward Pedestrians

Section 11-502 (Supp. I, 1972) of the Code requires drivers to exercise due care to avoid a collision with a pedestrian as follows:

Notwithstanding other provisions of this chapter or the provisions of any local ordinance, every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian and shall give warning by sounding the horn when necessary and shall exercise proper precaution upon observing any child or any obviously confused, incapacitated or intoxicated person.

¹¹New Jersey and Virginia.

Prior to 1971, this provision applied only on the roadway. As amended, it applies anywhere on the highway. Also prior to amendment in 1971, the Section did not contain the reference to intoxicated persons, and read as follows:

Notwithstanding other provisions of this chapter, every driver of a vehicle shall exercise due caution to avoid colliding with any pedestrian upon any roadway and shall give warning by sounding the horn when necessary and shall exercise proper precaution upon observing any child or any obviously confused or incapacitated person upon a roadway.

Most of the comparable laws and ordinances, like this earlier Code edition, apply only on the roadway and do not specifically refer to intoxicated persons.

Drivers do not avoid hitting pedestrians simply because the law makes it a misdemeanor to do so. The main impact of the Code section is probably not in giving pedestrians better protection from drivers of vehicles, but in improving their chances for recovery in a civil action following an accident. As shown in Table A-5, 40 States and 29 municipalities have similar provisions. All of the State laws and municipal ordinances apply only on the roadway, and none of them includes the specific reference to intoxicated pedestrians. Four of the laws (See Table A-5) contain additional provisions, primarily with regard to encountering blind persons. Twenty-two of the laws (See Table A-5) differ somewhat by omitting the word "obviously" in reference to "confused or incapacitated person."

The Code (Section 11-801) requires drivers to drive at a reasonable and prudent speed at all times, and in particular to drive at a safe and appropriate speed when special hazards exist with respect to pedestrians. Thirty States (See Table A-5) and 22 municipalities have similar provisions.

The Code (Section 11-508), the laws of 40 States (See Table A-5) and the ordinances of 23 municipalities prohibit driving through a safety zone. Forty-three States (See Table A-5) and 39 municipalities have definitions of "safety zone," which are similar to the definition in the Code. The Model Traffic Ordinance authorizes the traffic engineer to designate safety zones, and 26 municipalities have similar ordinances.

A.7.1 Pedestrians on the Sidewalk

The Uniform Vehicle Code (Section 11-509; Supp. I, 1972) provides that drivers must yield to pedestrians on the sidewalk, for example, when entering a driveway. Only two States¹² and one municipality have similar provisions. Nine States (See Table A-5) and six municipalities require a driver who is entering or emerging from an alley, driveway, or building to yield to pedestrians on a sidewalk. Twenty-one States (See Table A-5) and 21 municipalities require such yielding only when emerging from (but not when entering) an alley, driveway, or building within a business or residential district, but not elsewhere.

The Code (Section 11-705; 1968) requires a driver emerging from an alley, building, private road, or driveway within a business or residential district to stop before driving onto the sidewalk. Twenty-nine States (See Table A-5) have similar laws; another 14 States (See Table A-5) have similar laws that apply everywhere, rather than just in business and

¹²California and Wisconsin.

SECTION II

Table A-5

Drivers' Duties Toward Pedestrians

STATES	Drivers must avoid hitting pedestrians	Require safe and appropriate speed	Prohibit driving through safety zone	Definition of "safety zone" similar to code	Driver must yield to pedestrian when entering or leaving alley, driveway, or building	Driver must yield only when emerging from alley or driveway in business residential district	Driver must stop before driving on sidewalk	Prohibit driving on driveway
Alabama	X ^b		X	X			X ^c	
Alaska	X ^a	X	X	X			X ^c	
Arizona	X ^b	X	X	X			X ^c	
Arkansas	X ^b	X	X	X			X ^c	
California	X		X	X				X
Colorado	X	X	X	X		X	X ^c	
Connecticut		X	X	X		X	X ^c	X
Delaware	X ^a	X	X	X			X	
Florida	X	X	X	X		X	X ^c	X
Georgia	X ^{ab}	X		X			X ^c	
Hawaii	X	X	X	X	X		X ^c	X
Idaho	X ^b	X	X	X		X	X ^c	
Illinois	X	X	X	X	X		X ^c	X
Indiana	X ^b	X	X	X			X ^c	
Iowa	X ^b		X	X			X	
Kansas	X	X	X	X			X ^c	
Kentucky	X ^b							
Louisiana	X ^b		X	X	X		X	
Maine						X		
Maryland	X	X	X	X	X		X	X
Massachusetts	X	X					X	X
Michigan			X	X			X	
Minnesota	X ^b	X	X	X			X ^c	
Mississippi	X ^b		X	X			X ^c	
Missouri								
Montana	X ^b	X		X		X	X ^c	
Nebraska	X	X	X	X	X		X	X
Nevada		X	X	X				X
New Hampshire	X	X				X	X ^c	
New Jersey		X	X	X	X		X	X
New Mexico	X ^b		X	X		X	X ^c	
New York	X	X	X	X	X		X	
North Carolina	X ^b	X	X	X				
North Dakota	X ^b		X	X		X	X ^c	
Ohio	X		X	X			X	
Oklahoma	X ^b		X	X		X	X ^c	X
Oregon	X		X	X			X	
Pennsylvania			X	X				
Rhode Island	X ^b	X	X	X		X	X ^c	
South Carolina	X ^b	X	X	X		X	X ^c	
South Dakota			X	X			X ^c	X
Tennessee	X ^b		X	X		X	X ^c	
Texas	X	X	X	X	X		X ^c	X
Utah	X ^{ab}	X	X	X		X	X ^c	
Vermont	X		X		X		X	X
Virginia			X	X	X		X	X
Washington	X	X	X		X		X ^c	
West Virginia	X ^b	X			X		X ^c	
Wisconsin		X	X				X	X
Wyoming	X ^b				X		X	

^aContain provisions with regard to encountering blind persons

^bOmit the word "obviously" in reference to "confused or incapacitated person"

^cLimited to business and residential districts

SECTION II

Table A-5 (Cont'd)

Drivers' Duties Toward Pedestrians

STATES	Drivers must always yield to person with white cane or guide dog	Special precautions with blind pedestrians specified	Prohibit stopping standing parking of vehicles on sidewalk	Restrict stopping standing parking on crosswalk	Prohibit obstruction of safety zone adjacent curb	Prohibit obstruction of area near crosswalk at intersection
Alabama		X	X	X	X	X
Alaska			X	X	X	X
Arizona	X		X	X	X	X
Arkansas			X	X	X	X
California	X		X	X	X	X
Colorado		X	X	X	X	X
Connecticut	X					X
Delaware		X ^d	X	X	X	X
Florida		X	X	X	X	X
Georgia		X	X	X	X	
Hawaii		X ^d				
Idaho		X ^d	X	X	X	X
Illinois		X	X	X	X	X
Indiana		X	X	X	X	X
Iowa		X	X	X	X	
Kansas		X	X	X	X	X
Kentucky		X	X			
Louisiana		X	X	X	X	X
Maine		X ^d				
Maryland			X	X	X	X
Massachusetts		X	X	X	X	X
Michigan		X	X	X	X	X
Minnesota			X	X	X	X
Mississippi		X	X	X	X	X
Missouri		X				
Montana		X	X	X	X	X
Nebraska		X	X	X	X	X
Nevada		X	X	X	X	X
New Hampshire		X	X	X	X	X
New Jersey			X	X	X	X
New Mexico		X	X	X	X	X
New York			X	X	X	X
North Carolina						
North Dakota		X	X	X	X	X
Ohio	X		X	X	X	X
Oklahoma		X	X	X	X	X
Oregon		X	X	X	X	X
Pennsylvania			X	X	X	X
Rhode Island		X	X	X	X	X
South Carolina		X	X	X	X	X
South Dakota		X	X	X	X	X
Tennessee		X	X	X	X	X
Texas			X	X	X	X
Utah	X		X	X	X	X
Vermont		X	X	X		X
Virginia						X
Washington		X ^d	X	X	X	X
West Virginia		X ^d	X	X	X	X
Wisconsin		X	X	X	X	X
Wyoming		X ^d	X			

^dDo not specifically require driver to stop if necessary

residential districts. Nine municipalities have similar ordinances that apply only in business and residential districts, while 30 have ordinances that are not as limited.

The Code (Section 11-1103; 1968) prohibits driving on a sidewalk except at a driveway. Sixteen States (See Table A-5) and 42 municipalities have similar provisions.

A.7.2 Bicyclists' Duties to Pedestrians on Sidewalks

Three States¹³ and five municipalities prohibit all bicycle riding on sidewalks. The Model Traffic Ordinance [Section 12-14(a)], 42 municipalities, and two States¹⁴ prohibit bicycle riding in a business district. The Model Traffic Ordinance [Section 12-14(b)] and 12 municipalities prohibit bicycle riding on any sidewalk where signs have been erected to prohibit such riding. The Model Traffic Ordinance [Section 12-14(b)], one State,¹⁵ and nine municipalities prohibit bicycle riding on sidewalks by persons over a specified age, which is usually 15 years old. Another State¹⁶ generally prohibits riding on sidewalks, but authorizes municipalities to allow such riding by children under age 15.

The Model Traffic Ordinance [Section 12-14(c)], three States,¹⁷ and 21 municipalities require bicycles on a sidewalk to yield to pedestrians. The Model Traffic Ordinance [Section 12-14(c)], four States,¹⁸ and 14 municipalities require bicyclists on a sidewalk to give an audible signal before passing a pedestrian.

A.7.3 Blind Pedestrians' Right-of-Way

Like the Code (Section 11-511; Supp. I, 1972), the laws of five States (See Table A-5) require drivers to yield under all circumstances to a pedestrian using a white cane or walking with a guide dog. Two State laws¹⁹ require stopping as well as yielding, and they also require blind pedestrians to yield to an emergency vehicle sounding a siren.

Thirty-five other States (See Table A-5) have laws that do not require drivers to yield but do require them to take special precautions to avoid endangering or injuring a blind pedestrian. Twenty-eight (See Table A-5) of these 35 States specifically require the driver to stop if necessary to avoid endangering or injuring a blind pedestrian.

A.7.4 Highway Workers' Right-of-Way

The Code [Section 11-406(a); Supp. I, 1972] provides that drivers must yield to pedestrians engaged in highway work within a marked construction or maintenance zone. Only three States²⁰ and one municipality have similar provisions.

A.7.5 Stopping, Standing or Parking on Sidewalks, Crosswalks, or Near Safety Zones

The Code (Section 11-1003) provides as follows with respect to stopping, standing, and parking of a vehicle, which would interfere with pedestrian facilities:

¹³Michigan, Vermont, and Virginia.

¹⁴Massachusetts and Minnesota.

¹⁵New Hampshire.

¹⁶Virginia.

¹⁷Massachusetts, Minnesota, and Oregon.

¹⁸Connecticut, Massachusetts, Minnesota, and Oregon.

¹⁹Oregon and Utah.

²⁰Iowa, South Dakota, and Wisconsin.

“Except when necessary to avoid conflict with other traffic, or in compliance with law or the directions of a police officer or official traffic-control device, no person shall:

1. Stop, stand, or park a vehicle:
 - On a sidewalk;
 - On a crosswalk;
 - Between a safety zone and the adjacent curb or within 30 feet of points on the curb immediately opposite the ends of a safety zone, unless a different length is indicated by signs or markings;
 - At any place where official signs prohibit stopping.
2. Stand or park a vehicle, whether occupied or not, except momentarily to pick up or discharge a passenger or passengers:
 - Within 20 feet of a crosswalk at an intersection;
 - At any place where official signs prohibit standing.
3. Park a vehicle, whether occupied or not, except temporarily for the purpose of and while actually engaged in loading or unloading property or passengers:
 - At any place where official signs prohibit parking.”

Forty-four States (See Table A-5) and 37 municipalities prohibit the stopping, standing, or parking of vehicles so as to obstruct pedestrian facilities. Forty States (See Table A-5) and 36 municipalities prohibit such obstruction of a safety zone and the adjacent curb area. Forty-two States (See Table A-5) and 28 municipalities prohibit obstruction of the area near a crosswalk at an intersection.

The Code (Section 11-1112) prohibits drivers from entering a crosswalk unless there is room on the other side to clear it. Two States²¹ and 34 municipalities have similar provisions.

A.7.6 Review of Laws on Drivers' Duties to Pedestrians

One might expect that a pedestrian on a sidewalk, an area which is specifically designated for his use, would have adequate legal protection from the motor vehicles which must cross that sidewalk. The review of State laws reveals that pedestrian right-of-way is not, however, a generally accepted rule. Only two States²² and one municipality broadly give pedestrians the right-of-way on a sidewalk in all circumstances, as does the Uniform Vehicle Code (Section 11-509; Supp. I, 1972). Most of the State laws and municipal ordinances which deal with the subject specify that drivers must yield to pedestrians on a sidewalk only within a business or residential district, and only when the driver is emerging from (not when entering) specified kinds of nonhighway areas, such as driveways, alleys, and buildings. If pedestrians are being struck by motor vehicles on sidewalks, more could certainly be done to afford them the protection of the right-of-way.

Most States and many municipalities have provisions which prohibit driving through a safety zone. One problem is that it is not entirely clear just what a safety zone is or how a driver is to recognize one so that he can avoid driving through it. The definition of “safety zone” in the Code and in the laws and ordinances of most States and municipalities sheds

²¹Florida and Massachusetts.

²²California and Wisconsin.

little light on the question. A safety zone is “within a roadway,” and it is a space “officially set apart for the exclusive use of pedestrians”; this much seems clear. But a safety zone must be an area 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.”

A.8. *Other Pedestrian Duties*

There are some occasions when a pedestrian cannot remain within crosswalks or on sidewalks. In such cases, the pedestrian must obey all applicable laws.

A.8.1 *Walking Along the Highway*

The Uniform Vehicle Code [Section 11-506(a), Supp. I, 1972] prohibits pedestrians from walking in the roadway where a sidewalk has been provided and its use is practicable. As shown in Table A-6, eight States and five municipalities have similar provisions. Another 29 States (See Table A-6) and 20 municipalities prohibit walking on the roadway where a sidewalk is provided without regard to whether use of the sidewalk is practicable.

Where a sidewalk is not provided, the Code (Section 11-506(b)-(c), Supp. I, 1972), three States,²³ and one municipality require a pedestrian to walk only on the shoulder. Where neither a sidewalk nor a shoulder is provided, the Code (Section 11-506(b)-(c), Supp. I, 1972), five States,²⁴ and three municipalities require a pedestrian walking on the roadway to stay near the extreme left-hand edge, although the Code [Section 11-506(b), 1971] and one State²⁵ specify that on a one-way roadway the pedestrian may walk at the extreme edge of either side of the roadway. Laws in 36 States (See Table A-6) and ordinances in 19 municipalities simply require a pedestrian walking along a highway where sidewalks are not provided to walk on the left side of the roadway or its shoulder.

A.8.2 *Soliciting Rides or Business*

Section 11-507(a) of the Uniform Vehicle Code provides as follows with regard to hitchhiking:

No person shall stand in a roadway for the purpose of soliciting a ride.

This section does not prohibit hitchhiking; it merely prohibits standing in the roadway to do it. So long as the pedestrian stands on the shoulder, outside the curb line, or otherwise off the roadway, hitchhiking is not illegal under the Code.

Thirty-nine States (See Table A-6) and 31 municipalities prohibit standing in the roadway to hitchhike. Hitchhiking from the shoulder, behind the curb line, or otherwise off the roadway is not illegal in these jurisdictions. Eight States (See Table A-6) and four municipalities prohibit standing on the highway to hitchhike, thus in effect prohibit hitchhiking altogether.

The Code prohibits standing anywhere on a highway to solicit employment, business, or contributions from any vehicle occupant. Eleven States (See Table A-6) and two

²³Florida, Massachusetts, and Nebraska.

²⁴California, Maryland, New Jersey, North Carolina, and Virginia.

²⁵Nebraska.

SECTION II

Table A-6

Other Pedestrian Duties and Laws

STATES	Must walk on sidewalk, if provided and practicable	Must always walk on sidewalk	If no sidewalk, must walk on left shoulder	Prohibit hitchhiking on roadway	Prohibit hitchhiking on highway	Prohibit standing on highway to solicit or contributions	Pedestrian may solicit from curb shoulder, off roadway	Prohibit standing on or near highway to solicit watching/guarding vehicle	Authorize exclusion of pedestrians from controlled-access facilities	Directly exclude pedestrians from controlled-access facilities	Prohibit pedestrian "under influence" from highway except on sidewalk
Alabama		X	X	X							
Alaska		X	X	X							X
Arizona		X	X	X			X				
Arkansas				X							
California				X							
Colorado			X	X							X
Connecticut			X	X							
Delaware		X	X	X			X	X	X		X
Florida	X			X			X	X		X	
Georgia		X	X	X							
Hawaii		X	X	X	X	X	X	X	X		
Idaho		X	X	X			X	X	X		
Illinois		X	X	X		X	X	X	X		X
Indiana		X	X	X							
Iowa			X	X							
Kansas		X	X	X			X	X	X		
Kentucky			X	X							
Louisiana		X	X	X			X			X	
Maine	X		X		X	X					
Maryland		X					X	X	X		
Massachusetts	X			X			X				
Michigan		X	X								
Minnesota	X		X	X							
Mississippi				X							
Missouri											
Montana		X	X	X			X	X	X		X
Nebraska	X			X			X	X	X	X	
Nevada		X	X		X	X					X
New Hampshire		X	X	X			X	X	X		
New Jersey		X			X		X				
New Mexico		X	X	X			X	X	X		
New York	X		X	X		X		X		X	
North Carolina			X	X							
North Dakota		X	X		X	X		X	X		
Ohio	X			X						X	
Oklahoma		X	X	X	X		X				
Oregon			X	X							
Pennsylvania				X		X		X	X		
Rhode Island		X	X	X				X	X		
South Carolina		X	X	X							
South Dakota			X							X	
Tennessee		X	X	X			X	X	X		
Texas		X	X	X			X	X	X		
Utah		X	X	X			X	X	X		
Vermont		X	X		X	X		X	X		
Virginia	X			X							
Washington		X	X		X		X	X	X		
West Virginia		X	X	X							
Wisconsin			X	X						X	
Wyoming		X	X			X		X	X		

municipalities have similar provisions. Another 18 States (See Table A-6) and 11 municipalities have comparable provisions which prohibit standing on the roadway to solicit, but do not prohibit such soliciting from the shoulder or other nonroadway areas.

The Code [Section 11-507(c)], 18 States (See Table A-6), and 10 municipalities prohibit standing on or in proximity to a highway to solicit the watching or guarding of a vehicle.

A.8.3 Pedestrians on Controlled Access Highways, Bridges, and Railroad Tracks

The Uniform Vehicle Code (Section 11-313), 35 States (See Table A-6), and two municipalities authorize the exclusion of pedestrians from controlled access facilities. Six States (See Table A-6) and 10 municipalities have provisions which directly exclude pedestrians from such facilities.

The Code [Section 11-513(a); Supp. I, 1972] prohibits pedestrians from remaining on a bridge after a bridge operation signal indication has been given. Two States²⁶ and seven municipalities have similar provisions.

The Code [Section 11-513(a); Supp. I, 1972] prohibits pedestrians from passing around crossing gates at a bridge or railroad crossing while the gates are closed or are being opened or closed. One State²⁷ and 12 municipalities have similar provisions.

A.8.4 Miscellaneous Pedestrian Rules

The Code [Section 11-510; Supp. I, 1972] requires pedestrians to yield to an authorized emergency vehicle. Four States²⁸ and five municipalities have similar provisions.

The Code [Section 11-512; Supp. I, 1972] prohibits pedestrians who are under the influence of alcohol from being on a highway except on a sidewalk. Six States (See Table A-6) have similar laws.

A number of States and municipalities prohibit pedestrians from standing in the roadway to solicit business from the occupants of vehicles. No laws or ordinances have been located, however, which would prohibit vehicle occupants from parking on the roadway to solicit business from pedestrians.

Relatively few States and municipalities have laws or ordinances prohibiting a pedestrian from being on the roadway while under the influence of alcohol or drugs. Until recent efforts were made to repeal the drunk-in-public laws, perhaps laws to protect drunk pedestrians were not necessary. It is important, however, that society have some way to protect the drunk pedestrian from endangering himself and others and to prevent his interference with the traffic flow.

As shown in Table A-7, the traffic laws of 11 States and the ordinances of 15 municipalities contain provisions relating to school crossing guards or school traffic patrols. Four States²⁹ and 18 municipalities have provisions restricting parking near schools.

²⁶ Florida and Massachusetts.

²⁷ Florida.

²⁸ California, Florida, Maryland, and Nebraska.

²⁹ Nevada, New Jersey, New York, and Wisconsin.

SECTION II

Table A-7

Miscellaneous Pedestrian Laws

MISCELLANEOUS PEDESTRIAN LAWS	Provisions relating to school crossing guards or safety patrols	Special speed limits near schools
Alabama		X
Alaska		X
Arizona	X	X
Arkansas		
California	X	X
Colorado	X	
Connecticut		
Delaware		X
Florida		X
Georgia		
Hawaii		
Idaho		
Illinois		X
Indiana		
Iowa		X
Kansas		
Kentucky		X
Louisiana		
Maine		X
Maryland		
Massachusetts	X	X
Michigan		
Minnesota		
Mississippi		X
Missouri		
Montana		
Nebraska		
Nevada		
New Hampshire		X
New Jersey	X	X
New Mexico		
New York	X	X
North Carolina		X
North Dakota		X
Ohio		X
Oklahoma		X
Oregon	X	X
Pennsylvania		X
Rhode Island		X
South Carolina		
South Dakota		X
Tennessee		X
Texas		
Utah	X	X
Vermont		
Virginia	X	
Washington	X	X
West Virginia		X
Wisconsin	X	X
Wyoming		X

Twenty-nine States (See Table A-7) and 20 municipalities impose special speed limits for streets adjacent to schools.

One State³⁰ has a law that requires pedestrians walking on a roadway or shoulder at night outside a city or town to carry a light.

One State³¹ prohibits reckless pedestrians. A reckless pedestrian is defined as anyone who uses any street or highway negligently or fails to obey the signal of any traffic officer, pedestrian control sign, signal, marking, or device, or who recklessly disregards his own safety or the safety of any person by the manner of his use of any street or highway.

Other ordinances protect pedestrians from mud or water splashed by a motor vehicle, misuse of a pedestrian push-button signal, and opening a vehicle door unless and until it can be opened without endangering pedestrians on a sidewalk.

B. REVIEW AND EVALUATION OF ENFORCEMENT POLICIES, PROCEDURES, METHODS, PRACTICES AND CAPABILITIES FOR ENFORCING PEDESTRIAN RULES

B.1 Enforcement of Pedestrian Laws

Enforcement of pedestrian laws is regarded as a low priority. Total police effort in the area of pedestrian safety has been estimated at only 1 to 2 percent, with the primary emphasis in highway traffic management being motor vehicle collision prevention.

Nationally, there is a lack of formal written directives indicating police policies and procedures concerning enforcement of pedestrian laws. However, a few departments have established safety programs, most of which are directed toward school age children.

B.2 Pedestrian Enforcement Practices

Seldom is there enough recognition of the problem to assign a single officer, let alone a team, on a full-time basis to handle pedestrian problem areas. Responsibility for safety programs usually is assigned to personnel whose attention is shared with other duties. What concern there has been for pedestrian safety has usually centered on children. This is particularly enigmatic when, in urban areas, pedestrian fatalities characteristically amount to 40 or 50 percent of the total traffic fatality picture.

Citations involving pedestrians are extremely rare, and few records are kept of the number and type of warnings given by police. Citations are usually issued for hitchhiking, crossing a street against a red signal, and jaywalking; however, in many jurisdictions these acts are not considered violations. Although many pedestrians disobey traffic laws, they are usually prosecuted only when involved in accidents with motorists.

Because the priority of pedestrian law enforcement under city, county, and State police departments is low, little has been done to establish an adequate base from which to evaluate the impact of safety programs or enforcement activities, much less to identify the

³⁰Delaware.

³¹Connecticut.

problem. Because there is uncertainty as to the parameters that significantly affect traffic and pedestrian flow, critical factors may often be left unrecorded while data are collected on less important indicators; for example, departments seldom have information on pedestrian traffic volume and congestion, yet they maintain files on the daily enforcement index. In those jurisdictions where data on pedestrian accidents are recorded, there are a number of problems which render the information relatively useless as far as an assessment of the total pedestrian problem is concerned:

1. There is no uniformity in the way operational data and performance data are recorded.
2. Frequently, pedestrian and bicyclist accidents are condensed into one category, which makes independent analyses of either one impossible.
3. In other cases, in accidents where motorists are involved, detailed information on the pedestrians is not recorded independently or is not recorded at all.
4. Most pedestrian accidents go unreported unless a motorist is involved.

C. RELATIONSHIP BETWEEN ALCOHOL AND PEDESTRIAN SAFETY

C.1 Estimating the Role of Alcohol in Fatal Pedestrian Accidents

There are at least twice as many sober adult as drunk adult pedestrian fatalities. The proportion of fatalities that may involve alcohol in some causal fashion is estimated at approximately 20 percent.

Data included in this section are to be regarded cautiously because of various basic problems. Nevertheless, they provide information not only on the dynamics of the alcohol-involved pedestrian crashes but also on the alcohol-related nonfatal pedestrian accident. Recent research, which examined over 2,000 pedestrian accidents in 13 U.S. cities, indicated the following facts.

1. Drinking adult pedestrians appear overrepresented in the dart-and-dash accident types. (These are accidents in which the pedestrian suddenly leaves the curb or other place of safety and quickly moves into the path of a car.)
2. A larger proportion of pedestrian behavioral errors was found in crashes in which alcohol usage was suspected than were driver errors (11 percent to 7 percent). This suggests that the pedestrian system is, in fact, experiencing a greater number of failures when under the influence of alcohol.
3. The alcohol problem seems to be more acute among adult male pedestrians than among adult females (12 percent to 3 percent).
4. Ethnic minorities are overrepresented among alcohol-involved pedestrian accident victims.
5. Apparently, drinking by a pedestrian victim tends to be associated with an increase in injury severity.

6. The pedestrian-alcohol problem parallels the driver-alcohol problem in terms of time of day and day of week. Alcohol-related pedestrian accidents occur more frequently at night and on weekends.

These findings extend many of the alcohol and driving research discoveries to the pedestrian situation. All data, regardless of the small representation under study, point to the need for epidemiological studies focused upon both fatal and nonfatal pedestrian accidents. Such research could provide results which would not only add to the existing knowledge of circumstantial evidence regarding the problem, but also allow a more quantitative assessment of the extent and nature of the problem and generate guidelines for formulating effective countermeasures.

C.2 Nature and Extent of Existing Data on Alcohol and Pedestrian Safety

There are three types of information currently available concerning the pedestrian-alcohol problem: (1) information derived from post-mortem Blood Alcohol Concentration (BAC) measurements on fatally injured pedestrians; (2) information obtained through controlled study; and (3) findings based upon qualitative assessments of the presence of alcohol in crash victims. Although there is a dearth of substantive research on this problem, the information currently available and the similarity of the pedestrian-alcohol situation to the more extensively researched area of drinking-driving permit an estimate of what is unknown and how this needed knowledge can be acquired.

C.2.1 Fatality Data

Most of the information on the incidence of alcohol in pedestrian accidents is data from coroners and medical examiners on tested pedestrian fatalities. In various recent studies of those tested, the percentage of victims in fatal pedestrian accidents who exhibited a positive BAC (that is, those who had been drinking) ranges from 30 percent to about 74 percent—a discrepancy which indicates the uncertainty involved in available quantitative information. These data on fatally injured pedestrians provide an incomplete picture of the nature and extent of the problem. First, they provide no information about the extent of alcohol involvement in nonfatal pedestrian injuries. Second, they do not address the question of whether or not alcohol is a causal factor. Third, the apparent role of alcohol is inflated because studies of fatalities which have reported a percentage of blood alcohol content include cases for which post-mortem BAC measurements are not made. These cases consist of victims who are under 14 years of age or individuals who survive the accident by more than a specified period of time—generally 6, 12, or 24 hours. Since studies have shown that these individuals are less likely to have been drinking, their exclusion tends to inflate the apparent level of alcohol involvement among pedestrian fatalities. However, estimates can be made from the available information: it appears that approximately 36 percent of fatally injured adult pedestrians had BAC's of .10 or more. Approximately 70 percent of these (or 25 percent of all pedestrian fatalities) contributed to the accident. This finding implies a relationship between alcohol and pedestrian-vehicle accidents. A true causal relationship between alcohol and pedestrian accidents can be inferred, however, only through a comparison of alcohol involvement among pedestrian fatalities with alcohol involvement among pedestrians who are not involved in accidents and are using the streets at identical times and places where accidents have occurred.

C.2.2 *Child Pedestrians*

There are about 10,700 pedestrian fatalities per year, and approximately 2,800 are children under the age of 15. It is estimated that some 2,100 of the child pedestrian deaths are the result of an error on the part of the child, and the remaining 700 children die because of driver negligence. On the basis of research conducted in several large urban areas, it can be said that most child deaths occur in the daytime when there are few drunken drivers on the road. Most of these deaths occur while children are on their way to and from school. It is assumed, however, that as many as 10 percent of the cases of nonresponsible child pedestrian deaths involve drunken drivers.

C.2.3 *Adult Pedestrians*

A population of 7,900 adult pedestrians who lost their lives in pedestrian accidents was analyzed. When broken down according to pedestrian responsibility and driver involvement, the following results were obtained:

- Approximately 7,900 adult pedestrians died, of whom about 2,850, or 36 percent, had BAC's of .10 or more.
- Of the 2,850 adult pedestrians who had BAC's of .10 or more, an estimated 70 percent were responsible for their own deaths, which constitutes 25 percent of all pedestrians 16 or older.

It must be emphasized that these figures are extremely uncertain estimates based on somewhat fragmented research. The strongest statement that can be made on the basis of current knowledge is that the proportion of adult pedestrian fatalities that causally involves alcohol use by the pedestrian may be on the order of 20 to 30 percent. This says nothing, however, about the mechanisms of these crashes and therefore provides no insight for countermeasure development.

C.3 *Ratio of Pedestrian Deaths to Pedestrian Injuries*

One way to determine whether pedestrian collisions are more severe in one area than in another would be to determine the ratio of fatal pedestrian crashes to nonfatal crashes. For example, a higher proportion of fatalities among all pedestrian collisions in one area than in another could mean that the collisions are more severe or that emergency care is poorer—or both. On the other hand, a discrepancy in the ratio of deaths to injuries could simply indicate a difference in definition and/or reporting.

An important factor in counting pedestrian injuries is the definition of "injury." According to the National Safety Council definition, pedestrians, to be "officially" injured, should suffer injury of sufficient severity to restrict activity for at least 1 day beyond the accident. Many injuries which require hospital attention but do not restrict activity are not included. This may account for some of the discrepancies in the ratio of pedestrian injuries to pedestrian deaths found among various reports. In National Safety Council *Accident Facts* there is a great discrepancy between the ratio of fatal to nonfatal injuries (1/11) and fatal to nonfatal collisions (1/37). While some difference could be expected, this finding is quite surprising. The only inference that can be made is that different criteria for measurement have been employed.

A 1972 report from California shows 15.7 injuries for each pedestrian death; Michigan *Accident Facts* shows 353 pedestrians killed and 5,970 injured, a ratio of 1/16.9; Wisconsin *Accident Facts* shows the number of killed and the number of injured and then breaks them down further into major and minor injuries. There were 140 pedestrians killed and 2,437 injured, of which 696 were major injuries and 1,741 were minor. Overall, the ratio of pedestrian deaths to serious injuries is 1/5.0, and the ratio of pedestrian deaths to minor pedestrian injuries is 1/12.4 in Wisconsin.

On the basis of this scant information, it appears that definitions and criteria for reporting pedestrian collisions vary considerably from State to State.

C.4 Crash Dynamics

Four variables are of specific interest in studying the dynamics of pedestrian-alcohol accidents: "Indication of Pedestrian Alcohol," "Pedestrian Human Factor Alcohol," BAC of the pedestrian, and the test used to determine the BAC. Data based on the latter two variables are extremely scant. The first two variables track very closely in the data base. Thus, data presented here were based primarily on the "Indication of Pedestrian Alcohol," which represents the onsite investigators' best estimates of whether the pedestrians had been drinking on the basis of indications other than BAC measurements. Data have been analyzed by accident type, primary precipitating factors, pedestrian age, sex, race, injury severity, and the time of day and day of week.

C.4.1 Accident Type

The results of an analysis of accident by type are summarized in Table C-1. The number of pedestrians under "yes" for the dart-and-dash accident types (dartouts, pedestrian strikes vehicle, and intersection dash) is of particular interest. Further, in a sample of 813 accidents, 165 (20 percent) are of the dart-and-dash type; in 27 (3 percent) of these the pedestrians had been drinking. When compared to the drinking pedestrian involvement in all other types of accidents, it was found that the drinking adult pedestrians appear more often in the dart-and-dash accidents. This difference is highly significant statistically.

C.4.2 Primary Precipitating Process

The primary precipitating factors leading to an accident can be thought of as major system failure in the pedestrian-vehicle accident avoidance sequence. The specific failures noted by researchers were grouped into five major areas for both pedestrians and drivers. Up to three major failures could have been cited for each accident. These factor areas and the number drinking in each factor area are shown in Table C-2. It can be seen from this table that when the pedestrian was said to have been drinking, pedestrian factors predominated over driver factors. Fully 11 percent of all pedestrian factors occurred under "pedestrian drinking—yes," while only 7 percent of driver factors occurred under "pedestrian drinking—yes." This suggests that the pedestrian system is, in fact, experiencing a greater number of failures when under the influence of alcohol. None of this, however, is tied to BAC data; hence, an accurate scaling of the extent of system breakdown attributed to alcohol is impossible.

C.4.3 Pedestrian Age

The next area examined in this set of analyses was pedestrian age. Table C-3 presents an indication of pedestrian drinking by pedestrian age. It is clear from this table that alcohol is

SECTION II

Table C-1

Indication of Pedestrian Drinking by Accident Type*

Accident Type	Pedestrian Drinking			Percent Yes
	No	Yes	Unknown/ Possible	
Dartout-first half	40	10	13	16
Dartout-second half	36	5	3	11
Pedestrian strikes vehicle	18	7	4	24
Intersection dash	44	5	11	8
Multiple threat	33	2	5	5
Vehicle turn/merge	110	8	7	6
Vendor	1	—	2	—
Bus stop	30	2	4	6
Nonpedestrian activity in roadway	27	2	3	6
Other	389	44	116	8
TOTAL	728	85	168	

*Excludes data for pedestrians 14 years of age or younger.

SECTION II

Table C-2

Indication of Pedestrian Drinking by Primary Precipitating Factors*

Factor	Pedestrian Drinking			Percent Yes
	No	Yes	Unknown/ Possible	
Pedestrian course	272	43	72	11
Pedestrian search	304	56	68	13
Pedestrian detection	62	3	17	4
Pedestrian evaluation	80	4	12	4
Pedestrian action	13	2	2	12
Driver course	79	9	17	9
Driver search	294	22	49	6
Driver detection	77	9	19	9
Driver evaluation	42	5	6	9
Driver action	42	1	13	2
Other	80	8	25	7
TOTAL	1,345	162	300	

*Excludes pedestrians 14 years of age and younger.

SECTION II

Table C-3

Indication of Pedestrian Drinking by Pedestrian Age

Age	Pedestrian Drinking			
	No	Yes	Unknown/ Possible	Percent Yes
1-4	194	0	5	0
5-9	588	1	9	<1
10-14	209	1	9	<1
15-19	118	2	9	2
20-24	91	10	11	9
25-44	206	34	47	12
45-64	150	28	49	12
65-over	163	11	52	5

a particularly serious problem for pedestrians in the 25 to 44 age range. Drinking appears to be negligible up until age 19, increases rapidly, then tapers off as a major factor during old age.

Another type of study analyzed BAC data for pedestrians who died over a 5-year period, 1968-72. When all pedestrians aged 15 or over are considered, the estimated percentage of alcohol involvement was only 37 percent. However, when only the middle range of 30 to 59 is considered, the estimated alcohol involvement in these cases jumps to 70 percent. These findings clearly indicate that age is a critical variable in the study of alcohol involvement in pedestrian crashes.

C.4.4 Pedestrian Sex

Throughout the literature on highway safety and alcohol involvement, there is a consistent finding that males are more often found to have been drinking than females. A literature search revealed that approximately 12 percent of the male pedestrians involved in accidents had been drinking, while only 3 percent of the female pedestrians had been drinking.

C.4.5 Pedestrian Race

These data were also analyzed with respect to pedestrian race. The results suggest that alcohol involvement is proportionately more of a problem for racial and ethnic minorities than for the "white" population. Overall, 7 percent of the white pedestrians were coded "yes" under indication of pedestrian drinking, and an additional 14 percent were coded under "unknown/possible." For all nonwhites, the respective percentages were 12 percent "yes" and 16 percent "unknown/possible."

C.4.6 Injury Severity

Another variable considered in the current analysis of the research data was injury severity. These data, shown in Table C-4, tend to support the idea that drinking increases injury severity. While this finding has been reported for drivers, it has never been shown for pedestrians.

C.4.7 Time of Day, Day of Week

Earlier research on alcohol indicates that drinking is a particularly serious problem in the late night hours and on weekends. Current research extends these findings to drinking by pedestrians. Data show that 14 percent of pedestrians 15 years or older were scored as "yes" under "indication of pedestrian drinking" for Saturday and Sunday crashes. The remaining days of the week produced only 7 percent who were scored "yes."

In summary, recent research effort provides some useful insights into the pedestrian problem with alcohol. The research extends much of the alcohol and driving research results to the vehicle/pedestrian situation. More importantly, the results provide a starting point for the measurement and classification of pedestrian crash avoidance behavior.

SECTION II

Table C-4

Indication of Pedestrian Drinking by Severity of Pedestrian Injury*

Severity of injury	Pedestrian Drinking			Percent Yes
	No	Yes	Unknown/ Possible	
Fatal	71	17	71	11
Serious	110	15	28	10
Moderate	196	15	24	6
Slight	281	28	31	8
None	32	5	3	12
Unknown	37	5	11	9

*Excludes pedestrians 14 years of age and younger.

D. EVALUATION OF WAYS AND MEANS OF IMPROVING PEDESTRIAN SAFETY PROGRAMS

The incidence of pedestrian-vehicle accidents is alarming and the pedestrian safety situation constitutes a problem that deserves the attention of both elected officials and citizens on a nationwide basis. State legislatures and local governments have the responsibility and obligation to enact laws, regulations, and programs to protect pedestrians. Public support for pedestrian safety programs is of paramount importance in securing voluntary observance and support for such regulations and programs.

Pedestrian safety can be enhanced by implementing certain proven countermeasures. Current measures that reduce accidents involving pedestrians categorically include pedestrian education, engineering, and law enforcement. It is apparent that a comprehensive pedestrian safety program must tie together these components to be of significant consequence. One of the primary problems is the lack of information available to agencies. Such information is necessary for an accurate definition of the problems associated with pedestrian safety. Implementation of adequate data collection procedures is recommended. The creation and maintenance of pedestrian safety programs is practical and justified in light of the number of pedestrian fatalities and casualties.

D.1 *Education for Pedestrian Safety*

The need for a public education program cannot be over-emphasized when planning for pedestrian safety. The education of parents and children, motorists, and pedestrians requires *training in rights and responsibilities*. A nationwide public education program for specific groups is a significant countermeasure for the reduction of pedestrian fatalities and injuries.

Innovative programs have been begun in some communities. Henrico County, Virginia, has a facility located in a shopping center to teach pedestrian safety measures. This program underscores the importance of exposing young children to pedestrian safety education. Such attempts at training children should be reinforced at home and school. While it is unrealistic to expect a young pedestrian to develop adult reactions to traffic danger, education is urged to minimize accidents involving children.

Another approach to educating pedestrians is the concept of safety training areas dispersed throughout the jurisdiction. These safety centers can provide education procedures of varying sophistication and include preschool and school children as well as adults. The education of citizens from preschool to adult groups represents an effort toward a public education campaign.

Pedestrian education should focus on target groups and encompass principles of pedestrian safety and information on patterns of selected pedestrian accidents. Research in the area of pedestrian safety indicates some causes and countermeasures pertinent to pedestrian accidents. Behavioral and descriptive data on causal factors provide the basis for countermeasure identification. Education and engineering are among the most pertinent countermeasures dictated by certain accident types.

Major types of urban accidents occur when pedestrians dart into traffic and dash through intersections. Sometimes, pedestrians are not visible to motorists. Retroreflectorized markings on clothing, for example, could improve pedestrian visibility at night. Human

engineering solutions can be used to resolve erratic, irresponsible pedestrian behavior and limit pedestrian-vehicle conflict.

D.2 Adequacy of Facilities for Pedestrian Safety

This section examines facility-related features as countermeasures to enhance pedestrian safety. Studies and reports on particular pedestrian facilities rarely isolate a single countermeasure as the proposed solution to a problem. Educational measures are substantially enhanced by sound and efficient use of traffic control devices. The lack of adequate walkways in many residential areas is a readily identifiable deficiency, and programs to plan and construct these facilities are needed.

Adequate illumination, safety zones, pedestrian signal indications, crossing signs, and pavement markings are a few of the less expensive improvement countermeasures that work effectively. For more critical crossing problems, overpasses and underpasses may be required.

Research on pedestrian-involved accidents indicates a high percentage of accidents and injuries at urban, high-density crossing sites along with large numbers of midblock accidents. Some experimental countermeasures that are being tried are the use of broad stoplines some distance prior to a crossing location and zebra stripes at the crossing, the application of abrasive material in advance of crossing location to increase stopping capability, and the modification of traffic signal timing to reduce pedestrian waiting time and to provide adequate crossing time. Other countermeasures also being evaluated are midblock crosswalks, median and meter post barriers, far-side bus stops, stopline relocation, and diagonal parking. Visual restrictions contribute to many pedestrian accidents. The removal of visual obstacles to allow better sight distance relationships, could require additional parking restrictions, modifying traffic patterns, and removal of low trees and bushes. Methods of reducing and eliminating daytime visual problems for drivers, such as sun and sky glare, atmosphere boil, mirage and camouflage effects, rain, snow, mist, and fog are being explored.

Increased population and the commensurate growth in the number of vehicles and pedestrian accidents have prompted some city planners to consider traffic facility plans which separate vehicle and pedestrian traffic. Because the above measures vary in effectiveness under different circumstances, each community must evaluate the adequacy and appropriateness of each of these countermeasures for its particular area.

D.3 Enforcement for Pedestrian Safety

Reductions in pedestrian accidents can be achieved through education and engineering; however, many studies also recommend stricter enforcement measures for protection of pedestrians. Adequate regulations to protect pedestrians must be provided by governing bodies. For countermeasures to be effective, there must be enforcement procedures which include public support, apprehension of violators, and sanctions for violation of the law. Enactment of laws and regulations and subsequent law enforcement must be correlated with pedestrian education and engineering control. Pedestrian-vehicle accidents will likely be reduced when legislation legitimizes pragmatic countermeasures.

A campaign must be waged to gain voluntary observance of the laws and public support for enforcement measures. Enforcement is seen as necessary for increased pedestrian safety.

Enforcement measures should encourage the pedestrian to realize danger and assume responsibility for his own safety. It is important that each community relate enforcement measures to pedestrians and situations in their locale.

A summary of countermeasures with potential benefits for pedestrian safety appears in Table D-1. The "Countermeasure," "Utility," and "Expected/Actual Results" are described as they have been identified by researchers.

D.4 Areas for Further Research

Continued research on pedestrian behavior is needed to understand certain types of pedestrian accidents, identify and evaluate countermeasures, and determine factors that precipitate pedestrian accidents. Substantial data have been collected about age, sex, time of day, and street location. Further work is needed to isolate combinations of behavioral errors and situations that lead to particular types of accidents, and to evaluate countermeasures proposed to deal with specific causes.

Future research must also extend into unexplored areas of pedestrian safety. Research concerned with persons should focus on the impact of training and legislation in improving pedestrian safety. Research on vehicles should examine the behavioral responses and interactions between drivers and pedestrians. Studies should be undertaken to explore urban and rural differences, the effectiveness of various measures for the protection of pedestrians, and the cost benefit of implementation countermeasures.

Researchers must devise criteria for undertaking research projects in pedestrian safety, determine the advantages of research conducted on an international level for the purpose of comparative studies, and recommend proven (tested) countermeasures for implementation by States and communities.

E. ANALYSIS OF PRESENT FUNDING ALLOCATION OF PEDESTRIAN SAFETY PROGRAMS AND AN ASSESSMENT OF THE CAPABILITIES OF FEDERAL, STATE, AND LOCAL GOVERNMENTS TO FUND SUCH ACTIVITIES AND PROGRAMS

Current funding levels and potentials for future funding of pedestrian safety programs at Federal, State, and local levels are discussed below. AWP's and CP's for FY 74 were reviewed and analyzed to arrive at indices of pedestrian safety program spending. The AWP indicates planned expenditures for the forthcoming fiscal year, and the CP records the predicted spending over a 4-year period.

E.1 Limitations of Annual Work Programs in Present Analysis

AWP's, as a source for identifying pedestrian safety programs, reveal a lack of comparability from State to State because of individualized definitions and criteria for programs. Data further imposed limitations on the present analysis because bicycle and, to a lesser degree, pedestrian programs are often incorporated within other safety standards, and spending amounts are seldom broken out in detail. This condition makes it difficult to accurately identify and tabulate data specific to pedestrian programs. A combined analysis of pedestrian-bicycle activities had to be undertaken because most States combine these programs. State records do not allow pedestrian-bicycle programs to be separated and

SECTION II

Table D-1

Summary of Countermeasures for Pedestrian Safety

Countermeasure	Utility	Expected/actual results
Segregation of traffic by type; isolation of pedestrian from traffic	Roadway differentiation by type of traffic; separation of pedestrian movement and vehicles; separation of pedestrians by footpaths, underpasses, escalator-type overpasses	Substantial savings in accidents, injuries, property damage and lives; reduction in cost of time loss imposed on vehicular traffic by pedestrians
Provision of reduced speed limits in school areas and adult crossing guards	Installation of warning signs, flashing lights, reduction of speed limit in school area	Increased protection of school-age pedestrians in school zones
Use of reflective and retroreflective materials for greater pedestrian visibility	Brighter reflective characteristic than white material; ease in application to clothing, and removal when not required	Increased visibility of pedestrians after dark, with commensurate reduction of casualties
Public education on pedestrian rights and responsibilities	Develop responsible reactions to traffic danger	Formulation of pedestrian safety programs for children and adults
Identification of drinking pedestrians and the removal of unqualified or medically impaired drivers	Control of accidents involving problem drinkers and removal of certain drivers from the road	Minimize accidents resulting from alcohol and human failure
Creation of safe play areas in high-accident, high-density areas	Provision of adequate, safe play areas away from traffic	Reduction of accidents to children
Crosswalk illumination and use of abrasive at crossing site	Illumination providing no glare in the motorist field of vision and faster stopping capability than smooth surfaces	Reduction in vehicle-pedestrian accident rate
Redesign of streets, creation of pedestrian preserves and paths, prohibition of vehicular traffic from certain streets during specific daylight hours	Accommodates movement of growing populations while prescribing transport and safety features	Improvement in public transport, increased safety for pedestrians
Prohibition of onstreet parking; parking restrictions; barriers; and improvement of traffic signal cycles	Field of view of driver and pedestrian greatly improved; removal of physical obstructions; prevention of pedestrian passage between parked vehicles; and enabling pedestrians to cross intersections with greater safety	Increased safety for pedestrians

weighed comparatively. Hence, figures for each State are combined and represent pedestrian-bicycle programs within each State. The allocation of funds to overlapping subject areas within the AWP further affects the analysis of AWP data, since it restricts the designation of distinct funding categories.

E.1.1 Analysis of Annual Work Programs

A review of these data indicates that the pedestrian-bicycle programs are an integral, if small, part of most State traffic safety programs supported by Section 402 funds. Nine States do not allocate funds for pedestrian-bicycle programs. In the remaining 42 (including the District of Columbia), pedestrian programs exceed bicycle programs 33 to 5 (probably because of the existence of the U.S. Department of Transportation Highway Safety Program Standard for pedestrians and the lack of a bicyclist standard). Twenty-three States, many of which already have a pedestrian program, combine their pedestrian-bicycle programs under one heading.

Over one-half of the States (30) show less than \$100,000 in their FY 74 support for pedestrian-bicycle safety programs. Moreover, States in the far west are spending more than the other regions in both total dollars and average dollars per State. Six States indicate expenditures of more than \$500,000, and four of these are on the west coast.

Table E-1 summarizes pedestrian-bicycle expenditures in seven subject areas: safety programs-education; materials-equipment; capital costs; personnel costs; accident reporting-investigation; and research, development, and evaluation (RD&E). The category "N/A - Other" includes combined categories, nonascertainable information, and other subject areas. Table E-1 also details patterns and funding sources. Data from State AWP's for FY 74 were used to compose this table.

An AWP summary by level of State expenditures by regions is represented in Table E-2.

The total amount reported for FY 74 on pedestrian-bicycle safety programs was \$23.5 million in the seven major program categories. If California (where \$12 million skews the distribution) is omitted from the analysis, these data indicate that most funds were spent in safety programs-education, followed by RD&E, accident reporting-investigation, personnel costs, capital costs, materials-equipment, and N/A - Other.

Although 42 States report expenditure of funds for pedestrian-bicycle programs, most States (33) focus on only one, two, or three program areas. Only one State reports expenditures in all six program areas. Among the more common program areas are: pedestrian safety, pedestrian education, driver education, accident surveillance, and traffic records. Fifty-six percent of the States show more Federal than State and local funds in their pedestrian-bicycle programs. In terms of Federal regions, funding is mixed. Regional means vary from a low of \$3,000 in Region V to a high of \$2.2 million in Region IX.

State AWP levels of expenditures are depicted in Map E-1. Table E-3 reflects AWP pedestrian-bicycle expenditures and funding sources by State.

E.2 Analysis of Funding Data

To derive a more comprehensive profile of bicycle-pedestrian programs, 50 States, the District of Columbia, and one territory were surveyed by questionnaire. In addition, 21 sites

SECTION II

Table E-1

Pedestrian and Bicycle Expenditures* Patterns and Funding Sources, by Region

Regions	Safety Programs	Material/ Equipment	PROGRAMS					FUNDING SOURCE					REGIONAL MEANS
			Capital Costs	Personnel	Accident Reports	R/D/E	N/A Other	Federal	State	Local	N/A Other	TOTAL	
I	130.0	66.6	22.5	316.7	75.0		132.2	310.8		436.2	36.0	783.0	130.5
II	58.1	200.0			829.6			418.1	6.5		663.1	1,087.7	543.9
III	118.8	63.4	138.0	170.1	33.0	77.0	158.5	425.8	251.5	81.5		758.8	126.5
IV	1,344.0	101.5		17.9	2.0	175.0		564.7	162.5	913.2		1,640.4	205.1
V	243.6	118.6	60.0	223.8	11.0	114.5	215.0	296.8	117.3	226.0	346.4	986.5	164.4
VI	15.0							15.0				15.0	3.0
VII	68.0	18.0			24.0	111.2	16.0	182.0	55.2			237.2	59.3
VIII	115.8	1.1		8.4	23.2	70.2	53.0	138.0	4.0	3.0	126.7	271.7	45.3
IX	597.0	6.0			127.0	3.0	12,820.0	431.0	293.0	12,804.0	25.0	13,553.0	
X	2,350.0	12.0	475.0	58.0		819.3	375.3	176.0	3,140.5	5.0	768.7	4,090.2	

*All figures in thousands of dollars.

Data Source: State Annual Work Programs and Comprehensive Program Plans.

SECTION II
Table E-2
AWP Summary by Level of Expenditure

DOLLARS SPENT	NUMBER OF STATES IN EACH REGION										TOTAL NUMBER OF STATES
	I	II	III	IV	V	VI	VII	VIII	IX	X	
\$0.0	1	—	—	2	1	4	—	—	—	1	9
Less than \$49,999	2	—	1	2	—	1	1	3	—	—	10
\$50,000-99,999	—	—	2	—	2	—	3	3	1	—	11
\$100,000-199,999	1	—	2	1	1	—	—	—	1	—	6
\$200,000-299,999	1	1	1	2	1	—	—	—	—	—	6
\$300,000-499,999	1	—	—	—	1	—	—	—	1	—	3
\$500,000-999,999	—	1	—	1	—	—	—	—	—	2	4
More than \$1,000,000	—	—	—	—	—	—	—	—	1	1	2
Total	6	2	6	8	6	5	4	6	4	4	51*

*Includes District of Columbia; includes Puerto Rico.

(which were selected as a stratified random sample representative of the Nation) were surveyed and visited. The sample was developed for DOT by the National Committee on Uniform Traffic Law and Ordinances, and provided by DOT for this study.

Information was gathered in six major program areas:

- Planning
- Facilities
- Public information education
- Research, development, and evaluation
- Accident investigation and analysis
- Traffic law enforcement.

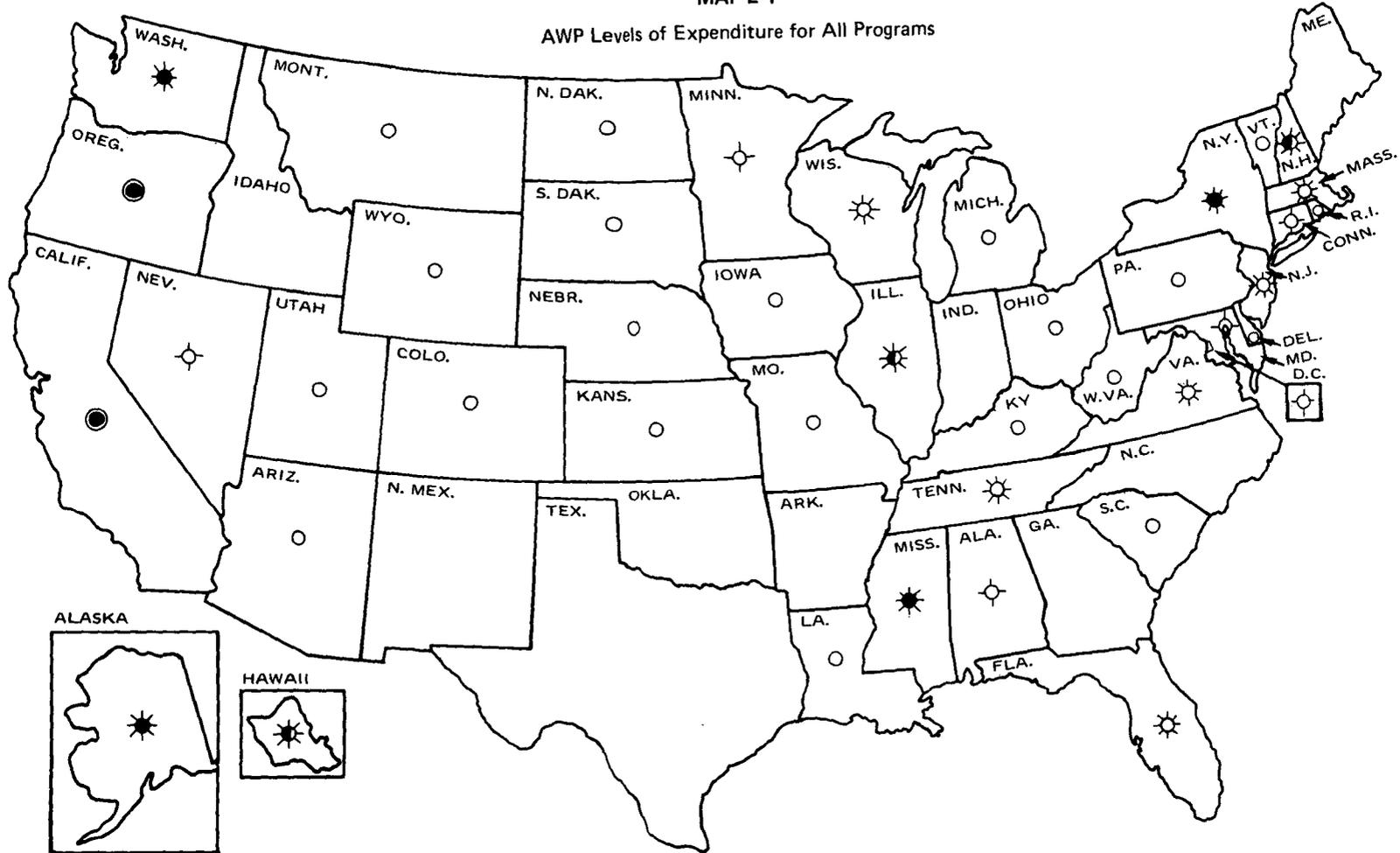
Forty-four percent of the States, and 71 percent of the 21 site locations responded and are shown on Map E-2. An analysis of these data and the results of the study are reported below. (A thorough discussion of the survey design and procedures is presented in Section III of the original study report.^{3,2} Sections IV and V of the report discuss in detail pedestrian-bicycle survey data.)

^{3,2}“A Study of Current and Potential Findings in Pedestrian and Bicycle Safety,” Contract No. DOT-HS-4-00891.

SECTION II

MAP E-1

AWP Levels of Expenditure for All Programs



50

- Less than \$100,000
- ⊕ \$100,000-\$199,999
- ☀ \$200,000-\$299,999

- ★ \$300,000-\$499,999
- ★ \$500,000-\$1,000,000
- More than \$1,000,000

SECTION II

Table E-3

AWP Pedestrian and Bicycle Expenditures and Funding Sources by State*

	PROGRAMS							FUNDING SOURCE				TOTAL
	Safety Programs	Material/ Equipment	Capital Costs	Personnel	Accident Reporting	R/D/E	N/A Other	Federal	State	Local	N/A Other	
<i>REGION I</i>												
Conn.	10.0						130.0	70.0		70.0		140.0
Maine												
Mass.	120.0	36.0			75.0			195.0			36.0	231.0
N.H.				361.7				11.7		350.0		361.7
R.I.		20.6	22.5					29.1		16.2		45.3
Vermont		5.0						5.0				5.0
TOTAL	130.0	66.6	22.5	361.7	75.0		132.2	310.8		436.2	36.0	783.0
<i>REGION II</i>												
N.J.	53.0	200.0						246.5	6.5			253.0
N.Y.	5.1				829.6			171.6			663.1	834.7
TOTAL	58.1	200.0			829.6			418.1	6.5		663.1	1,087.7
<i>REGION III</i>												
Delaware						30.0		30.0				30.0
D.C.		14.0		44.0		12.0	94.0	82.5	81.5			164.0
Md.	41.8	16.9		41.6	23.0		64.5	132.8	55.0			187.8
Penn.				69.0				49.0		20.0		69.0
Va.	75.0	32.5	71.0	15.0	10.0	35.0		124.0	55.0	59.5		238.5
W. Va.	2.0		67.0	.5				7.5	60.0	2.0		69.5
TOTAL	118.8	63.4	138.0	170.1	33.0	77.0	158.5	425.8	251.5	81.5		758.8

All Figures in thousands of dollars.

Data Source: State Annual Work Programs and Comprehensive Program Plans for FY74.

SECTION II

Table E-3 (continued)

AWP Pedestrian and Bicycle Expenditures and Funding Sources by State*

	PROGRAMS						FUNDING SOURCE				TOTAL	
	Safety Programs	Material/ Equipment	Capital Costs	Personnel	Accident Reporting	R/D/E	N/A Other	Federal	State	Local		N/A Other
<i>REGION IV</i>												
Ala.		87.0				80.0		67.0	100.0			167.0
Fla.	250.0							187.5	62.5			250.0
Ga.	No \$-	See C.P.										
Ky.	10.0				2.0			10.0		2.0		12.0
Miss.	970.0							70.0		900.0		970.0
N. Car.	No \$											
S. Car.	9.0	14.5		17.9				30.2		11.2		41.4
Tenn.	105.0					95.0		200.0				200.0
TOTAL	1,344.0	101.5		17.9	2.0	175.0		564.7	162.5	913.2		1,640.4
<i>REGION V</i>												
Ill.	203.6	51.6	4.0	117.3		64.5		43.8	46.8		346.4	437.0
Ind.	No \$											
Mich.	20.0			60.0		10.0		60.0		30.0		90.0
Minn.		56.0		46.5			1.0	76.0	27.5			103.5
Ohio	8.0				11.0	34.0	4.0	57.0				57.0
Wisc.	12.0	11.0	60.0			6.0	210.0	60.0	43.0	196.0		299.0
TOTAL	243.6	118.6	60.0	223.8	11.0	114.5	215.0	296.8	117.3	226.0	346.4	

*All figures in thousands of dollars.

Data Source: State Annual Work Programs and Comprehensive Program Plans for FY74.

SECTION II

Table E-3 (continued)

AWP Pedestrian and Bicycle Expenditures and Funding Sources by State*

	PROGRAMS							FUNDING SOURCE				TOTAL
	Safety Programs	Material/ Equipment	Capital Costs	Personnel	Accident Reporting	R/D/E	N/A Other	Federal	State	Local	N/A Other	
<i>REGION VI</i>												
Ark.	No \$											
La.	15.0							15.0				15.0
N. Mex.	No \$											
Okla.	No \$											
Texas	No \$											
TOTAL	15.0							15.0				15.0
<i>REGION VII</i>												
Iowa		18.0				22.0	16.0	40.0	16.0			56.0
Kansas	68.0				24.0			92.0				92.0
Mo.						50.0		50.0				50.0
Neb.						39.2		39.2				39.2
TOTAL	68.0	18.0			24.0	111.2	16.0	182.0	55.2			237.2

*All figures in thousands of dollars.

Data Source: State Annual Work Programs and Comprehensive Program Plans for FY74.

SECTION II

Table E-3 (continued)

AWP Pedestrian and Bicycle Expenditures and Funding Sources by State*

	PROGRAMS						FUNDING SOURCE				TOTAL	
	Safety Programs	Material/ Equipment	Capital Costs	Personnel	Accident Reporting	R/D/E	N/A Other	Federal	State	Local		N/A Other
<i>REGION VIII</i>												
Col.				8.0		3.0		11.0				11.0
Mont.	14.0				20.0	59.0		80.0			13.0	93.0
N. Dak.	7.8										7.8	7.8
S. Dak.	64.5						35.0				99.5	99.5
Utah	29.0				3.2	8.2	18.0	45.0	4.0	3.0	6.4	58.4
Wyo.	0.5	1.1		0.4				2.0				2.0
TOTAL	115.8	1.1		8.4	23.2	70.2	53.0	138.0	4.0	3.0	126.7	271.7
<i>REGION IX</i>												
Ariz.							66.0		11.0	55.0		66.0
Calif.	210.0				100.0		12,754.0	424.0		12,640.0		13,064.0
Hawaii	282.0	2.0			25.0			2.0	282.0		25.0	309.0
Nevada	105.0	4.0			2.0	3.0		5.0		109.0		114.0
TOTAL	597.0	6.0			127.0	3.0	12,820.0	431.0	293.0	12,804.0	25.0	13,533.0
<i>REGION X</i>												
Alaska						712.3	75.9	6.0	13.5		768.7	788.2
Idaho	No \$											
Oregon	2,350.0					52.0		50.0	2,352.0			2,402.0
Wash.		12.0	475.0	58.0		55.0	300.0	120.0		775.0	5.0	900.0
TOTAL	2,350.0	12.0	475.0	58.0		819.3	375.9	176.0	3,140.5	5.0	768.7	4,090.2

*All figures in thousands of dollars.

Data Source: State Annual Work Programs and Comprehensive Program Plans for FY74.

The overall low rate of response to this survey represents a constraint in making a definitive statement about the national picture of pedestrian and bicycle funding-programming. The study is further limited by the inability to separate pedestrian-bicycle data.

E.3 Analysis of Pedestrian Safety Programs

A minimal amount of programming is being done at the State and local levels for pedestrian safety. Only two States report comprehensive, substantially funded pedestrian safety programs. Funds are being channeled into two program areas: public information and educational activities. Other activities are minimally pursued.

E.3.1 Planning

Only one Region reported any substantial amount of staff time devoted to planning for pedestrians. Only two States reported substantial spending in this area. From the results of the survey, it can be concluded that planning for pedestrian safety is not an area of major expenditures.

E.3.2 Facilities

Although the information reported on spending for pedestrian facilities is concentrated on pedestrian signs and for marking crosswalks, perhaps a greater amount of funds goes into actual walkway construction. The information gathered clearly shows that while traffic control devices are provided at intersections (such as walk/don't walk signals and crosswalk markings), a concern for comprehensive programs or a logical basis for spending has not been developed. Most States are doing very little in the way of comprehensive planning for pedestrian facilities and are unable to extract funding information on the pedestrian facilities which are constructed. Very few States reported the source of their money used for pedestrian improvements. Those who did indicated that most monies came from the Federal Government, with the State general fund as the second largest source.

E.3.3 Public Information-Education

The areas where pedestrians seem to have been taken most into consideration are safety education programs and safety campaigns. Only two Regions reported no expenditures for pedestrian education or safety campaigns. Nineteen States, including the District of Columbia and Puerto Rico, reported spending for safety education or safety campaigns. Two of the eight cities in the site visit sample reported spending in these areas as well.

Most of the money spent in safety education programs is directed either toward younger children (kindergarten through sixth grade) or toward the public through safety campaigns. This emphasis on safety education for the young probably reflects concern about the high incidence of fatal or serious injuries to young pedestrians.

It is apparent that safety education for school-age children is a primary concern. The large expenditures for safety education programs, kindergarten through sixth grade, coupled with the lack of expenditures for facilities, planning, and RD&E (as will be shown later) indicate that the concern of most State governments is with making children aware that they need to be cautious and alert while walking, playing, or crossing streets.

In the area of safety campaign expenditures, no information was received concerning who constituted the target groups. Therefore, it is unknown how much of this effort is directed toward children versus toward adults. Fifty percent of the States that responded report NHTSA funding for various safety education-public information programs both for FY 72-74 and projected for FY 75-77.

E.3.4 Research, Development, and Evaluation

A limited number of States (10) and two cities provided information on State and local activities and spending in research, development, and evaluation of pedestrian safety programs. Only one State reported large spending in RD&E from State and local budgets. Increased budget allocations for RD&E each year indicate a continued emphasis in this area. The other nine States that responded reported only minimal expenditures. Four of those nine indicated that most of their monies for RD&E came from or will come from the Federal Government, usually from NHTSA. There appears to be no pattern for State increases or decreases in future fiscal year expenditures. Most States indicated no involvement in pedestrian RD&E. The above information leads to the assumption that pedestrian RD&E is a very low priority nationally.

E.3.5 Accident Investigation and Analysis

National statistics show a marked increase in the number of pedestrians and bicyclists involved in fatal or serious accidents during the past several years. Each State, therefore, was requested to provide total expenditures on accident investigation and the percentage of this money spent on pedestrian accident investigation. Nine States, one county, and three cities reported some spending on pedestrian accident investigation. The three cities reporting such expenditures indicated that 10.0, 5.5, and 2.0 percent of their accident investigation budgets were directed toward the analysis of pedestrian accidents. Of the nine States that responded, four reported expenditures in excess of 5 percent. The others spent less than 2 percent of their accident investigation budgets on pedestrian accident investigation.

E.3.6 Traffic Law Enforcement

Enforcement of laws covering the pedestrian is receiving minimal attention. Only five States reported spending in this area, and those five are spending less than 2 percent of their law enforcement budgets on pedestrian law enforcement. Note that in both of these areas, many States indicated that it is virtually impossible to extract the cost of these services in terms of pedestrian safety exclusively, since usually the time of one staff member (such as a policeman or data analyst) is spent on total law enforcement and traffic safety.

E.3.7 Obstacles to Pedestrian Safety

The lack of data on pedestrian accidents, facility usage, and individual desires, together with the lack of comprehensive planning, are the greatest obstacles to providing pedestrian safety. Given this information, adequate funding for programs could be more easily justified and obtained.

E.3.8 Future Spending Priorities for Pedestrian Programs

States were asked to estimate the amount of money needed in each of several areas to improve their pedestrian safety programs. Most respondents were unable to provide

estimates—a natural result of the lack of planning and of RD&E reported earlier. It is expected, however, that pedestrian facilities will require the greatest funding. Estimates for this area ranged from \$5,000 to \$500,000. The next area reported as requiring significant funding was public information-education. Here estimates ranged from \$1,000 to \$50,000 additionally needed.

E.4 Alternative Sources of Funding

Federal sources other than DOT-NHTSA and FHWA have funds available for pedestrian-bicyclist programs. A principal agency is the Department of the Interior, where the Bureau of Outdoor Recreation is already funding bikepaths in some States. The Department of Housing and Urban Development specifies that open space programs include the funding of bikeways, although traditionally they have been excluded.

The following funding sources are available to State or local governments:

- Highway trust funds. Some States are considering highway safety funds as a source for bikepaths, but Oregon is the only State with a viable plan.
- Private foundations and corporations, especially insurance firms, are already investing in bicycle programs.
- Bicycle sales tax.
- Registration, license, or inspection fees.
- Use of gasoline tax for bicycle pathways.
- Special bonds.

Although these alternatives can be considered as potential sources of funding, no State is using all or even a significant part of these resources. Most officials acknowledge their potential but are doubtful that these funding sources could be implemented. With the exception of the Federal alternatives, States and localities perceive other sources as not politically feasible alternatives. The probability that the States and local areas will adopt these funding sources in the near future remains doubtful.

E.5 Innovations in Pedestrian-Bicycle Safety

Innovation in pedestrian-bicycle safety has been most apparent in the area of facilities. Pedestrians in some urban centers now enjoy shopping streets, malls, and town squares specially designed for pedestrian needs. A few cities have constructed walking and sitting pavilions, over- and under-passes, moving sidewalks, and enclosed walkways.

Safety equipment is also in an experimental stage. Among the concepts being examined are: Requirements for safety helmets, techniques for making the bicyclist more visible to other road users, and exacting safety standards for bicycle manufacturers. In addition, design standards for onstreet and separate bicycle pathways and for bicyclist traffic control devices are being developed.

Education, the most predominant feature of safety activities, is usually the most static. Researchers have found very traditional programs directed toward school-age children, with few signs of innovation. Those States aware of their insufficiencies are revising old curricula and reexamining the role of both the pedestrian and the bicyclist in the mobility system. In addition, police officers are trying alternate ways to treat youthful offenders. Among the more common are citations without court appearances, letters to parents, trials by peer groups, and pedestrian-bicyclist classes.

The above-mentioned activities, at best, are merely a beginning. Planning and RD&E for bicycles are in a very primitive stage. Until these areas are enriched and coordinated, innovations will remain at very low levels.

F. FINDINGS

F.1 *Review and Evaluation of State and Local Ordinances, Regulations, and Laws Pertaining to Pedestrian Safety*

- There is a serious lack of uniformity among existing pedestrian laws and regulations that can be judged as unsafe, unfair, and unreasonable. This situation creates much confusion for motorists and pedestrians.
- Although the Uniform Vehicle Code and most States and municipalities define pedestrians, these definitions often exclude persons in wheelchairs, riding toy vehicles, on roller skates, or propelling pushcarts. In most jurisdictions these individuals have neither the rights nor the obligations of pedestrians.
- Most States and municipalities have laws and ordinances requiring pedestrians to obey pedestrian crossing signals at intersections. However, there is a lack of uniformity in the use and interpretation of pedestrian traffic control signals: “walk” or “don’t walk” signals, yellow light in conjunction with the red light, and yellow light with the green traffic control signals.
- It is generally accepted that vehicles must yield to pedestrians in a crosswalk where no traffic signal exists. This principle seems proper in areas that are not heavily traveled by vehicles, but problems emerge in more urban areas where there are not sufficient gaps in the traffic flow to permit a safe crossing. When faced with a steady stream of traffic, pedestrians cannot step into traffic to demand the right-of-way which is equally theirs, and few vehicles actually yield to pedestrians unless such action is necessary to avoid hitting them.
- Although drivers are legally obligated to yield to any pedestrian who might be crossing in an unmarked crosswalk, drivers may not be able to determine where an unmarked crosswalk exists. This presents a potentially dangerous situation.
- The question of pedestrian right-of-way at crosswalks should be thoroughly examined from a safety viewpoint considering efficient traffic movement, civil law, and civil liability.
- Most States and municipalities prevent vehicles from driving through “safety zones,” but few laws or ordinances define the term.
- Although many States and municipalities prohibit pedestrians from standing in the roadway to solicit business from vehicle occupants, there seem to be no laws

prohibiting vehicles from parking in the roadway to solicit business from pedestrians. Pedestrians, especially young children, are injured or killed while attempting to do business with ice cream or other street vendors.

- In most states and municipalities there are strictly enforced laws governing the intoxicated driver. This is not the case for the drunk pedestrian. It is apparent that the difference is based on the idea that the drunk pedestrian is probably dangerous to himself but not as much a danger to others as is an intoxicated driver.

F.2 Review and Evaluation of Enforcement Policies Procedures, Methods, Practices, and Capabilities for Enforcing Pedestrian Rules

Police operations in the area of pedestrian safety are characterized by the following:

- There is a lack of formal statements describing violations and policies and procedures for dealing with them.
- There is a paucity of data on frequency, type, location, etc., of accidents and effects of enforcement on frequency of violations and accidents.
- Violations are seldom acted upon, with the exception of some west coast area police departments.
- Police effort is mainly directed toward traffic safety education of school children rather than enforcement for the safety of adults.

F.3 Relationship Between Alcohol and Pedestrian Safety

- There is a scarcity of data on the involvement of alcohol in pedestrian accidents. Even less is known about the causative or behavioral role of alcohol in nonfatal crashes. Apparently, very few studies have focused on the problem.
- Data presented so far apparently represent the extent of our knowledge on the injured pedestrian's use of alcohol, and the majority of these data have heretofore been unpublished. Moreover, they are not based on a quantitative measurement of Blood Alcohol Concentration.
- The absence of data based on controlled studies makes it difficult to estimate the overrepresentation of alcohol in pedestrian accidents. Data on the BAC's of fatally injured pedestrians in addition to considerations of responsibility in fatal crashes suggest that approximately 36 percent of fatal pedestrian accidents involve alcohol.
- Studies and routine tabulations of nonfatal pedestrian accidents, unfortunately, do not include quantitative measures of BAC.

F.4 Evaluation of Ways and Means of Improving Pedestrian Safety Programs

- Implementation of varied and diverse countermeasures will help to improve pedestrian safety. Accident-reducing measures including facility construction, traffic control device application, pedestrian education, and law enforcement.
- Major types of accidents occur when pedestrians dart into traffic and dash through intersections. Sometimes pedestrians are not visible to motorists. Education and engineering account for the most pertinent countermeasures dictated by accident

types. Stricter enforcement measures for protection of pedestrians are also necessary. Countermeasures are most effective when enforcement procedures are correlated with pedestrian education and engineering control.

- One of the primary enforcement problems is the lack of information available to enforcement agencies. Such information is necessary for an accurate definition of the problems associated with pedestrian safety. Implementation of adequate data collection procedures is recommended.

F.5 Analysis of Present Funding Allocation of Pedestrian Safety Programs and Assessment of the Capabilities of Federal, State, and Local Governments for Future Funding

- The bicyclist receives significantly more attention than the pedestrian. Despite an apparent increase of walkers, joggers, and hikers, pedestrians are not a cohesive, vocal group. Whereas extensive bicycle facilities follow increased bicycle usage and citizen pressure, pedestrian programs seem to follow fatalities.
- Pedestrian programs are an integral but very small part of most State programs. A review of the State's Annual Work Programs shows that 43 States have some pedestrian safety programs, but the majority indicate amounts less than \$100,000 each in FY 74.
- Little is being done nationally for pedestrian safety. A few States, however, report comprehensive, substantially funded pedestrian safety programs. Levels of funding and expenditures seem to indicate that the protection of the pedestrian is not viewed with the priority it demands. Most States focus their expenditures and attention on public information and education.
- The low priority assigned to pedestrian concerns inhibit the aggressive fostering of program activities by officials in this area. Allocation of staff time and funds varies and is not consistent with safety requirements and needs. Most program activities are minimally pursued. Spending for pedestrian facilities is largely concentrated on purchasing pedestrian signs and crosswalks.
- Funding seems to be the greatest obstacle to adequate pedestrian safety programs. Extensive planning and staff activity in all program areas are absent because of insufficient funding allocations.
- The findings of this study indicate a high priority need for improved facilities. High in importance is public information and education, followed by planning. Research, development, and evaluation are receiving minimal attention, and accident investigation and analysis and enforcement are receiving negligible support or attention.

G. RECOMMENDATIONS

G.1 Review and Evaluation of State and Local Ordinances, Regulations, and Laws Pertaining to Pedestrian Safety

- Efforts must be made to provide uniform laws across the United States. This would be to the benefit of both pedestrians and motorists. All pedestrian laws (both new and proposed) should reflect the way that "reasonable" pedestrians walk. Such laws should neither subject the pedestrian to unnecessary dangers, nor unduly interfere with his progress. To the extent that pedestrians view the laws as constituting an

unreasonable impediment to their movement, they will probably ignore them. When a pedestrian law is frequently violated, that law should be reassessed to determine whether it really serves a valid function in protecting pedestrians, or merely impedes their flow, thus causing good citizens to violate the law. It may be that such a law should be repealed, or that, if it serves a valid function, greater enforcement might be necessary to bring about compliance, which would result in better pedestrian safety.

- Laws and ordinances defining pedestrians should be reviewed to ensure uniformity and that individuals propelling or riding some type of device are adequately protected and regulated.
- There is a need for a thorough evaluation from a safety viewpoint of the question of pedestrian right-of-way at crosswalks in terms of the efficiency of traffic movement, civil law, and civil liability.
- The theory of pedestrian right-of-way must also be analyzed within the context of civil law and civil liability. In a system where accident reparations are based on fault, it may be highly desirable to give pedestrians a legal right-of-way at crosswalks; in a sphere where accident reparations are made without regard to fault, such pedestrian right-of-way may be neither necessary nor desirable. Legislation on this matter will be possible only when the resolution of civil liability is no longer a necessary factor of the traffic law. It is necessary to determine whether safety zones perform a useful function in the safe and efficient movement of traffic. If so, the laws should be modified to clearly indicate that function and how safety zones are to be marked so that they are clearly recognizable by both pedestrians and drivers. If safety zones are not widely used, these laws should be repealed.
- The enactment of laws regulating the activities of motorists soliciting business from pedestrians is urgent. There is also a need for provisions in the laws to provide protection for pedestrians patronizing vendors and to prevent interference with safe and efficient traffic flow. Laws must be enacted and enforced to protect such pedestrians from danger to themselves and others, and to prevent them from interfering with traffic flow. Such laws should be carefully drafted, however, to proscribe only that conduct which is clearly dangerous, or which has substantial potential for interference with traffic, such as being on the roadway. (Laws which prohibit drunk pedestrians from being anywhere on or in proximity to a highway are really little more than reenactments of drunk-in-public laws.) The laws should also be drafted so as to allow the drunk pedestrian some course of action. It would seem undesirable and illogical to make it legally impossible for him to leave the bar where he got drunk, or to otherwise so restrict his pedestrian activities that it appears just as reasonable for him to drive as to walk.

G.2 Review and Evaluation of Enforcement Policies Procedures, Methods, Practices, and Capabilities for Enforcing Pedestrian Rules

- Pedestrian law enforcement should be increased and made a higher priority item in the traffic law enforcement effort.
- Statements of policy and directives relating to pedestrian accident experience and enforcement should be established and a police officer apprised of the importance of taking appropriate countermeasures.
- A selective enforcement program is needed.

- The police department, municipal court, and safety specialists should openly meet and decide on important issues pertaining to bicycle and pedestrian accidents and enforcement of regulations. Results of such meetings should be made public.
- Supervision and coordination of all bicycle and pedestrian safety programs should be centralized.
- Records information should include not only number of arrests but also information concerning the types of violations observed, the times, places, and types of enforcement activities, as well as demographic information on the violators.

G.3 Relationship Between Alcohol and Pedestrian Safety

- Major epidemiological studies are vitally needed to fill the gaps in knowledge on the problem of nonfatally injured pedestrians.
- Efforts must be directed at establishing controlled studies of victims of alcohol-related crashes.
- A major focus of future efforts should be the scaling of both the extent and type of pedestrian system failures against pedestrian BAC. The central problem appears to be occurring under the categories of pedestrian search and pedestrian course (selection and negotiation). Specific delineation of these factors as a function of BAC should be carefully investigated in the future.
- Critical variables, such as age, sex, race, injury severity and time of crash, must be included as integral parts of any research designed to study the alcohol-pedestrian problem.

G.4 Ways and Means of Improving Pedestrian Safety

- The allocation of public funds for the creation and maintenance of pedestrian safety programs should be accelerated.
- The possibility of instituting a nationwide program of public pedestrian safety education should be investigated. Principles of pedestrian safety and information on patterns of pedestrian accidents should be included in education programs. Certain programs should be directed toward special target groups—that is, children and older persons.

G.5 Federal, State, and Local Pedestrian Funding and Funding Capabilities

- Pedestrian safety should be a significant component of all State highway safety programs, supported by planning staff, and adequately funded.
- Pedestrian programs which respond to public needs should receive substantial commitment of funds.
- Alternate and additional sources of funding must be explored and utilized in fulfilling Federal, State, and local responsibilities to pedestrians.

- In order to facilitate the identification of pedestrian funding information, State and local planning and fiscal records should be maintained so that allocations and expenditures are reported in separate categories.
- Every municipality should have a comprehensive pedestrian program. This would include a balanced engineering plan covering application of traffic control devices, providing adequate crossing illumination, and determining the need for major crossing structures. There would be a method of establishing pedestrian demand and of assigning improvement priorities based on that demand.
- Adequate regulations to protect pedestrians must be established. Public support for enforcement measures must be encouraged.
- Future research on pedestrian behavior should focus on certain types of pedestrian accidents and on identification and evaluation of effective countermeasures. Specific areas of investigation should include: road conditions which precipitate pedestrian accidents and traffic control devices to help alleviate these conditions; time factors and weather conditions affecting pedestrian injuries; determination of the impact of training and legislation on pedestrian safety; and examination of pedestrian and driver behavioral responses.
- Planning by officials and interested citizens should include the following:
 - 1) Examination of laws and ordinances
 - 2) Consultation with Governor's Highway Safety representative
 - 3) Determination of program objectives
 - 4) Identification of resources, areas of responsibility, and operational agency responsibility designation
 - 5) Outlining of program and milestone events
 - 6) Evaluation of results

SECTION III: BICYCLIST SAFETY

INTRODUCTION

In recent years there has been a marked increase in bicycle usage, particularly among adults. As opposed to sales reports in the 1950's and 1960's, current findings indicate that the bicycle is no longer merely a child's toy; rather, its usage as a transportation and recreation vehicle for adults is increasing rapidly. The National Electronics Inquiry Surveillance System (NEISS) of the Consumer Product Safety Commission has developed data which show that approximately one million accidents involving bicycles occur across the United States each year. The Research and Program Development Subcommittee of the National Highway Safety Advisory Committee recently learned that during the energy crisis of 1973-74, while auto occupant and pedestrian deaths decreased 25 percent, bicyclist deaths increased 39 percent during November, December, January, and February as compared with those months in 1972-73.

The National Safety Council estimates that 100,000 motor vehicle-bicycle accidents and one million injuries associated with bicycles and requiring professional medical treatment occur each year. Research studies suggest that a very small percentage of all bicycling accidents on and off the highway are reported to police authorities. Only motor vehicle-related bicyclist deaths on public highways are commonly reported. Bicyclist fatalities accounted for 1,100 of the 55,800 traffic fatalities that occurred during 1973.

Other facts about bicyclist accidents are as follows:

- More than 78 percent involve children.
- The highest frequency occurs during rush-hour traffic in urban areas.
- Bicyclist accidents are primarily attributed to loss of control of the bicycle, mechanical failures, and entanglement of body and bicycle.
- Studies show that bicyclist accidents seem to be most often the fault of the bicyclist rather than the opposing motorist.
- In many cases, accidents involve bicyclists who do not know or who willfully disregard traffic regulations.

Coupled with the increases in bicycle sales and usage and in the proportion of adults riding bicycles on the highways, these accident data point to the fact that bicyclist injuries and fatalities are and will continue to be a serious problem that deserves immediate attention.

A. REVIEW AND EVALUATION OF STATE AND LOCAL ORDINANCES AND REGULATIONS PERTAINING TO BICYCLIST SAFETY

The bicycling laws of the 50 States and of 50 randomly selected communities have been reviewed for this report by the National Committee on Uniform Traffic Laws and Ordinances (NCUTLO). In addition to State and local laws, this section summarizes the bicycle laws of both the Uniform Vehicle Code (UVC) and the Model Traffic Ordinance (MTO) of NCUTLO. Summarized in Section I of this report is the background of this study effort. A listing of those jurisdictions from which bicyclist and pedestrian laws were studied can also be found in Section I. The information presented here will be used in publishing a Traffic Laws Commentary on bicyclist safety which will be available to State legislators, safety officials, and the public.

A.1 *Definition and Status of Bicycles*

What is a bicycle? The Uniform Vehicle Code (Section 1-105) defines “bicycle” as follows:

“Every device propelled by human power upon which any person may ride, having two tandem wheels either of which is more than 14 inches in diameter.”

The Model Traffic Ordinance does not contain a definition of “bicycle,” but it does provide as follows [Section 1-1(b)]:

“Whenever any words and phrases used herein are not defined herein but are defined in the State laws regulating the operation of vehicles, any such definition therein shall be deemed to apply to such words and phrases used herein, except when the context otherwise requires.”

Thus, the UVC definition of a bicycle would be applicable whenever that term is used in the MTO.

State and municipal laws are not uniform in their definitions of the term “bicycle.” As shown in Table A-1, 37 States and 35 of the 50 municipalities whose laws were reviewed have defined the term in conformity with the Code. Differences among the remaining laws arise, in part, from variations in the following considerations: number, size, and arrangement of wheels, and whether or not motor-powered. Most State laws and most municipal ordinances exclude certain devices with small diameter wheels which clearly would otherwise be considered bicycles. This seems to be done primarily to avoid application of traffic laws to young children.

The definitions also exclude certain other devices such as “mopeds” (that is, bicycles with “helper motors”) and human-propelled vehicles with one, three, four, or more wheels. Such devices should neither escape reasonable regulation nor be subjected to unreasonable regulation because they do not fall within the definition of bicycle. If regulation of these vehicles as bicycles is appropriate, the definition of bicycle should be expanded.

Is a bicycle a vehicle? Many provisions of the vehicle codes in the United States are addressed to the “driver of a vehicle.” The Uniform Vehicle Code (Section 1-184) defines the term “vehicle” as:

“Every device in, upon, or by which any person or property is or may be transported or drawn upon a highway, excepting devices moved by human power or used exclusively upon stationary rails or tracks.”

Since bicycles, by definition, are moved by human power, they are excluded from the definition of “vehicle.” The Model Traffic Ordinance contains no definition of vehicle, but Section 1-1(b) would adopt the Code definition by reference.

Thirty-seven States (See Table A-1) and 27 of the 50 municipalities surveyed specifically exclude bicycles from the definition of vehicle. Eight municipalities do not define the term except by reference to State law. In each case, the State involved does exclude “bicycle” from the term “vehicle.”

Bicycles have traditionally been excluded from the definition of “vehicle” because certain vehicle code requirements that specifically apply to vehicles should not be applied to bicycles. Where the requirements for vehicles should apply to bicycles, a substantive provision has been inserted to indicate that they do indeed apply. If there are any good reasons for changing the definition of vehicle in the vehicle codes to include bicycles, such a change probably should be made. Some bicyclists argue that defining “vehicle” to include bicycles would clarify the legal status of bicycles. They feel that by excluding bicycles from the definition of vehicle, the laws suggest that a bicyclist does not have equal rights and duties, and that a provision is not sufficient to overcome this discrimination.

A.2 Application of Motor Vehicle and Traffic Law to Bicycles

Making traffic laws applicable to bicycles by means of Uniform Vehicle Code Section 11-1202 may have been suitable at a time when the bicycle was rarely used on streets that carried heavy traffic. The whole impetus behind the existing bicycle regulations in the Code is to avoid applying harsh criminal laws to children. Section 11-1202 fits that pattern well. It vaguely tells the bicyclists to obey the law just like the driver of a vehicle, but it does not really afford a sound basis for enforcement activity.

Substantial use of bicycles by adults, both as a transportation and recreation device, may have rendered Section 11-1202 inadequate. It is doubtful, for example, that many courts will support serious convictions such as those for riding a bicycle while under the influence of alcohol or drugs, or vehicular homicide by bicycle: here the Code is too vague.

Some of the rules designed to regulate vehicular traffic, although they can reasonably be applied to bicycles, may not specifically state the optimal rule. The volume and nature of bicycle traffic on our roads demand that rules specifically designed to facilitate safe and efficient integration of bicycles into our traffic pattern be included in the Code.

SECTION III

Table A-1

Legal Status of Bicycle/Traffic Laws Applicable to Bicyclist

STATES	Definition of "bicycle" in conformity with UVC	No definition of "bicycle" in the vehicle code	Bicycle excluded from definition of vehicle	Traffic laws applicable to bicycles on highway exclude sidewalks and bike paths	Traffic laws apply to highway to include sidewalks and bike paths	Traffic laws apply to roadway to include shoulders	Rules of the road applying to drivers of a vehicle apply to bicycles anywhere on a highway	Rules applicable to a driver apply to bicyclists only on roadway portion of highway	All or some accident laws required apply to highway	Special rules for operation of bicycles in conformity with UVC
Alabama	X			X					X	X
Alaska	X				X				X ^b	
Arizona	X		X						X ^c	X
Arkansas		X	X		X				X ^c	
California	X		X	X		X		X	X ^c	
Colorado	X		X		X					
Connecticut	X		X			X		X		
Delaware	X		X	X						
Florida	X		X					X	X ^c	X
Georgia	X		X		X	X	X		X ^b	
Hawaii	X		X		X			X	X ^c	X
Idaho	X		X		X			X	X ^c	X
Illinois	X		X		X			X	X ^c	X
Indiana	X		X		X			X	X ^c	X
Iowa		X	X		X	X		X	X ^c	X
Kansas	X		X		X			X	X ^c	
Kentucky		X		X			X		X ^b	
Louisiana			X	X			X		X	X
Maine	X		X		X			X	X ^c	
Maryland	X			X			X		X	X
Massachusetts	X			X		X			X	
Michigan	X		X		X	X		X	X	X
Minnesota	X		X		X	X		X	X ^c	
Mississippi		X	X		X	X		X	X ^c	
Missouri		X	X	X				X		
Montana	X		X	X				X		X
Nebraska	X		X		X			X		X
Nevada	X		X		X			X	X ^c	X
New Hampshire		X	X	X	X		X			X
New Jersey		X	X					X	X ^c	X
New Mexico	X		X		X			X	X ^c	X
New York	X		X		X			X		
North Carolina		X			X		X		X ^a	
North Dakota	X	X			X		X		X ^a	
Ohio	X			X			X			X
Oklahoma	X		X		X			X	X ^c	X
Oregon	X		X	X		X		X	X ^c	X
Pennsylvania		X		X			X		X	
Rhode Island	X						X		X ^a	X
South Carolina	X		X		X			X	X ^c	X
South Dakota		X			X		X		X ^a	
Tennessee	X		X		X			X	X ^c	X
Texas			X		X			X	X ^c	X
Utah	X		X		X			X	X ^c	X
Vermont		X		X				X		X
Virginia		X	X	X				X	X ^c	
Washington	X		X		X	X		X		X
West Virginia	X		X		X			X	X ^c	X
Wisconsin	X			X			X		X	
Wyoming	X		X		X			X	X ^c	X

^a Applies anywhere in State

^b Applies only on highway

^c Applies only on roadway

A.2.1 To Whom Do Bicycle Laws Apply?

According to Code Section 11-1202, all requirements applicable to the driver of a vehicle are equally applicable to the operator of a bicycle on the roadway, even though a bicycle is not a vehicle. Note, however, that the impact of this provision is exclusively in terms of rules of the road and requirements for persons involved in accidents. Section 11-1202 does not make requirements pertaining to motor vehicle titling and registration, driver licensing, motor vehicle equipment, or periodic inspection applicable to bicycles or bicycle operators. Nor does it appear to make applicable the Code's compulsory insurance requirements, and equipment requirements of vehicles in general, or any other requirements outside of Chapters 10 and 11 of the Code.

The vehicle titling requirements of the Uniform Vehicle Code are imposed upon the owner of the vehicle, and not upon the driver. Since the driver of a vehicle has no rights or duties in regard to the title requirement, no rights or duties in regard to vehicle titling are made applicable to the operator of a bicycle by Section 11-1202.

A.2.2 Are Rules of the Road Applicable to Bicycles?

All States and most municipalities make the rules of the road for vehicle drivers applicable to bicyclists.

A.2.3 Where Are Traffic Laws Applicable to Bicycles?

One significant factor affecting the legal status of bicycles is the matter of where regulations apply to bicycles. Under the Uniform Vehicle Code (Section 1-122) and the laws and ordinances of most States and municipalities, rules that apply to bicyclists on a "highway" would apply everywhere within the right-of-way, including the median strip, shoulders, sidewalks, and any bicycle paths within the right-of-way. In 16 States (See Table A-1) and 12 of the municipalities studied, however, such rules might be given a more limited application, which would exclude sidewalks or bicycle paths.

Under the Uniform Vehicle Code (Section 1-158) and the laws and ordinances of most States and municipalities, rules applicable to bicyclists on a "roadway" would apply only on the paved or improved portion that is normally used for vehicular travel, and not on the median strip, shoulders, sidewalks, or bicycle paths within the highway right-of-way. However, 11 States (See Table A-1) and 18 municipalities might also apply such rules to the shoulders of the roadway.

In 15 States (See Table A-1) and 16 municipalities, the rules applicable to the driver of a vehicle are also applicable to bicyclists anywhere on a highway. In accordance with the Uniform Vehicle Code (Section 11-1202), however, the laws of 35 States (See Table A-1) and ordinances of 22 municipalities make their rules applicable to the drivers of vehicles and yet applicable to bicyclists only on the roadway portion of a highway.

A.2.4 Are Accident Reporting Requirements Applicable to Bicyclists?

Most States and municipalities also make accident rules applicable to bicyclists, although in some cases these rules apply only to the driver of a motor vehicle and not to a bicyclist. According to the Code (Section 11-1202), 41 States (See Table A-1) and 27 municipalities make some or all accident rules applicable to bicyclists. Generally, however, these provisions have more limited geographic use when applied to bicycles than when applied to vehicles. The remaining nine States and 23 municipalities either do not have accident reporting requirements or do not apply such requirements to bicyclists.

A.3 Rules of the Road

Uniform Vehicle Code rules of the road apply to bicyclists as follows:

- Bicyclists anywhere on the highway are required to obey the lawful directions of a policeman or fireman authorized to direct traffic (Section 11-103).
- Bicyclists on the roadway are required to obey the directions of all official traffic control devices, including red signals, stop signs, yield signs, and all other signs, signals, markings, and devices (Chapter 11, Article II). [The Model Traffic Ordinance (Section 12-12) does apply this same rule to bicyclists anywhere on the highway, however.]
- Bicyclists on the roadway must ride as close as practicable (possible, safe, and reasonable) to the right-hand curb or edge of the roadway [Section 11-1205(a)].
- Bicyclists on the roadway must pass vehicles proceeding in the same direction on the right if it is practicable (possible, safe, and reasonable) to do so. Passing such vehicles on the left is lawful [Section 11-1205(a)].
- Bicyclists may not ride the wrong way on a one-way roadway but may do so if on the shoulder or sidewalk (Section 11-308).
- Bicycles may be prohibited from using controlled access roadways, but no Code provision authorizes their exclusion from the shoulders or other parts of the right-of-way of a controlled access highway (Section 11-313).
- Bicyclists on the roadway must obey the same right-of-way rules as drivers of vehicles, but bicyclists on the shoulder or other area off the roadway have no right-of-way duties or rights, except the specific duty under the Model Traffic Ordinance [Section 12-14(c)] to yield to pedestrians on a sidewalk. Specifically, at uncontrolled intersections, the vehicle or bicycle on the left must yield to the vehicle or bicycle on the right (Section 11-401); a vehicle or bicycle turning left must yield to a vehicle or bicycle approaching from the opposite direction (Section 11-402); a vehicle or bicycle facing a stop or yield sign must yield to vehicles or bicycles on the other roadway (Section 11-403); a vehicle or bicycle entering a roadway from a nonroadway area must yield to vehicles or bicycles already on the roadway (Section 11-404); and vehicles and bicycles must yield to authorized emergency vehicles and vehicles and pedestrians engaged in highway work (Section 11-405, 406).

- Bicyclists on the roadway must yield to pedestrians whenever the driver of a vehicle would be required to do so (primarily at unsignalized crosswalks), and pedestrians must yield to bicyclists whenever they would be required to yield to the driver of a vehicle (primarily when crossing at noncrosswalk locations) (Chapter 11, Article V). Right-of-way rules applicable to pedestrians do not apply to persons riding bicycles, even when they are riding on the sidewalk, but such rules do apply when the bicyclist dismounts and walks his bicycle.
- Bicyclists on the roadway must avoid striking pedestrians, regardless of who has the right-of-way. Under the Model Traffic Ordinance [Section 12-14(c)], bicyclists must yield the right-of-way to all pedestrians on a sidewalk.
- Although bicyclists on the roadway must ride as close as practicable to the right curb or edge of the roadway, a bicyclist walking his bicycle must do so on an available sidewalk, or on the shoulder if there is no sidewalk, or as close as practicable to the left curb or edge of the roadway when there is no shoulder or sidewalk (Section 11-506).

A.3.1 Problems Encountered When Rules of the Road Are Applied to Bicyclists

One definite problem with most existing rules of the road for bicycles is that the rules usually apply only on the roadway. This problem may be most acute with regard to the absence of regulations for bicyclists on the sidewalks. Except for provisions that require bicyclists to yield to pedestrians, the bicyclist on the sidewalk is virtually in a legal vacuum. The bicyclist is neither afforded any right-of-way over vehicles crossing the sidewalk, nor required to yield. At intersections, the bicyclist has no right-of-way in the crosswalk, nor is he required to yield to cross traffic. Likewise, he is subject to neither the traffic control signals, nor pedestrian control signals, nor to the right-of-way rules applicable at uncontrolled intersections. He would be required to obey a police officer directing traffic if one were there.

Another serious deficiency is that many problems of bicycle movement in traffic are not adequately covered or are not covered at all by the Code's rules of the road. The right-of-way problem between the bicyclist who is proceeding straight through an intersection and the vehicle driver turning right is an example. Another example can be cited when a bicycle path crosses a highway. Vagueness of the Code adds to the uncertainty of rights and responsibilities. In addition, the Code does not directly address the question of whether a bicyclist should be allowed to pass a line of vehicles stopped in traffic or should be required to wait in line with them.

A.3.2 Special Rules for Operation of Bicycles

Laws that are specifically applicable to bicycles apply on highways and bicycle paths under the Code (Section 11-1201-1207), the laws of 29 States (See Table A-1), and the ordinances of 12 municipalities. Another four States¹ and eight municipalities specify some

¹Alaska, Massachusetts, New York, and Wisconsin.

different application (some more broad, some more restrictive) for such laws. The laws of the other 17 States and 38 municipalities do not specify where the laws that are specifically applicable to bicycles should be used. In addition:

- The Model Traffic Ordinance [Section 12-12(a)] and the ordinances of 24 municipalities require bicyclists on the highway to obey official traffic control devices.
- The Uniform Vehicle Code [Section 11-1205(a)], the laws of 38 States, as shown in Table A-2, and the ordinances of 31 municipalities require a bicyclist to stay as close as practicable to the right side of the roadway, although two States² allow riding near the left side on a one-way roadway.
- The Uniform Vehicle Code [Section 11-1205(b)], the laws of 31 States (See Table A-2), and the ordinances of 20 municipalities prohibit bicyclists from riding more than two abreast on a roadway, but they do allow riding two abreast. The laws of six States³ and the ordinances of eight municipalities prohibit riding bicycles abreast under some or all conditions.
- Only two State laws⁴ and two municipal ordinances specifically prohibit bicycles from passing between lines of vehicles. One State⁵ law specifically allows bicycles to pass vehicles on the right, while another State law⁶ and one municipal ordinance specifically prohibit such passing.
- The Uniform Vehicle Code (Section 11-313), 42 States (See Table A-2), and 11 municipalities either prohibit or authorize the prohibition of bicycle traffic on controlled access highways or roadways. Eighteen of the State laws (See Table A-2) and three of the municipal ordinances refer only to the roadway; the others cover the whole right-of-way. Thirty-one of the laws (See Table A-2) and five of the ordinances require signs to effect the prohibition; the others do not.
- The Model Traffic Ordinance [Section 12-14(b)], three States,⁷ and 15 municipalities either prohibit or authorize the prohibition of bicycle traffic on certain roadways other than controlled access roadways.
- Twenty-four municipalities specifically require bicyclists entering a roadway from a nonroadway area to yield to traffic on the roadway. No similar State laws apply specifically to bicyclists, but laws imposing this duty upon the driver of a vehicle would also impose this duty on bicyclists.
- Three municipalities have ordinances that require bicyclists on the roadway to yield to pedestrians under all circumstances. Two municipalities have ordinances that effectively require bicyclists on the roadway to yield to vehicles under all circumstances.

²California and Oregon.

³Delaware, Massachusetts, Nebraska, New Jersey, Oregon, and Wisconsin.

⁴Michigan and Oklahoma.

⁵Massachusetts.

⁶Michigan.

⁷Maryland, Massachusetts, and Oklahoma.

SECTION III

Table A-2
General Bicycle Riding Rules

STATES	Must keep to right	No more than two riding abreast	No riding on controlled access roadways	No clinging to moving vehicles	Use available bike path instead of roadway	Must ride astride or upon permanent bicycle seat	No. of riders restricted to no. for which designed	At least one hand on handlebars at all times
Alabama	X	X	X ^{ab}	X	X	X	X	X
Alaska	X	X	X ^b	X	X	X	X	X
Arizona	X	X	X ^{ab}	X	X	X	X	X
Arkansas								
California	X		X ^b	X		X	X	X
Colorado	X	X	X ^{ab}	X	X	X	X	
Connecticut	X	X		X	X	X	X	
Delaware	X		X ^{ab}	X	X	X	X	X
Florida	X	X	X	X	X	X	X	
Georgia	X		X ^b	X	X	X	X	X
Hawaii	X	X	X ^b	X	X	X	X	X
Idaho	X	X	X ^{ab}	X	X	X	X	X
Illinois	X		X ^b		X			
Indiana		X	X ^b	X		X	X	
Iowa			X					
Kansas	X	X	X ^b	X	X	X	X	X
Kentucky								
Louisiana	X	X	X	X	X	X	X	
Maine	X		X ^{ab}	X		X	X	
Maryland	X	X	X	X	X	X	X	X
Massachusetts				X		X	X	
Michigan	X	X	X	X	X	X	X	
Minnesota	X	X	X ^b	X	X	X	X	X
Mississippi			X					
Missouri				X				
Montana	X	X	X ^{ab}	X	X	X		X
Nebraska	X		X ^b	X	X	X	X	X
Nevada	X	X	X	X	X	X	X	X
New Hampshire	X	X		X	X	X	X	X
New Jersey	X		X ^b	X	X	X	X	
New Mexico	X	X	X ^{ab}	X	X	X	X	X
New York	X	X	X	X	X	X	X	X
North Carolina								
North Dakota	X	X	X ^{ab}	X	X	X	X	X
Ohio		X	X	X	X	X	X	
Oklahoma	X	X	X ^{ab}	X	X	X	X	X
Oregon	X			X	X	X	X	X
Pennsylvania			X					
Rhode Island	X	X	X ^{ab}	X	X	X	X	X
South Carolina	X	X		X	X	X	X	X
South Dakota			X ^{ab}					
Tennessee	X	X	X ^{ab}	X	X	X	X	X
Texas	X	X	X ^{ab}	X	X	X	X	X
Utah	X	X	X ^{ab}	X	X	X	X	X
Vermont	X	X	X ^b	X	X	X	X	X
Virginia			X ^b	X				
Washington	X	X	X ^{ab}	X	X	X	X	X
West Virginia	X	X	X ^{ab}	X	X	X	X	X
Wisconsin	X		X ^b	X	X	X	X	X
Wyoming	X	X	X ^{ab}	X	X	X	X	X

^aRefer only to roadway

^bRequire signs indicating prohibition

- No State law and only one municipal ordinance specifies the course for a bicycle to follow when making left or right turns. One State law⁸ and five ordinances require turn signals.
- Two State laws⁹ and 20 municipal ordinances impose speed restrictions specifically applicable to bicycles. Most of these require a reasonable and prudent speed.
- Only one municipal ordinance specifically addresses the offense of operating a bicycle while under the influence of alcohol or drugs.
- The Uniform Vehicle Code (Section 11-1204), the laws of 42 States (See Table A-2), and the ordinances of 38 municipalities make it illegal for a bicyclist to cling to a moving vehicle.
- Only one municipal ordinance imposes a minimum age limit for operation of a bicycle on the roadway. That ordinance prohibits persons under the age of 12 from riding a bicycle on the roadway.

A.3.4 Rules for Riding on Bicycle Lanes and Paths

The Uniform Vehicle Code [Section 11-1205(c)], the laws of 36 States (See Table A-2), and the ordinances of 23 municipalities provide that, where a usable bicycle path has been provided adjacent to the roadway, bicyclists must use that path.

Only a few laws and ordinances specifically regulate the use of bicycles or vehicles on bicycle lanes or paths. Two ordinances regulate the direction of bicycle travel in a bicycle lane and restrict leaving such a lane after the bicycle has entered it. One ordinance regulates turning maneuvers by bicycles in such lanes. Three State laws¹⁰ and three municipal ordinances restrict the use of bicycle lanes or paths by vehicles.

A.3.5 Rules for Use of Sidewalks by Bicycles

Three States¹¹ and five municipalities prohibit all bicycle riding on sidewalks. The Model Traffic Ordinance [Section 12-14(a)], two States,¹² and 24 municipalities prohibit bicycle riding in a business district. The MTO [Section 12-14(b)] and 12 municipalities prohibit bicycle riding on any sidewalk where signs have been erected prohibiting such riding. The MTO [Section 12-14(b)], one State,¹³ and nine municipalities prohibit bicycle riding on sidewalks by a person over a specified age (15 is usually the age limit). Another State¹⁴ generally prohibits riding on sidewalks, but authorizes municipalities to allow such riding by children under age 15.

The Model Traffic Ordinance [Section 12-14(c)], three States¹⁵ and 21 municipalities require bicycles on a sidewalk to yield to pedestrians. The MTO [Section 12-14(c)], four

⁸Massachusetts.

⁹Connecticut and New Hampshire.

¹⁰California, Oregon, and Washington.

¹¹Michigan, Vermont, and Virginia.

¹²Massachusetts and Minnesota.

¹³New Hampshire.

¹⁴Virginia.

¹⁵Massachusetts, Minnesota, and Oregon.

States,¹⁶ and 14 municipalities require bicyclists on a sidewalk to give an audible signal before passing a pedestrian.

A.3.6 *Use of Seats by Bicyclists*

The Uniform Vehicle Code [Section 11-1203(a)], the laws of 39 States (See Table A-2), and the ordinances of 23 municipalities require a bicyclist to ride upon or astride a permanent bicycle seat. The Uniform Vehicle Code [Section 11-1203(b)], the laws of 39 States (See Table A-2), and the ordinances of 30 municipalities restrict the number of persons carried on a bicycle to the number for which the bicycle is designed or equipped. The Uniform Vehicle Code (Section 11-1206), the laws of 30 States (See Table A-2), and the ordinances of 20 municipalities prohibit carrying any article that prevents the bicyclist from keeping at least one hand on the handlebars. Another four States¹⁷ and 10 municipalities have requirements that relate to keeping hands on the handlebars or otherwise keeping the bicycle under control.

A.4 *Special Requirements, Procedures, and Penalties*

What are the special equipment requirements for bicycles? The Uniform Vehicle Code specifies the following requirement [Section 11-1207(a)]:

“Every bicycle when in use at nighttime shall be equipped with a lamp on the front which shall emit a white light visible from a distance of at least 500 feet to the front”

As shown in Table A-3, the laws of 37 States duplicate the Code and 11 other States (See Table A-3) have comparable laws. The Uniform Vehicle Code also specifies the following requirement [Section 11-1207(a)]:

“Every bicycle when in use at nighttime shall be equipped . . . with a red reflector on the rear of a type approved by the department which shall be visible from all distances from 100 feet to 600 feet to the rear when directly in front of lawful lower beams of head lamps on a motor vehicle.”

The laws of 47 States (See Table A-3) contain comparable provisions. The Code [Section 11-1207(a)] provides as follows with regard to a rear light on bicycles:

“A lamp emitting a red light visible from a distance of 500 feet to the rear may be used in addition to the red reflector.”

The laws of 26 States (See Table A-3), like the Code, provide that a lamp emitting a red light for a distance of 500 feet to the rear may be used in addition to the rear reflector. The laws of 13 other States (See Table A-3) contain similar provisions, but differ as to the specified visibility distance. The laws of three states do not specify a visibility distance; the others require visibility for the number of feet indicated. The laws of five States¹⁸ allow a rear light to be used in place of the reflector rather than in addition to it. One State¹⁹

¹⁶Connecticut, Minnesota, Montana, and Oregon.

¹⁷Florida, Louisiana, Massachusetts, and New Jersey.

¹⁸Mississippi, North Carolina, Pennsylvania, South Dakota, and Virginia.

¹⁹New Jersey.

SECTION III

Table A-3

Special Requirements for Bicyclists on Equipment

STATES	Nighttime use requires front light	Night use requires rear reflector	Rear red light allowed in addition to rear reflector	Bicycle pedals must be equipped with reflectors	Provisions relating to audible warning device	Brakes	Authorize local governments to require bicycle registration
Alabama	X	X	X			X	
Alaska	X	X	X				
Arizona	X	X	X		X ^c	X	X
Arkansas	X	X	X ^a				
California	X ^a	X	X ^a	X		X	
Colorado	X	X	X		X	X	X
Connecticut	X ^a	X			X ^b	X	X
Delaware	X	X	X		X ^b	X	
Florida	X	X	X ^a				
Georgia	X ^a	X	X ^a	X		X	X
Hawaii	X	X	X		X	X	
Idaho	X	X	X		X	X	X
Illinois	X	X	X ^a	X	X	X	X
Indiana	X	X	X ^a		X	X	X
Iowa	X ^a	X	X ^a		X ^c		X
Kansas	X	X	X ^a	X		X	X
Kentucky	X ^a				X ^b		
Louisiana	X	X	X			X	X
Maine	X ^a	X		X		X	
Maryland	X	X	X		X	X	X
Massachusetts	X ^a	X	X ^a	X	X ^c	X	
Michigan	X	X	X		X	X	X
Minnesota	X	X	X			X	
Mississippi	X	X			X ^c		
Missouri							X
Montana	X	X	X			X	X
Nebraska	X	X	X			X	X
Nevada	X	X	X		X	X	X
New Hampshire	X ^a	X	X ^a	X	X ^b	X	X
New Jersey	X	X			X	X	
New Mexico	X	X	X		X	X	X
New York	X ^a	X	X ^a				
North Carolina	X	X				X	
North Dakota			X				
Ohio					X ^b		X
Oklahoma	X	X	X			X	X
Oregon	X	X	X		X ^c	X	
Pennsylvania	X ^a	X					X
Rhode Island	X	X	X	X	X	X	X
South Carolina	X	X	X		X	X	X
South Dakota	X ^a	X			X	X	
Tennessee	X	X	X		X	X	
Texas	X	X	X			X	X
Utah	X	X	X		X	X	
Vermont	X	X	X ^a		X ^b	X	
Virginia	X	X					X
Washington	X	X	X			X	X
West Virginia	X	X	X		X	X	X
Wisconsin	X	X	X ^a		X	X	X
Wyoming	X	X	X		X	X	X

^aSpecific visibility varies from Code

^bRequire audible warning device but do not specifically prohibit siren or whistle

^cDo not specifically require warning device but prohibit siren or whistle

requires a red rear light regardless of whether a reflector is used. The light must be visible from 500 feet. In addition to front and rear lights and a rear reflector, eight States (See Table A-3) require that bicycle pedals be equipped with reflectors.

Audible warning devices are also required for bicyclist safety. The Code (Section 11-1207) provides as follows with regard to audible warning devices on bicycles:

“No Person shall operate a bicycle unless it is equipped with a bell or other device capable of giving a signal audible for a distance of at least 100 feet, except that a bicycle shall not be equipped with nor shall any person upon a bicycle use any siren or whistle.”

Eighteen States (See Table A-3) have laws which substantially conform to this provision. Six other States (See Table A-3) have comparable laws which require a bell, horn, or some other audible warning device. Five other States (See Table A-3) have laws which do not specifically require a bell or other warning device, but which do prohibit the use of a siren or whistle on a bicycle.

Brakes are specified as follows in the Code [Section 11-1207(c)]:

“Every Bicycle shall be equipped with a brake which will enable the operator to make the braked wheels skid on dry, level, clean pavement.”

Thirty-nine States (See Table A-3) and 28 municipalities require bicycles to be equipped with brakes. Almost all of these follow the Code requirement that brakes be capable of causing the wheel to skid; only one State law²⁰ specifies a stopping distance requirement (30 feet from initial speed of 15 mph).

Certain other requirements are cited in some States and localities for bicyclist safety. The laws of four States²¹ provide that a bicycle may not be equipped with handlebars which are so raised that the operator must elevate his hands above his shoulders to grasp the normal steering grip area. Three municipalities have laws which regulate the height of handlebars. The laws of three States²² and the ordinance of one municipality provide that a bicycle may not be altered or modified so that the pedal in its lowermost position will be more than 12 inches above the ground. One State law²³ prohibits any alteration to extend the length of the fork of a bicycle.

A.5 Inspection Requirements

The Model Traffic Ordinance (Section 12-6) provides as follows with regard to inspection:

“The chief of police, or an officer assigned such responsibility, shall inspect each bicycle before licensing the same and shall refuse a license for any bicycle which he determines is in unsafe mechanical condition.”

²⁰Massachusetts.

²¹California, Georgia, Massachusetts, and New Hampshire.

²²California, Georgia, and New Hampshire.

²³Massachusetts.

Of the municipal ordinances surveyed, only seven require that a bicycle be inspected before it is registered.

A.6 Registration Requirements

The Uniform Vehicle Code does not require bicycle registration. However, the Code does specifically authorize municipalities to require bicycle registration. Code Section 15-102(a),(8) provides as follows:

“The provisions of this act shall not be deemed to prevent local authorities with respect to streets and highways under their jurisdiction and within the reasonable exercise of the police power from:

. . . Regulating the operation of bicycles and requiring the registration and inspection of same, including the requirement of a registration fee.”

Four States²⁴ have laws which require registration either statewide or in municipalities. Thirty States (See Table A-3) have similar laws authorizing local governments to require bicycle registration. The Model Traffic Ordinance (Section 12-2) requires that bicycles be registered as follows:

“No person who resides within this city shall ride or propel a bicycle on any street or upon any public path set aside from the exclusive use of bicycles unless such bicycle has been licensed and a license plate is attached thereto as provided herein.”

A.6.1 Registration Plates, Decals, Tags, or Stickers

The Model Traffic Ordinance [Section 12-5(a)] provides that upon registering a bicycle, the chief of police must also issue a plate to be attached to the bicycle. The ordinances of 29 municipalities provide for the issuance of registration plates, decals, tags, or stickers.

A.6.2 Identifying Numbers on Bicycles

Four States²⁵ have laws relating to bicycle serial numbers. Twenty-four municipalities also have laws which provide that, in registering a bicycle, there either may or must be an identifying number stamped upon the bicycle. The Model Traffic Ordinance has no such provision.

A.6.3 Recordkeeping

The Model Traffic Ordinance [Section 12-4(c)] requires that certain records be kept by the authority who issues the license, as follows:

“The (chief of police) shall keep a record of the number of each license, the date issued, the name and address of the person to whom issued, and the number on the frame of the bicycle for which issued, and a record of all bicycle license fees collected by him.”

²⁴California, Hawaii, Massachusetts, and Utah.

²⁵California, Hawaii, Massachusetts, and Utah.

A.7 Transfer of Ownership

The Model Traffic Ordinance (Section 12-8) provides for the transfer of ownership of a bicycle in the following manner:

“Upon the sale or other transfer of a licensed bicycle, the licensee shall remove the license plate and shall either surrender the same to the (chief of police) or may upon proper application but without payment of additional fee have said plate assigned to another bicycle owned by the applicant.”

The basic concept behind this provision is that registration follow the owner, not the bicycle. Upon sale or transfer of a bicycle, the old registration becomes invalid for that bicycle. Four municipalities have ordinances which, like the MTO, clearly provide that a license plate shall not remain upon a bicycle when ownership of that bicycle is transferred. Additionally, five other municipalities have ordinances which appear to provide that the license plate shall not remain on a bicycle when that bicycle is transferred. Each of these ordinances requires that the transferee apply for a new bicycle license, thus indicating that a new license plate will be attached upon completion of the normal registration process. Seventeen municipalities have ordinances which differ from the MTO by not requiring that the license plate be removed from a bicycle when ownership of that bicycle is transferred.

B. REVIEW AND EVALUATION OF BICYCLIST LAW ENFORCEMENT POLICIES, PROCEDURES, METHODS, AND PRACTICES

B.1 Enforcement of Bicyclist Laws

The overall incidence of bicyclist accidents is relatively low when compared to the total number of other problems within jurisdictions of police departments. Total police effort in the area of pedestrian-bicyclist safety has been very low, with primary emphasis in highway traffic management being collision prevention. As is the case with pedestrian safety, there is not enough recognition of a problem to assign personnel on a full-time basis. Responsibility for bicyclist safety programs competes with other duties to which personnel are assigned. Concern for the bicyclist has usually centered on children, even though adult (15 years of age and over) bicyclist fatalities amount to about 40 to 50 percent of total bicycling traffic fatalities.

Appropriate legislation has been set forth as one countermeasure of importance in the area of bicyclist safety. Laws, however, will not have the intended effect unless enforcement policies and procedures are established and practiced by the appropriate agencies and officials. Presented herein is a review of the bicyclist safety enforcement policies, procedures, methods, and capabilities in the United States. Among the sources of information are reports from experts in the area of bicyclist safety, and a survey conducted by the International Association of Chiefs of Police (IACP) under contract with the National Highway Traffic Safety Administration of the Department of Transportation. The methodology for the IACP study is discussed in Section II of this report.

B.2 Enforcement Policy and Administration

With the exception of some State highway patrol organizations, whose jurisdictions are sometimes limited to the supervision of traffic on interstate and major State highways,

many police agencies do not make distinctions between traffic, criminal, or other police functions, particularly as they relate to manpower utilization. Hence, it is difficult to assess the degree to which enforcement activity is specifically directed toward bicyclist safety.

B.2.1 Formal Written Policies and Procedures

Nationally, there is a lack of formal written directives indicating official police policies and procedures concerning enforcement of bicyclist laws. A few departments, however, have already established safety programs, most of which are directed toward school age children.

B.2.2 Police Records and Information Gathering

The priority status of bicyclist safety under city, county, and State police departments is very low; hence, little has been done to establish an adequate data base from which to evaluate the impact of safety programs or enforcement activities. Because there is uncertainty as to the parameters that significantly affect traffic and bicyclist flow, critical factors are often left unrecorded while data are collected on less important indicators; for example, departments seldom have information on bicyclist traffic volume and congestion. In those jurisdictions where data on bicyclist accidents are recorded, there are a number of problems that render the information relatively useless as far as an assessment of the total bicyclist problem is concerned:

- There is no uniformity in the way operational data and performance data are recorded.
- Frequently, pedestrian and bicyclist data, whether or not the accidents involve motorists, are condensed into one category, which makes independent analyses of either one impossible.
- Most bicyclist accidents go unreported unless a motorist is involved.
- In accidents where motorists are involved, detailed information on the bicyclists is not recorded.

B.2.3 The Bicyclist Problem and Law Enforcement Agencies

The most readily identifiable problems of bicyclist safety as revealed by the survey of enforcement agencies are as follows:

- The number of bicyclists on the streets is rapidly increasing.
- There is an apparent increase in bicyclist accidents.
- Generally, only bicycle accidents involving motorists are reported to or by the police.
- Bicyclist accidents are a greater problem in cities than in rural areas.
- Most bicyclist accidents occur at nonintersections rather than at intersections.

- Bicyclists have not perceived themselves as being bound by traffic laws and ordinances.
- Adequate bicycle routes are not available.
- Motorists do not know what the rights and duties of bicyclists are.
- Few trip origin and bicycle count studies have been made.

The issuance of citations to bicyclists is extremely rare, and no records are kept of the number or types of verbal warnings given by police. Although many bicyclists disobey traffic laws, they are usually prosecuted only when they are involved in accidents with motorists. Police effort is mainly directed toward traffic safety education of school children rather than enforcement for safety regulations.

C. ALCOHOL INVOLVEMENT IN BICYCLE/MOTOR VEHICLE CRASHES

This section presents a review of the literature on alcohol-related bicycle-motor vehicle crashes. The source of the information is a study sponsored by NHTSA with an aim of assessing what is known about the degree and nature of alcohol's role in this problem. Information revealed by the literature search is of value in making inferences about the degree and nature of alcohol's role in bicycle-motor vehicle accidents, given certain assumptions about the frequency with which the operators drink and operate their vehicles, the amount of alcohol they consume, and the opportunity for conflict during periods of mutual roadway use.

C.1 *Nature and Extent of Existing Data on Bicycle-Motor Vehicle Crashes*

An extensive survey of the literature failed to reveal a single source of information about the incidence of alcohol-involved bicycle-motor vehicle crashes in the United States. This finding is very likely the result of a general assumption that bicycle accidents, particularly those involving alcohol use, are relatively rare events in the United States and that only a small portion of the bicycling population is old enough to drink alcoholic beverages.

In sharp contrast with domestic literature, the foreign literature was found to contain a substantial number of studies that dealt with alcohol's role in bicycle-motor vehicle crashes. Most of the studies, but not all, were conducted in Western Europe, where bicycle usage is high. Because of large differences in the patterns of bicycle usage, the age distribution of the bicycling population, and the patterns of alcohol consumption, data from the foreign literature cannot be used to estimate the incidence of alcohol-involved bicycle-motor vehicle crashes in the United States. However, these data provide an indication of the problem that could exist as bicycle usage patterns in the United States become more like the usage patterns in countries where large numbers of adults use bicycles as transportation vehicles. Implications of these data will be discussed later in this segment of the report.

In order to gather information concerning the involvement of alcohol in accidents between bicycles and motor vehicles, the literature search was extended to include the files of accident recordkeeping agencies. Data gleaned from agencies of a sample of States and an indepth analysis of accident data from one major city are presented below.

C.1.1 *Accident Data in the United States*

The findings reported herein are based on a telephone survey of officials from a sample of 24 States and are listed in Table C-1. All States surveyed routinely tabulate the number of crashes between bicycles and motor vehicles, but few (33 percent) were able to determine the number of bicycle-motor vehicle crashes that involved drinking operators. Fewer still (21 percent) were able to identify which of the two operators had been drinking.

C.1.2 *Results*

- About 3 percent of all bicycle-motor vehicle crashes involved alcohol use on the part of at least one of the operators.
- In approximately 78 percent of all alcohol-involved bicycle-motor vehicle crashes, it was the motorist who had been drinking. In the remaining 22 percent of the cases, it was the bicyclist who had been drinking.

These data constitute conservative estimates of the relative parameters for the following reasons:

- Many bicycle-motor vehicle crashes are not reported because they occur on private property or do not result in significant property damage or personal injury.
- Many intoxicated operators are not detected by the investigating officers.
- Many intoxicated operators are detected but not reported. Some research has shown that an officer's willingness to report alcohol involvement is dependent upon many factors, including: visible evidence of intoxication; the relevance of drinking to the occurrence of the accident; the officer's relationship with the vehicle operator; and the attitude toward drinking and driving held by his superiors, the police magistrates, and the community at large. All such factors act to reduce the probability that alcohol involvement will be reported.
- Bicyclists are far less likely than motorists to be cited for a violation of traffic laws and ordinances even when the violations lead directly to a collision. This double standard appears to be true for bicyclists of all ages and is particularly prevalent in cases where the bicyclists sustain injuries in the accident. It is apparent that officers assume that injury is sufficient punishment for the offense, which reduces the frequency of reporting alcohol involvement.
- The law in many jurisdictions is ambiguous about whether operating a bicycle under the influence of alcohol is, in fact, unlawful. The findings from the review of bicycling laws in the United States by the National Committee on Uniform Traffic Laws and Ordinances show that "in almost half the states . . . prohibition against driving while under the influence would probably not apply to bicyclists." Further, "of all the laws and ordinances reviewed, only one municipal ordinance specifically addresses the offense of operating a bicycle while under the influence of alcohol."

C.1.3 *Findings From Foreign Literature*

Data from foreign literature on alcohol involvement in bicycle-motor vehicle crashes come from autopsy studies of traffic accident fatalities or from hospital evaluations of injured victims. In several of the studies, the BAC level was measured for all fatalities that occurred within the sampling area, or all traffic accident victims admitted to a given hospital

SECTION III

Table C-1

Availability of Data on Alcohol Involved Bicycle/Motor Vehicle Crashes

State	Routinely record total number bicycle/motor vehicle crashes	Record total alcohol-related crashes	Records permit identification of operator that had been drinking
Arizona	Yes	No	No
Arkansas	Yes	Yes	Yes
California	Yes	Yes ¹	Yes ¹
Colorado	Yes	Yes ²	No
District of Columbia	Yes	No	No
Florida	Yes	No	No
Georgia	Yes	No	No
Illinois	Yes	No	No
Kansas	Yes	Yes	No
Massachusetts	Yes	No	No
Michigan	Yes	Yes	No
Minnesota	Yes	No	No
Nebraska	Yes	No	Yes
New York	Yes	No	No
North Carolina	Yes	No	No
Ohio	Yes	No	No
Oklahoma	Yes	No	No
Oregon	Yes	Yes	Yes
Pennsylvania	Yes	No	No
Tennessee	Yes	No	No
Texas	Yes	No	No
Utah	Yes	No	No
Washington	Yes	Yes	Yes
Wisconsin	Yes	Yes	No

¹For Los Angeles and Santa Barbara only.

²Fatal accidents only.

for treatment. However, in some studies, BAC measurements apparently were made only when there was reason to believe that the accident victim had been drinking.

The literature revealed that there is a correlation between alcohol use and the incidence of accidents. The existence of a concurrent correlation is inconclusive evidence that alcohol is, in fact, a precipitating factor. Assuming a causal relationship between alcohol and accidents is particularly questionable in countries where drinking is a cultural tradition. Although it cannot be assumed that all of the accidents involving drinking bicyclists are the

direct result of intoxication, a conservative evaluation of data leaves room for consideration that alcohol consumption by bicyclists is a potential problem.

C.2 Effects of Alcohol on Driving and Cycling Skills

It is clear that there are certain types of skills that are of fundamental importance in avoiding bicycle-motor vehicle accidents. Consideration of the effect of alcohol on these skills enables one to make at least gross inferences about the effect of alcohol on the likelihood of accidents.

Ten types of bicycle-motor vehicle crashes that commonly occur have been analyzed. It was revealed that the most critical skills for motorists are scanning, detecting the presence of a bicyclist in a complex visual field, judging distances and velocities, and anticipating erratic behavior on the part of the bicyclist. The skills judged most critical for bicyclists are scanning; detecting and recognizing cues to hazards, which are often subtle; judging distances and velocities; anticipating erratic behavior on the part of the motorist; and maintaining stability of the bicycle. Scanning, visual detection, evaluation, and decision-making appear to be critical skills for both motorists and bicyclists. Motor control appears to be more critical for bicyclists than motorists.

Recent research studies have pointed out the following facts.

- The consumption of alcohol results in a significant degradation of the ability to scan effectively. When faced with a scanning task, intoxicated subjects (1) tend not to distribute their attention as efficiently as sober subjects; (2) tend to fixate on the middle of the road, generally neglecting the periphery; (3) miss more relevant objects that are part of a complex situation; and (4) tend to have less flexible perception patterns.
- Visual acuity, which appears to be relevant to driving skills, is relatively insensitive to alcohol. When peripheral vision is examined while other information is being processed, however, a substantial performance decrement is noted even under the influence of moderate doses of alcohol. Since motorists and bicyclists are nearly always engaged in multiple tasks, it seems reasonable to assume that alcohol would result in a degradation in the operator's ability to detect relevant stimuli in a complex stimulus field, especially if the stimuli appear in the periphery.
- Specific types of evaluation and decisionmaking skills (such as judgement of distance, velocity, and clearance distance) which are required of drivers and bicyclists are dependent upon information-processing capability, a skill degraded by alcohol. Hence, it is likely that the requisite skills would show some degree of degradation.
- The consumption of alcohol results in a dramatic degradation in an individual's ability to control a vehicle and increases time delays associated with making corrective actions.

Inferences from these findings thus point to the fact that the skills required to avoid bicycle-motor vehicle crashes are degraded by alcohol. This seems equally valid for motorists and bicyclists.

D. EVALUATION OF WAYS AND MEANS OF IMPROVING BICYCLIST SAFETY PROGRAMS

This section reviews and assesses bicyclist safety programs and countermeasures and identifies new directions for research in bicyclist safety. A broad spectrum of problems and proposed solutions is noted. The suggested countermeasures vary in complexity, adaptability, and costliness. A summary of countermeasures for bicyclist safety is found in Table D-1.

D.1 *Analysis of Bicycle-Related Accidents*

A Detroit traffic study²⁶ examined the actions by participants which lead to accidents involving bike riders. The major accident-causing actions identified were: cycling out of driveway into path of car, cycling into street from area between parked cars, entering intersection without due care, changing direction in front of car, disobeying traffic signs, riding on sidewalk and failing to observe vehicles using driveways and alleys, and midblock crossing.

A study conducted by the American Association for Automotive Medicine identified several factors contributing to bicycle accidents. The researchers found that bicyclists do not conform to traffic regulations, whereas motorists are trained to obey a set of formal rules, even in the absence of apparent risk. The study points out that the bicyclist is usually young, untrained, and seldom ready to cope with the unexpected. Young bicyclists do not comprehend complex traffic rules, and some ride before they are able to effectively control the bicycle. The safety of young riders is further endangered by riding bicycles which are too large for them, thereby preventing them from maintaining stability under conditions such as very slow speed or in a stopped position. The study further states that neither a scaled-down version of the adult bicycle nor the "high-rise" bicycle has been satisfactorily demonstrated to be appropriate.

An analysis of bicycle accidents in North Carolina indicated that the typical accident occurred in clear, dry weather and involved a bicyclist 10 to 14 years of age who unexpectedly emerged from an exit, such as an alley or driveway. Nonfatal accidents were found to be concentrated in residential areas and involved younger bicyclists. More fatal accidents were associated with older riders and occurred in open country at higher motor vehicle speeds.

A study conducted by the State of Illinois analyzed fatalities and injuries by type of accident, accident location, day of week, and age groups of drivers and bicyclists. The report states that most bicycle-related accidents occur in cities with 10,000 to 100,000 persons; the most frequent occurrences of bicycle accidents were in May through August; the age of bicyclists ranged from 5 to 14, and the drivers' ages from 35 to 44.

D.2 *Educational Countermeasures*

Studies that appraise traffic accidents involving bicycles bring attention to contributing factors that can be controlled to reduce the frequency of bicycle accidents. Countermeasures, although implied, are clear. The research seems to recommend traffic safety education that could be implemented into the school curriculum. Young bicyclists are

²⁶ *The Child in Detroit Traffic*, 1970 HS 009 684.

SECTION III

Table D-1

Summary of Countermeasures for Bicyclist Safety

Countermeasure	Utility	Expected/actual results
Development of standards for bicycles	Definition of requirements and specifications in the types and characteristics of brakes, handlebars, height and other factors	Predictions and conclusions for accident potential and potentially dangerous situations where bicycle performance can be related to safety
Planning and construction of bikeways	Isolation of cyclists and traffic	Reduction in accidents involving bicyclists
Licensing, enforcement	Control and maintenance of bicycles, issuance of warnings for violations by cyclists	Increased safety for bicyclists
Intersection marking, use of signals and signs, lighting	Improvement of bikeway design and engineering	Reduction of biking accidents and casualties
Safety education for bicycle riders	Training for cyclists on proper riding procedures and road discipline	Increased awareness and information on bicycle safety
Application of retroreflective materials to vehicle and/or rider	More highly visible wearing apparel and bicycles to provide night reflection and daytime visibility	Magnifies visibility of bicycle and rider
Traffic regulations for bicyclists	Rules appropriate to bicycle operation designating the responsibilities of riders	Reduce traffic accidents involving bike riders
System of bikeways	Provides safe, convenient and pleasant travel between residential areas and commercial areas	Reduction or elimination of hazardous traffic situations that endanger bicyclists; and improved access to bicyclists

careless and often take risks that prove to be fatal. It is often suggested that education programs teach bicycle riders road discipline, roadway placement, and priority, as well as how to respond to traffic conflicts. Unfortunately, no data exist which prove the effectiveness of bicycle safety training programs as they are currently designed. Research is needed in this area and it should emphasize the behavior needed to avoid or survive conflict situations.

D.3 Enforcement

In the absence of bicycle laws, the creation of regulations to govern the use of the bicycle is warranted. Bicycle laws, together with the use of safety devices and bikeways, should substantially reduce bicyclist-related accidents.

The California Traffic Safety Program is applying the findings of a study to reduce bicycle-related accidents. The study resulted in a number of safety innovations which depend on licensing and enforcement. The safety plan includes a program to license and inspect bicycles to achieve control and maintenance. An educational enforcement approach is used. Police issue warnings and/or citations to bicyclists. In the case of young bicyclists, copies of infractions are sent to the parents. The plan incorporates education through the appointment of a full-time police traffic officer responsible for observation, enforcement, and teaching bicyclists and supervising junior patrols.

D.4 Engineering Countermeasures

There have been a limited number of studies that compare the safety and handling factors for high-rise and conventional bicycles. The bicyclists' ability to corner, stop, and dismount are important in case of an accident. The high-rise bicycle, without gearing, was found to be unsuitable for transportation. One study indicates that bicycle features, such as wheel size, fork angle, wheelbase, and weight, should be designed to enhance the rider's safety in the event of an accident. Such studies are intended to assist manufacturers in making two-wheeled vehicles safer to ride.

Highway design configurations have also been shown to be a significant factor involved in bicyclist safety. Roadway design, delineation, and the deployment of traffic control devices affect the safety of both the bicyclist and the motor vehicle driver. Further research to determine the general relationships between highway elements and bicyclist safety is underway. Research to identify and evaluate promising countermeasures is being pursued. Future efforts should be directed toward accommodating bicyclists and motor vehicle drivers by providing both groups the opportunity to travel safely.

D.4.1 Better Fitting of Bicycles to Riders

A study on children and bicycles revealed a very high percentage of children who required "blocks" on their bicycle pedals in order to reach them. This indicated the use of a bicycle too large for the rider as well as the probability that the rider could not place either foot on the ground when stopping. The latter condition is a traffic hazard as well as a contributing factor in many injuries resulting from falls.

D.4.2 Conspicuousness of Rider and Bicycle

There seems to be a need for more highly visible bicycles and riders. Application of retroreflective materials to a vehicle and/or rider and better lighting on bicycles and roadways may increase safety for night riders. Further investigation regarding conspicuousness of bicyclists during the day is required. High visibility flags may be effective. Other devices that make bicyclists more visible both at day and night are becoming available.

D.4.3 Safe Play Areas

Among young bicyclists a significant number of bicycle accidents appear to result from street games which force motorists to make maneuvers that divert their attention from traffic. Many conflicts of this nature could be avoided if safe offstreet bicycle riding areas were provided.

D.4.4 Bicycle Facility-Related Countermeasures

The creation of bikeways separated from regular highways is sometimes considered as an advantageous way to help assure safe transportation for bicyclists. However, this countermeasure does not always solve the problem of reducing bicycle-motor vehicle conflicts at intersections, serving the destination demands of bicyclists, or providing the most cost-effective type of bicycling facility. Bikeways cannot be provided along many downtown streets where a high proportion of accidents are now occurring because of restrictions. Separated bikeways frequently include street crossings and are not completely effective in eliminating intersection accidents. The tendency is to build bikeways where there is room for them rather than to serve user needs. Improvements are rarely made for bicycles on the basis of where accidents are occurring. More emphasis is needed on how to bridge hazardous spots on both onstreet and offstreet bicycling facilities and how to establish overall route continuity.

The Federal Highway Administration has developed guidelines for separate bikeway construction which if followed will result in safe bicycling facilities.

D.5 A Typical Example of City Bikeway Development

An Iowan city has undertaken a long-range bikeway system to provide safety, convenience, and pleasant travel between residential areas and major metropolitan and commercial areas. The plan is designed to be a functional, scenic bikeway which will reduce or eliminate some of the hazardous traffic situations that endanger both bicyclists and motorists. The bikeway improves the bicyclists' access to sites previously denied those using this mode of transportation. The plan visualizes radial, peripheral, and loopout routes, and includes the use of existing public streets, specially constructed paths on public property, sections of sidewalk, and public easements over private property. The significance of this project is that it illustrates that a moderate-sized community, with public and private support, can develop low-cost, high-benefit safety countermeasures for bicyclists.

D.6 Proposed Research and New Directions

There is an apparent dearth of information on the extent to which bicycle safety objectives have been accomplished through existing bicycle safety programs. There have been minimal attempts at measuring or evaluating the success of existing procedures and

programs. Researchers on bicycle safety must take on the task of developing definitive conclusions between select countermeasures and bicycle safety.

Additional research on bicyclist behavior is needed to understand certain types of accidents and to identify and evaluate countermeasures. Some data have been collected about age, sex, time of day, and street location. Further work is needed to isolate combinations of behavioral errors and situations that lead to particular types of accidents, and to evaluate countermeasures proposed to deal with specific causes.

E. ANALYSIS OF PRESENT FUNDING ALLOCATION OF BICYCLE SAFETY PROGRAMS AND AN ASSESSMENT OF THE CAPABILITIES OF FEDERAL, STATE, AND LOCAL GOVERNMENTS TO FUND SUCH ACTIVITIES AND PROGRAMS

Current funding levels and potentials for future funding in bicycle and safety at Federal, State, and local levels are discussed in this section. Annual Work Programs (AWP) and Comprehensive Program (CP) Plans for FY 74 were reviewed and analyzed to arrive at indices of bicycle safety program spending. The bulk of the funds identified in this section are those available from DOT for implementation of comprehensive highway safety programs and those State funds used to match Federal funds. The data presented in this section should not be construed as representing total funds available to the States for implementing bicycle programs since it is likely that some additional States and local funds currently spent on bicycle programs were not reported.

The identification and analysis of data specific to bicycle programs was made difficult by State AWP's inclusion of bicycles within other safety standards. Additionally, a combined analysis of pedestrian-bicycle programs had to be undertaken since most States combine these programs. State records did not allow pedestrian-bicycle programs to be separated and weighed comparatively. Hence, figures for each State appear combined, and represent all pedestrian-bicycle programs within that State.

An analysis of AWP data indicates that bicycle programs receive less attention than pedestrian programs, although both programs are included under one heading. State and regional bicycle expenditures, funding patterns, and sources are reported in Section II, which includes table summaries of pedestrian-bicycle safety funding.

The following sections detail how States and localities are responding to the influx of bicycles on their roadways. Areas of particular interest are the level of government that is financing the program, sources of funds, and funding patterns and trends.

E.1 *Planning*

All but five of the States responding to the survey indicate that planning efforts exist on some level within the State. However, planning activities appear fragmented. Planning for bicycle safety occurs in several departments (that is, transportation, parks, motor vehicles, police, education, and natural resources). Major efforts are engaged by the departments of transportation and education. In many cases, government agencies are aided by community planning groups and advisory committees. Fifty percent of these States list at least four such groups participating in planning. Thirteen States provided some data on planning dollars spent; of these, 11 spent less than \$12,000 each.

Although DOT was the major source of funds for the planning efforts of six States, the amounts were minimal, in no case exceeding \$40,000. The two States spending the most did so with state and local funds, and only slight aid from the Federal Government (1 to 2 percent). The four States utilizing State sources other than the General Fund used drivers' licenses, motor fuel, and State highway and highway user taxes. In all but one case, the actual amounts were slight.

Planning person years varied from .1 to 14, with 73 percent of the States using less than five. There is no easily apparent corollary between total planning dollars and person years.

Local planning efforts are even smaller than State efforts. Six States reported at least some expenditures—most from local sources. The maximum amount was \$27,000.

E.2 Facilities

Fifteen States in various regions throughout the nation indicated that they have some type of biking facility. All States did not list the number of miles of each facility, and it is difficult to determine the difference between planned and constructed bikepaths. Those States building bikeways report ways extending from 50 to 1,000 miles. Since the States did not reveal the ratio of construction costs to number of miles, it is impossible to determine a valid cost per mile.

Of three types of bikeways—existing roads with signs/demarcations, existing roads with physical barriers, bike paths separate from roadways—separate pathways are the most costly. However, just as many States have constructed these, as have put up signs or demarcations. Estimated FY 75 cost vary from \$15,000 to \$3.3 million.

More than half of the States responding to the questionnaire reported no cost figures. At different sites throughout the Country (with the exception of the West Coast), officials confirmed that bicycle expenditures are a low priority of State and local governments, as well as of the general population.

The Federal Highway Administration allows the use of highway funds to construct bicycle and pedestrian facilities. Two million dollars had been expended in the construction of 55 miles of bicycle facilities through August 1973. The 1973 Federal Aid Highway Act liberalized the conditions for providing these facilities. Additional funds have been committed to expand and extend these activities. Despite the availability of Federal dollars for bikeway construction, some State officials are reluctant to transfer funds from "carways" to "bikeways" and may not utilize these monies unless they are explicitly designated for bicycle use.

Few States provided information about construction costs, and even fewer provided information concerning maintenance costs. Bikeway maintenance is generally performed by crews whose primary responsibility is highways. Bikeway costs are too deeply imbedded in other traffic costs to be isolated for the purposes of this study. For the seven States that provided dollar figures, maintenance costs ranged from 7 to 13 percent of construction costs. This sample is too low to extrapolate with any accuracy. It is also impossible to compare accurately the maintenance dollars of the three types of bicycle facilities.

Data on the source of funds for construction and maintenance of facilities was almost negligible, although funds appear to come from a combination of Federal, State, and local

sources. A number of States have set aside money from the highway Trust Fund for construction of bicycle pathways under the provisions of Section 124 of the 1973 Federal Aid Highway Act.

Some States and localities indicate attempts to provide a comprehensive bikeway program. Since the bicyclist does not receive equal treatment with the driver, significant improvement is needed to achieve safe and enjoyable bike riding. The comprehensiveness of special provisions vary, as do allocations of dollars. However, States and localities have focused attention on storage facilities, rest area/shelters, bike signals and markings, and identification of impediments of biking.

E.3 Public Information/Education

Nine major categories of public information/education were investigated. They included: preschool education, elementary school (kindergarten through sixth grade), middle school (10th through 12th grade), curriculum development, adult education, violators schools (court referrals in lieu of fine), safety campaigns, and teacher training.

Although no State claimed expenditures in all of the above categories, 91 percent of the States responding spent some money on bicyclist education. The majority of these, 60 percent, listed expenditures in one or two areas; 15 percent in two or three areas; and 25 percent in four to seven areas. School education programs, especially kindergarten through sixth grade, received the greatest attention, with 60 percent of these States spending some money in this area. From 30 to 45 percent of the States also expended funds in curriculum development, safety campaigns, middle school, senior school, and teacher training. Preschool programs were neglected in all but three States, and adult education programs for bicyclists were virtually ignored.

There was a tendency in safety education for the same agency to sponsor all programs. In most cases, this was the department of education. In other cases, there was a shared responsibility between the police and education departments.

Unlike pedestrian education programs, bicycle education programs are essentially locally funded. Teacher training receives more State general funds than any other category. There are exceptions in individual States, but only two States are receiving more than \$20,000 in any school program. Curriculum development and campaigns for bicycle safety generally receive both State and local funds. Federal funding exceeds State and local sources in three of the five States. The only State spending substantial amounts for bicycle education is doing so with State and local money.

New York supersedes all other States in spending for educational program areas. Not only is New York spending money in seven educational program areas, but it is also spending more for each program than most other States combined. The source of funding in New York for FY 75 programs was 65 percent State general fund, and 35 percent local funds. No Federal funds were reported.

E.4 Research, Development, and Evaluation

The majority of States indicated no bicycle RD&E programs, or could not identify the amount spent. The majority of those States having RD&E programs indicated that the

RD&E effort was administered by one agency. RD&E programs can be found in the following departments: parks and recreation, education, public safety, law enforcement, and public works.

Funding for these RD&E programs comes from all government levels: Federal (NHTSA and FHWA), State General Funds, State Highway Users Funds, and local funds. Two States are 100-percent Federally funded, but in most cases, funding is mixed. The one State with substantial RD&E programs received less than 80 percent of its money from Federal sources in FY 74.

Five of the six States spending money for RD&E from FY 72-74 spent less than \$50,000; and of these, four spent less than \$10,000. The sixth spent almost \$2,000,000. Spending is projected to increase during FY 75-77. The one State that has spent almost \$2 million from FY 72-74 is projected to spend at least \$2.7 million for FY 75-77.

Interviews indicated that the funds for bicycle programs were too limited to justify spending for RD&E, and were allocated to other areas. The paucity of local funds is apparent, because local areas look to the State and Federal Governments for any RD&E efforts.

E.5 Accident Investigation and Analysis

Eleven States reported some accident investigation and analysis costs. With the exception of one State, which estimated 39 percent of its accident investigation and analysis dollars as going to bicycles, none spent more than 5 percent. There is no apparent relationship between the total State funds spent on accident investigation and analysis, and the percentage spent on bicycle accident investigation and analysis. Only one city spent 13 percent of its accident investigation and analysis money on bicycle investigation. In most cases, local (city and county) spending for bicycle accident investigation and analysis parallels that of States. Spending levels range from 0 to 5 percent.

E.6 Traffic Law Enforcement

Seven States reported funds spent on traffic law enforcement—all less than 2 percent. Police officers indicated that public opinion inhibited enforcement of bicycle regulations and until the situation is changed, few violators would be cited. Localities issuing pedestrian-bicycle citations believe such action helps reduce accidents. One city claimed that a 27-percent increase in enforcement was followed by a 26-percent decrease in accidents. Most community officials are dissatisfied with the concept of giving bicyclists (especially school-age children) citations. Instead, they are considering violator schools, letters to parents, and judgment by peers.

No statewide regulations for bicycles or bicycle riders are apparent, although officials in some States are considering their implementation. To date, bicycle use has been regulated entirely by local communities and counties. Of the regulations now in effect, registration and licensing are most common. Sixty percent of 15 communities, and the District of Columbia report at least one of the two. Only two communities report that they maintain bicycle inspection.

Where programs do exist they tend to be either voluntary, or mandatory without enforcement provisions. One city which has extensive enforcement of its regulations estimates that 75 percent of the bicycles are registered.

One county is considering computerizing registration information now scattered among separate cities as a means of reducing bicycle theft and tabulating the extent of bicycle usage. Since there are no licensing and registration budgets, this is atypical of the country as a whole. It is generally indicated that most local agencies have neither the time nor interest to funnel their effort into bicycles. Overburdened police are concerned about the additional burden that mandatory licensing would create for them.

E.7 Limitations in Achieving Bicycle Safety

A major restriction and the one stressed most often in the survey, was funding limitations (13 States and eight cities and counties for a combined 24 percent of the total response). Bicycles have changed rapidly from a child's toy to a mode of transportation. A problem closely related to funding is the low priority commonly assigned to bicycle programs. Transportation officials generally resist transferring funds from traditional highway projects to bicycle safety projects. This attitude applies to all types of bicycle programs: construction, education, planning, RD&E, and enforcement. Public opinion is itself divided as to whether or not bicycle programs should be increased or priorities changed; this is a further roadblock in the path of expanded programs. Those areas of the nation where bicycle programs are most progressive tend to be those where citizens groups, bicycle clubs, and concerned individuals have lobbied extensively.

Internal governmental problems limiting bicycle safety effort, consist mainly of a lack of coordination with other departments, inadequate staffs, inadequate staff training, and inadequate planning. Federal, State, and local governments have not sufficiently focused on research, development, and evaluation. The Department of Transportation is presently engaged in activities directed to the promulgation of a program standard for highway safety. Previously, in the absence of a uniform program standard, there had been little research to determine the effectiveness of a "safety program."

Adopting existing roadways for safe bicycle use poses a problem. Since the bicycle is more susceptible to impediments in the road, corollary maintenance of roads for bicycle usage must be incurred. Many existing roadways in the country are unsuited for extensive bicycle use because of narrowness. Local attitudes may determine whether or not a substantial investment is made for safety improvement of existing roadways for safe bicycle usage.

E.8 Priorities—Present and Future—for Bicycle Programs

In both States and localities, the highest priority for bicycle safety funding has been for improved facilities. This includes bikeway construction, traffic control device installation, and route and needs studies. Bikeways represent the largest expenditure of these funds. In cases where the facilities appeared to be the highest funding priority, they generally accounted for 60 percent–70 percent of all projected funding. Next in importance is education, followed by RD&E and planning. Accident investigation and analysis is an area requiring additional coverage, and therefore, additional money. These projected needs closely parallel the present expenditure level in States and localities. Varying needs have bicycle programs ranging from \$4,000 to \$5 million; 56 percent of the States reported needs in excess of \$1 million, with cities and counties reporting smaller amounts.

Over one-half of the States reporting program expenditures cited expenditures in three to four program areas. Although planning and education were frequently mentioned, most

money is going into facilities. In 42 percent of the States, spending for facilities received top priority, succeeded by education and planning. Planning, facilities, and education are the program areas of highest priority, receiving 50 percent of the money expended. RD&E is receiving some funds, but accident investigation and analysis, law enforcement and licensing, registration, and inspection receive negligible support.

E.9 Alternative Sources of Funding

Federal sources, other than DOT, have funds available for pedestrian and bicycle programs. A principal agency is the Department of the Interior where the Bureau of Outdoor Recreation is already funding bikepaths in some states. The Department of Housing and Urban Development specifies that open space programs now include the funding of bikeways, although traditionally they have been excluded.

The following funding sources are available to State or local governments:

- Highway trust funds. Some States are considering highway safety funds as a source for bikepaths, but Oregon is the only State with an extensive plan.
- Private foundations and corporations, especially insurance firms, are already investing in bicycle programs.
- Bicycle sales tax.
- Registration, license, or inspection fees.
- Use of gasoline tax for bicycle pathways.
- Special bonds.

Although these alternatives can be considered as potential sources of funding, no State is using all or even a significant part of these resources. Most officials acknowledge their potential, but are doubtful that these funding sources could be implemented. With the exception of the Federal alternatives, the States and localities perceive other sources as not politically feasible alternatives. The probability that the States and local areas will adopt these funding sources in the near future remains doubtful.

E.10 Innovations in Bicycle Safety

Innovation in bicycle safety has been most apparent in the area of facilities, and alternate roadways for bicyclists. Some cities are using canals, utility, railroad and highway rights-of-way, road medians, and drainage ditches for bicycle routes. Special efforts are being made to place bicycle routes in scenic areas.

Additional experiments involve the linking of bikepaths to the other element in the mobility framework—cars, buses, mass transit. Included are the building of storage racks in train stations, and routing bikes to metro stops. Proposals to incorporate bicycle paths and storage facilities as a required part of all new construction have been submitted for inclusion in zoning codes and city ordinances.

Safety equipment is also in an experimental stage. Among the concepts being examined are: requirements for safety helmets, techniques for making the bicyclist more visible to other road users, and exacting safety standards for bicycle manufacturers.

Education, the most predominant feature of safety activities, is usually the most static. Researchers have found very traditional programs directed at school-age children, with few signs of innovation. Those states aware of their insufficiencies are revising old curricula and reexamining the role of the bicyclist in the mobility system. In addition, police officers are trying alternate ways to treat youthful offenders. Among the more common are citations without court appearances, letters to parents, trials by peer groups, and bicycle safety school.

The activities mentioned above, at best, are merely a beginning. Planning and research, development, and evaluation for bicycles are in a very primitive stage. Until these areas are enriched and coordinated, innovations will remain at very low levels.

F. FINDINGS

F.1 *Review and Evaluation of State and Local Ordinances, Regulations, and Laws Pertaining to Bicyclist Safety*

- Bicycles are not generally included in the definition of a “vehicle” because many of the regulations to which vehicles are subject simply do not apply to bicycles. However, when bicyclists share the roadway with vehicles, they must usually obey the same traffic laws as operators of vehicles.
- Where State laws or municipal ordinances define “bicycle,” they often refer to the number and size of the wheels, apparently in an effort to exclude young children from the legal liabilities associated with traffic laws.
- A legal “no man’s land” exists in the cases of mopeds—bicycles with “helper motors”—and bicycles with one, three, four or more wheels. They are not considered “bicycles,” so they are not regulated.
- Bicyclists are required to follow the same procedures as operators of vehicles when they are involved in accidents on highways and on private property. They must stop, identify themselves, and aid any person who has been injured.
- The bicyclist operates in a legal vacuum when he rides anywhere except on the roadway, where he must obey traffic regulations, and on the sidewalk, where he must generally yield to pedestrians. Where a bicycle path crosses the roadway and when a bicyclist crosses in a crosswalk, the bicyclist neither has the right-of-way, nor is he specifically required to yield or obey crossing signals.
- The legal status of the bicycle and the bicyclist in relation to motor vehicles and pedestrians is not well defined.
- Given that bicycles are not generally defined as vehicles, legislation should perhaps be designed to include the bicycle as a vehicle except where specifically exempted from some provisions of the law such as insurance, inspection, and operator licensing requirements. However, whether bicycles and vehicles should be subject to all the same laws is a question requiring careful evaluation.

- Bicycles have not been included in the definition of “vehicle,” a special provision might be made that children under a specified age would neither be prosecuted for violation of traffic laws, nor be liable in civil actions arising from such violations.
- Either the definition of “bicycle” should be expanded to include conveyances such as mopeds (bicycles with “helper motors”) or separate regulations should be enacted to apply to them.

F.2 Review and Evaluation of Enforcement Policies, Procedures, Methods, Practices, and Capabilities for Enforcing Bicyclist Rules

- Within law enforcement agencies there is a lack of formal statements describing violations, policies, and procedures for dealing with the bicyclist.
- Little data exist on the frequency, type, location, etc., of accidents and the effects of enforcement on frequency of violations and accidents.
- With the exception of some west coast area police departments, enforcement actions against bicyclist violators are infrequent.
- Bicycle safety activities by police agencies are mainly directed toward traffic safety education of school children rather than enforcement for the safety regulations.
- Data suggests that accident-involved bicyclists either did not know or willfully disregarded safety regulations and practices.
- Enforcement of bicycle safety regulations is one of several ways in which the number of bicycle accidents might be reduced.

F.3 Alcohol Involvement in Bicycle/Motor Vehicle Crashes

- The best information available at present suggests that at least 3 percent of all bicycle/motor vehicle accidents involve alcohol use by one of the operators.
- When alcohol-involved crashes do occur, it is usually the motorist who has been drinking in about 78 percent of the cases.
- Data obtained from traffic accident reports probably provide a conservative estimate of the incidence of alcohol-related bicycle-motor vehicle crashes and of the proportion of crashes in which the bicyclist has been drinking.
- No evidence has been found to suggest that the incidence of alcohol-involved bicycle-motor vehicle crashes has increased during the past 5 years.
- The frequency of alcohol-involved bicycle-motor vehicle crashes varies as a function of time of day and day of week. During the day, risk is highest at about 7:00 p.m. During the week, risk is highest on Saturday and Sunday.
- Inferential evidence suggests that the skills required to avoid bicycle-motor vehicle crashes are degraded by alcohol. This inference appears equally valid for motorists and bicyclists.

- Literature from studies in Western Europe indicates that a problem exists with drinking bicyclists and suggests that alcohol-related bicycle accidents could become a serious problem if bicycle usage patterns in this country become more like those in countries where large numbers of adults use bicycles as a primary form of transportation.

F.4 Evaluation of Ways and Means of Improving Bicyclist Safety Programs

- Several factors contribute to bicyclist accidents. Studies suggest that a number of accidents involve bicyclists who have not conformed to traffic regulations. The safety of some riders is further endangered by riding oversized bikes. Additionally, some younger cyclists lack the knowledge, judgment, and skill to effectively operate and control a bicycle. It appears that the frequency of bicycle accidents can be significantly influenced by safety education, enforcement, and engineering programs which are carefully designed and validated.
- Education programs designed to meet the needs of younger and older bicyclists is an immediate response to reduce accidents where the riders are inexperienced in the operation of bicycles. Current educational programs for bicyclists are largely directed toward those of a young age. As adult bicycling increases, greater participation by adults in safety programs can be expected. Information and training should ensure a better-informed cyclist. However, it must be stressed that much more effort must be devoted to the accident reduction effectiveness of existing programs. It must also be recognized that existing education programs may require substantial revision to maximize the return on the investment in this type of program.
- The evaluation of bicyclist laws and enforcement policies and procedures should receive emphasis in safety planning. Licensing and inspection programs may also offer partial solution to safety problems of bicyclists.
- Many engineering countermeasures provide for the safe movement of bicyclists on roadways but cannot be viewed as eliminating the bicycle-motor vehicle conflicts. Engineering bicycles for the maximum safety of riders is an integral measure in bicyclist safety. Bicycle features designed to enhance the bicyclists' capability in operation can reduce accidents and fatalities.
- There seems to be a need for more study of visibility of bicycles and riders.
- The creation of safe play areas and bikeways may also result in a slight reduction of bicyclist accidents and fatalities.
- An analysis of the available studies on bicyclist safety gives some indication of the direction for future research. The extent to which bicyclist safety objectives have been accomplished through existing safety programs has not been established. Research activities should measure the extent of success of current procedures and programs. The absence of data relating bicycle performance to safety suggests an area for further investigation.

F.5 Analysis of Present Funding Allocation of Bicyclist Safety Programs and Assessment of the Capabilities of Federal, State, and Local Governments for Future Funding

- The increasing number of bicycles and bicyclists has had a significant impact on the status of bicyclist programs. The proposal by DOT regarding a highway safety program standard for bicyclist safety and a vocal bicyclists' lobby are only two results of the "bicycle boom" that have substantially affected programs for bicyclist safety.
- Although pressure on State and local public officials by citizens and bicyclist groups has spurred a flurry of activity at all levels of government, bicyclist programs are still seriously neglected in most States, cities, and counties.
- Bicyclist programs are an integral but very small part of most State programs. A review of the States' Annual Work Programs shows that 43 States have some pedestrian or bicyclist safety programs, but the majority of states indicate expenditures of less than \$100,000 each in FY 74.
- The low priority assigned to bicyclist activities inhibits the aggressive fostering of program activities by officials in this area. Allocation of staff time and funds varies and is not consistent with safety requirements and needs. Most program activities are minimally pursued.
- Despite the fact that planning and public information and education are the most commonly mentioned program areas for State and local bicyclist spending, most expenditures are focused on bicycle facilities, especially bicycle paths.
- Funding is the greatest obstacle to adequate bicyclist safety programs. Extensive activity in all program areas is absent because of insufficient funding allocations.
- State and local funding of bicyclist programs has been for improved facilities. This includes bikeways, overpasses, traffic control devices, and special provisions. Next in importance are public information and education, followed by planning.
- Spending for the enforcement of bicyclist laws is usually less than 2 percent of law enforcement budgets.
- RD&E, accident investigation and analysis, and enforcement are receiving negligible support or attention.

G. RECOMMENDATIONS

G.1 Review and Evaluation of State and Local Ordinances, Regulations, and Laws Pertaining to Bicyclist Safety

- Causal factors in bicycle accidents should be studied to determine those amenable to correction through adoption of appropriate regulations. Model legislation should be developed for those factors for which adequate regulations do not currently exist.

- Uniformity of bicycle safety regulations should be sought throughout the country, especially as related to the accident causal factors discussed above.
- New laws should be enacted defining the rights and responsibilities of the bicyclist when riding in crosswalks and when bicycle paths cross the roadway. In addition, rules of the road for bicycles should be made applicable to bicycles operating anywhere on the highway—not just on the roadway.
- The importance of defining the rights and obligations of the bicyclists on the highway must be recognized by lawmakers and elected officials. With increased bicycle usage, enactment of rules and regulations in this area is necessary. But adequate levels of enforcement and application of laws is essential for them to be effective in ensuring bicyclist safety.
- A thorough evaluation should be made to determine whether bicycles and vehicles should be subject to all of the same laws.
- If bicycles are included in definitions of “vehicle,” there should be a special provision exempting children under a certain age from prosecution for violation of traffic laws.
- Either conveyances such as mopeds should be included in the definition of “bicycle,” or separate regulations specifically applicable to them should be enacted.
- New laws specifically defining rights and responsibilities of bicyclists in crosswalks and in bicycle paths crossing the roadway should be enacted, and existing rules of the road should be made applicable to bicycles operating not just on the roadway, but also on the highway.

G.2 Review and Evaluation of Enforcement Policies, Methods, Practices, and Capabilities for Enforcing Bicyclist Rules

- Statements of policy and/or directives relating to bicyclist accidents and enforcement do not exist in most law enforcement agencies. In order to achieve the goal of establishing directives for the enforcement of legislation affecting bicyclists, appropriate agencies and officials must:
 - Bring to the awareness of the public and of individuals responsible at all levels of government the facts pertaining to bicyclist safety.
 - Develop and promulgate written procedures or directives describing methods of dealing with bicyclist violations.
 - Encourage participation in both enforcement and safety education activities by enforcement personnel. Police department administrators should emphasize to officers the importance of taking appropriate countermeasures against bicyclists and/or against motorists who violate the rights of bicyclists.
- A first step toward improving development and enforcement of policies and procedures on bicyclist should be an effort to determine the nature and extent of the problem. This effort should be made not only in local jurisdiction but also at

county and State levels. Further study should be made of the nature and effect of current enforcement activities (such as verbal warnings given to bicyclists for traffic violations) and adjudication procedures. Such information could provide guidelines for the development and implementation of corrective measures.

- One of the primary enforcement problems is the lack of information available to enforcement agencies. Such information is necessary for an accurate definition of the problems associated with bicyclist safety. Implementation of adequate data collection procedures is recommended.
- Traffic records should be kept for bicyclists as well as for motorists.
- A selective enforcement program should be planned so that available manpower is directed to those places where accidents are occurring, at the times when they occur, for the purpose of enforcing regulations against those violations which cause accidents, and by taking appropriate actions against violators.
- The effectiveness of safety education directed at parents of school age children has not been determined and should be investigated. Pending development of proven effective educational countermeasures resulting from studies such as noted above, it would seem desirable on an interim basis to initiate police traffic safety education efforts directed at parents of preschool children and at grammar school through high school age students, with particular emphasis on the grammar school students.
- If the analysis of accidents confirms that an unusually large number of children at certain ages are accident problems, specialized educational efforts should be directed toward parents of such groups and toward those children through the school system.
- The police department and the municipal court should jointly agree upon important issues pertaining to bicycle accidents and enforcement of regulations.
- Supervision and coordination of all bicyclist safety programs should be centralized.
- The courts should be apprised of the substantial involvement of bicyclists in accidents.
- Programs appropriate to the rehabilitation of violators of bicyclist regulations should include information directed toward adult bicyclist violators, and such education and rehabilitation should be directed toward appropriate defendants.
- A traffic school, appropriate for attendance by both juvenile and adult offenders, should be developed and made operational.
- Officers must be made aware of the importance of taking appropriate countermeasures against bicyclist violators and/or against motorists who violate the rights of bicyclists.

G.3 Alcohol Involvement in Bicycle-Motor Vehicle Crashes

- A higher level of the reporting applied to drinking motor vehicle drivers should apply to drinking bicyclists.

- Data on alcohol-related bicycle-motor vehicle crashes, including information on which operator has been drinking, should be maintained in a separate accident category.
- Uniform criteria for recording and reporting data must be established across the country. This is crucial for the further study of patterns of alcohol usage and the development of countermeasures.

G.4 Ways and Means of Improving Bicyclist Safety

Throughout this report, a broad range of traditional and innovative measures to prevent bicyclist accidents has been discussed. These measures have included adoption of uniform traffic laws and ordinances, improved traffic law enforcement, judicial remedies, increased visibility of bicyclists and bicycles, improved design of the bicycle, education and training of riders and motorists, construction of bikeway facilities, and redesign of highway systems. While many of the programs applying one of more of these proposed accident countermeasures may have resulted in the prevention of bicyclist accidents, the regrettable fact remains that very little effort has been devoted to validly assessing the effect or lack of effect of these activities on the incidence of bicyclist accidents. By far, the greatest research need is for a concerted effort to assess the effectiveness of proposed bicyclist accident countermeasures so that ineffective measures can be discarded and emphasis placed on those countermeasures of proven effectiveness. It is therefore recommended that major emphasis be placed on research designed to delineate specific causal factors in bicyclist accidents and to devise measurements for the effectiveness of current countermeasures.

G.5 Federal, State, and Local Bicyclist Safety Funding and Funding Capabilities

- Planning and fiscal records should be maintained so that allocations and expenditures are reported by separate categories which enable the identification of bicyclist funding.
- Bicyclist programs should be a significant component of all State highway safety programs, and planning staff and program activities for bicyclist safety should be expanded. A balanced program should be developed concurrent with the expansion of facilities.
- Future programmatic and funding requirements must take into consideration that needs will spiral. Funding limitations are the greatest deterrent to providing adequate bicyclist safety programs. Bicyclist programs which maximally respond to public needs will require substantial commitment of funds. Funding and programmatic assistance from all sources should be thoroughly utilized. Alternative sources of funding must be explored and utilized in fulfilling Federal and local responsibilities to bicyclists.
- Commitment of funds from all levels of government is needed to establish and maintain bicyclist safety programs, for the expansion of research and evaluation programs, and for innovation in activities and programs.