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URBAN PEDESTRIAN ACCIDENT COUNTERMEASURES EXPERIMENTAL EVALUATION

Volume II - Accident Studies

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16. Abstract

A pedestrian accident data collection system was established in six major cities. The system involved using the regular police accident report form and a specifically designed supplementary data form. The information on the forms was combined, and the precipitating and predisposing factors, as well as the distribution of accident types in the accident data base, were determined. Such a data collection system, when fully operational, can provide a great deal of useful information and appears to be very appropriate for use in an accident-based evaluation of pedestrian safety countermeasures designed to impact upon specific types of urban pedestrian accidents. Descriptive data on 2,044 pedestrian accidents from the six study cities is presented.

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ABSTRACT

This Volume describes the procedures and results associated with the second task of a three-task study. Task I consisted of a behavioral evaluation of nine pedestrian countermeasures. It was described in Volume I. Task II consisted of the preparation for an accident-based evaluation of pedestrian countermeasures and the development of baseline information. It is described in this Volume. Task III consisted of a survey of educational and instructional pedestrian safety material and is described in Appendix A of this report.

A pedestrian accident data collection system was established in six major cities. The system involved using the regular police accident report form and a specifically designed supplementary data form. The information on the forms was combined, and the precipitating and predisposing factors, as well as the distribution of accident types in the accident data base, were determined. Such a data collection system, when fully operational, can provide a great deal of useful information and appears to be very appropriate for use in an accident-based evaluation of pedestrian safety countermeasures designed to impact upon specific types of urban pedestrian accidents.

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CHAPTER 1

INTRODUCTION

The seriousness of the pedestrian accident problem has been frequently reported. The sheer magnitude of the numbers, 400,000 injuries and 10,000 fatalities annually, dramatizes the importance of the problem. The Department of Transportation has been actively concerned with the problem since 1969 when a DOT sponsored accident investigation study was funded.* That study revealed that urban pedestrian accidents tend to have certain common behavioral elements. After investigating over 2,000 accidents, Snyder and Knoblauch developed a series of "accident types" which characterized the recurring behavioral antecedents of the urban pedestrian accidents. Based on this accident typology a series of countermeasures were identified to ameliorate the behavioral and/or environmental antecedents of the various accident types. Volume I of this report described a series of behavioral studies that were performed to evaluate the effectiveness of those countermeasures and certain other countermeasures in inhibiting the undesirable vehicular and pedestrian behavior associated with the various accident types.

This volume of the final report describes the establishment of a pedestrian accident data collection system in several cities. The police accident report forms were modified (through the use of a supplementary form) so that the behavioral antecedents associated with pedestrian accidents could be determined. These factors, in turn, permit the determination of the distribution of accident types in each of the sample cities. This data base is to be used in the design of a study to be conducted under a separate contract in which the accident reduction effectiveness of various countermeasures will be evaluated. The procedures followed to establish the accident data collection system and the results of the accident data analysis will be described. Finally, Appendix A to this volume contains recommendations for improving the effectiveness of pedestrian safety related materials and messages. The recommendations are based on a survey of existing pedestrian safety information.

The remainder of this volume is devoted to describing the development of a pedestrian accident data base in several cities. The procedures followed in developing the data base and the results of the first year of data collection will be discussed.

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*Snyder, M.B., Knoblauch, R.L. Pedestrian Safety: The Identification of Precipitating Factors and Possible Countermeasures. Volumes I and II. Final Report. Operations Research, Inc., Contract DOT FH-11-7312, NHTSA January 1971.

Rationale

Basically there were three major reasons for performing this phase of the project. First, we intended to verify or possibly extend the results of the previously mentioned study. Snyder and Knoblauch (1971) reported the distribution of accident types among 13 major cities. It would be of great value to determine whether this distribution is similar in a different sample of cities. In most cases, the cities included in the present sample are somewhat smaller than those reported on in the ORI report.

Secondly, we intended to determine the feasibility of determining the accident types from the regular police accident report and some very limited supplementary data that were being collected. Snyder and Knoblauch had determined the accident types from data collected by field investigators who visited the accident sites and interviewed the pedestrians and drivers involved. Our goal was to use the far less costly approach of using the regular police accident report and some limited additional data provided by the investigating officer in order to determine the accident types.

Finally, we intended to determine some of the pedestrian accident characteristics of the sample cities. Future Federal efforts will be directed toward determining the accident reducing effectiveness of various pedestrian countermeasures. Depending on the accident type distribution and other pedestrian accident characteristics, it is a distinct possibility that some of the cities in the present sample will be asked to host this accident evaluation study.

CHAPTER 2

METHODOLOGICAL PROCEDURES

The purpose of this Chapter is to document the procedures followed in developing the accident data collection operation. Basically, the issue was one of determining what data would be collected, where the data should be collected, and, finally, determining how the collected data should be processed. The following topics are discussed:

Identification of Required Data Items

Identification of Existing Accident Data Items

Identification of Necessary Supplementary Data Items

Data Collection Procedures

Identification of Required Data Items

In order to identify the required data items, a somewhat pragmatic approach was used. First, current police accident forms were reviewed to determine what data are presently being collected on pedestrian accidents. Second, the predisposing and precipitating factors for each target accident type were analyzed to determine what information is needed in order to place a given accident in the typology. The following two subsections provide a more detailed discussion of this process.

Police accident report forms from ten major cities* were examined to determine the type of information that is collected on pedestrian accidents. It was found that three general classes of information were collected:

1. Identification
2. Site Description
3. Accident Description

The identification information is concerned largely with specifying the individuals, their addresses and the particular location of the accident. The majority of this information, with the exception of the driver's and the pedestrian's age, sex, and the location of the accident, is of little interest in the present effort.

*Not necessarily the cities currently under consideration, as potential study sites were not identified at the time.

The site description information, typically a series of checklist items of environmental, climatic, and traffic engineering oriented data, in most cities adequately characterized the accident site. Characterization is needed only at a sufficient level of detail so as to determine if the site might be a potential candidate for a particular countermeasure or group of countermeasures.

The accident description data tended to be oriented more heavily to vehicle-vehicle accidents than to vehicle-pedestrian accidents. Typically, several checklists of driver and vehicle actions were provided while only one rather general group of pedestrian actions was listed. Often the pedestrian actions were lists of not necessarily mutually exclusive events, yet the officer was instructed to "check one" whereas "check all that apply" would have been more useful as far as the present study is concerned.

In initial contacts with several cities it was determined that there was a practical limit on how much additional information the police would be willing to collect on each pedestrian accident. In order to minimize the amount of overlapping and/or similar information that the police would have to collect, the response categories for the various data items were carefully reformatted. This was done most frequently by collapsing response categories so that infrequent or noncritical responses were grouped together. For example, one city might have rain, snow, or fog as the response categories for weather; another might have rain, snow, fog and mist. In cases like this, the responses for the required data items become: rain, snow, and fog or mist. By doing this, the response categories from the two cities become compatible with no additional effort on the part of the reporting officer in either city.

By carefully examining the police accident report forms, it was possible to structure the response categories of the required pedestrian accident data items so that they were compatible with the ones already being used by the cities. Of course, in some cases, this does result in a loss of some information. We will, citing the previous example, be unable to distinguish between fog or mist at the accident site. Given the restrictions on the reporting time, it was determined that the loss of detail at this level is not important. It is far more desirable to have the officer concentrate on providing the behavioral data (i.e., driver action and pedestrian action) needed to identify the various accident types.

As previously discussed in Volume I, each of the target accident types have associated predisposing and precipitating factors. In order to determine the effectiveness of a given countermeasure, it is necessary to determine if the accidents occurring are target accident types for the countermeasure being evaluated. Thus, for the purposes of the accident study, it is necessary to determine the types of accidents that occur. However, it is possible that certain countermeasures will effectively deter one type of undesirable pedestrian behavior, and another type of counterproductive behavior will emerge. Thus, the countermeasures might not be

considered effective even though one of the target behaviors was effectively modified. Therefore, it would appear to be desirable to do more than "type" each accident. The proposed plan is to have data on selected precipitating and predisposing factors collected. This information is sufficiently detailed to permit a determination of accident type as well as to describe the various contributing circumstances. This level of detail will also permit additional accident types to be developed should they emerge during the course of the project or after the various countermeasures have been implemented.

Thus, a number of required pedestrian accident data items were developed. They included a combination of the items already collected on the police accident report form and certain additional data items that are needed if the accident type of each accident is to be determined. Table 2-1 shows this list of required data items formatted as a Master Coding Form. All of this information had to be collected in a compatible, codable format in order to achieve the study objectives.

Identification of Existing Accident Data Items

In order to determine what additional accident data would be needed to supplement the information already being collected, a detailed analysis of the police accident reports in the study cities was performed. This currently collected information was compared with the required data items just discussed. For each city a list of missing or incomplete data items was developed and reformatted into an add-on form for use by local police officers. Police accident report forms for each of the candidate cities were examined to determine which of the required data items were routinely collected. This included only that information which was contained in the checklist or short answer items; it became apparent that the written accident description was too idiosyncratic and unstructured to be relied upon for consistent, reliable information. Although certain information is frequently indicated in the written description, it is largely up to the discretion of the reporting officer.

Table 2-2 shows the data items currently being collected by nine major city police departments (note that some cities in addition to those in the sample are included). It can be seen that most of the descriptive information is collected by the majority of the cities. The most consistent gaps occur in the categories involving the pedestrian and driver behavioral actions.

Table 2-1

Master Coding Form: Pedestrian Accident Summary

Coder _____
Date _____

Card Number . 1

CITY: 01 Akron 02 Columbus 03 Miami 04 New York City 05 San Diego 06 San Jose 07 Toledo 08 D.C. . . . 2,3

ACCIDENT NUMBER: Code Police Accident Report No., Justify Left 4-10

DATE: Code Month (11, 12) Day (13, 14) Year (15, 16) 11-12, 13-14, 15-16

TIME: Military Time (18-21) DAY OF WEEK: 22-1 Sun 22-2 Mon 22-3 Tue 22-4 Wed 22-5 Thur 22-6 Fri 22-7 Sat 18-21,22

DRIVER–AGE: (23, 24) DRIVER–SEX: 25-1 Male 25-2 Female 25-3 Hit and Run 23-24, 25

PEDESTRIAN–AGE: (26, 27) PEDESTRIAN–SEX: 28-1 Male 28-2 Female 26-27,28

PEDESTRIANS INJURED: Code no. of injured peds. in Col. 29. Complete separate form for each ped. 29

INJURY SEVERITY: 30-1 Fatal 30-2 Serious 30-3 Moderate 30-4 Slight 30-5 None 30

LIGHT CONDITIONS: 31-1 Daylight 31-2 Dawn or Dusk 31-3 Dark 31

WEATHER CONDITIONS: 32-1 Clear or Cloudy 32-2 Rain 32-3 Snow or Sleet 32-4 Fog or Mist . 32-5 Other _____ 32

ROADWAY CONDITIONS: 33-1 Dry 33-2 Wet 33-3 Snow, Ice or Mud 33-4 Other _____ 33

TYPE OF VEHICLE: 34-1 Car 34-2 Taxi 34-3 Bus 34-4 Truck 34-5 Other _____ 34

TYPE OF ROAD: 35-1 Two-way 35-2 One-way 35-3 Divided 35-4 Expressway 35-5 Other _____ 35

TYPE OF AREA: 36-1 Resid. 36-2 Comm. 36-3 Indust. 36-4 Undev. 36-5 School 36-6 #1,2 36-7 #1,3 36-8 #2,3 36-9 Other _____ 36

TRAFFIC CONTROL: 37-1 Red,Green,Amber Signal 37-2 Stop or Yield Sign 37-3 None 37-4 Other _____ 37

THE VEHICLE WAS: 39-1 Proceeding Straight 39-2 Backing 39-3 Turning Right 39-4 Turning Left
39-5 "U" Turning 39-6 Stopped in Traffic 39-7 Starting in Traffic 39-8 Stopping or Slowing 39
40-1 Entering or Leaving Parking Space 40-2 Other _____ 40

THE ACCIDENT OCCURRED: 41-1 At an intersection 41-2 Not at an intersection 41
42-1 In a marked crosswalk 42-2 In an unmarked crosswalk 42-3 Not in a crosswalk 42
43-1 With the street lights on 43-2 With a pedestrian signal present 43-3 #1,2 43

NUMBER OF TRAFFIC LANES: Code no. of traffic lanes, do not include parking lanes 44

THE PEDESTRIAN WAS STRUCK: 45-1 In the 1st traffic lane entered 45-4 In the 4th traffic lane entered 45-7 In the parking lane
45-2 In the 2nd traffic lane entered 45-5 In the 5th traffic lane entered 45-8 While not in the roadway
45-3 In the 3rd traffic lane entered 45-6 After crossing more than 5 lanes 45

THE DRIVERS VISION WAS BLOCKED BY: 46-1 Standing traffic 46-2 A parked vehicle 46-3 A bus at a bus stop 46-4 Other _____ 46

THE DRIVER: 47-1 Did attempt evasive action,swerved or braked to avoid pedestrian 47
49-1 Was attending to traffic and failed to see pedestrian 50-1 Was under the influence of alcohol or drugs 49,50
51-1 Was exceeding the speed limit 52-1 Was engaged in a turning or merging maneuver 51,52
53-1 Made an improper turn 54-1 Disobeyed a sign or signal 53,54

THE PEDESTRIAN CROSSED: 55-1 From behind a parked vehicle 56-1 Against the signal 55,56
57-1 At a bus stop In front of the bus 57-2 At a bus stop Behind the bus 58-1 In front of standing traffic. 57,58

THE PEDESTRIAN WAS: 59-1 Running 60-1 Going to or from an ice cream truck or vendor 59,60
61-1 Crossing with other pedestrians 62-1 Not attempting to cross the roadway 61,62
63-1 Getting in or out of vehicle 64-1 Not aware that the vehicle was backing up 63,64

THE PEDESTRIAN: 65-1 Appeared suddenly in the path of the vehicle 66-1 Walked or ran into the vehicle 65,66
67-1 Was working on or pushing a vehicle 68-1 Was working in roadway 68-2 Was playing in roadway . . 67,68
69-1 Attempted evasive action to avoid the vehicle 70-1 Was under the influence of alcohol or drugs . . . 69,70

ACCIDENT TYPE: Subjective typing by Coder 76,77

DEGREE OF CERTAINTY IN ACCIDENT TYPING: 78-1 Positive 78-2 Reasonably Certain 78-3 Uncertain 78

ACCIDENT TYPE: Objective typing by Sorting Program (Coder; leave blank) 79,80

Card No.	Ident.	ACCIDENT LOCATION: House Number	ON: Street Name	St.,Rd. Etc.	Feet	N.S. E.W.	At or of	Street Name	St.,Rd. Etc.	Quadrant or Area	Type
2	Same as Card 1										Same as Card 1
1	2 — 16	18 19 20 21 22 23	25 26 27 28 29 30 31 32 33 34	36 37	39 40 41 42	44 45	47 48	50 51 52 53 54 55 56 57 58 59	61 62	64 65 66 67	76 — 77

Table 2-2

Accident Data Reported by Selected Cities

X available on regular police accident report
Xrc available on regular police accident report; some recoding necessary
Xfi available on regular police accident report; as fill-in the blank response
S available from secondary sources, i.e., city traffic engineer

Remaining Data Items to be included in "Add-on Form"

DATA ITEMS	D.C.	N.Y.	MIAMI	SAN DIEGO	SAN JOSE	AKRON	CLEVE	COLUM	TOLEDO
DATE	X	X	X	X	X	X	X	X	X
TIME	X	X	X	X	X	X	X	X	X
DAY OF WEEK	X	X	X	X	X	X	X	X	X
DRIVER: Age	Xrc	X	Xrc	X	Xrc	X	X	X	X
Sex	X	X	X	X	X	X	X	X	X
PED #1 : Age	Xrc	X	Xrc	X	Xrc	X	X	X	X
Sex	X	X	X	X	X	X	X	X	X
PED #2 : Age	Xrc	X	Xrc	X	Xrc	X	X	X	X
Sex	X	X	X	X	X	X	X	X	X
APPARENT SEVERITY									
Fatal	X	X	X	X	X	X	X	X	X
Serious	X	X	X	X	X	X	X	X	X
Moderate	X		X	X	X	X	X	X	X
Slight	X	X	X	X	X	X	X	X	X
None	X	X	X	X	X	X	X	X	X
ACCIDENT LOCATION	X	X	X	X	X	X	X	X	X
LIGHT CONDITIONS									
Daylight	X	X	X	X	X	X	X	X	X
Dawn or Dusk	X	X	X	X	X	X	X	X	X
Dark	X	X	X	X	X	X	X	X	X
WEATHER CONDITIONS									
Clear or Cloudy	X	X	X	X	X	X	X	X	X
Rain	X	X	X	X	X	X	X	X	X
Snow or Sleet	X	X	N/A	N/A	N/A	X	X	X	X
Fog or Mist	X	X	X	X	X	X	X	X	X

Table 2-2 (Continued)

Accident Data Reported by Selected Cities

DATA ITEMS	D.C.	N.Y.	MIAMI	SAN DIEGO	SAN JOSE	AKRON	CLEVE	COLUM	TOLEDO
ROADWAY CONDITIONS									
Dry	X	X	X	X	X	X	X	X	X
Wet	X	X	X	X	X	X	X	X	X
Snow, Ice, or Mud	X	X	X	X	X	X	X	X	X
TYPE OF VEHICLE									
Car	X	X	Xfi	Xfi	X	Xfi	Xfi		
Taxi	X	X	Xfi	Xfi		Xfi	Xfi		
Bus	X	X	Xfi	Xfi	X	Xfi	Xfi		
Truck	X	X	Xfi	Xfi	one code	Xfi	Xfi		
Tractor-Trailer	X	X	Xfi	Xfi		Xfi	Xfi		
Other _____	X	X	Xfi	Xfi	X	Xfi	Xfi		
ROADWAY TYPE									
# of driving lanes	S	S	X	S	S	X	X	X	X
Divided roadway	S	S	X	S	S	X	X	X	X
Expressway, freeway	S	S	X	X	S	X	S	X	X
One-way street	S	S	S	X	S	X	S	S	S
Two-way surface street	S	S	X	X	S	S	S	S	S
Other, specify	S	S	X	S	S	S	S	X	S
LOCALITY									
Residential	S	S	X	S	S	X	X	X	X
Commercial, stores	S	S	X	S	S	S	X	X	S
Industrial, manufactng	S	S	S	S	S	S	X	X	S
Undeveloped, open	S	S	X	S	S	X	X	X	X
Other, specify	S	S	X	S	S	S	X	X	S

Table 2-2 (Continued)

Accident Data Reported by Selected Cities

DATA ITEMS	D.C.	N.Y.	MIAMI	SAN DIEGO	SAN JOSE	AKRON	CLEVE	COLUM	TOLEDO
TRAFFIC CONTROL									
Police officer, school guard, watchman		X		X	X	X	X	X	X
Red, grn, amber signal	X	X	X	X	X	X	X	X	X
Signal w/ ped control	S	S	X	S	S	S	S	S	S
Flashing light signal	X	X	X	X	X	S	S	S	S
Stop or yield sign	X	X	X	X	X	X	S	X	X
None	X	X	X		X		X	X	X
VEHICLE ACTION									
Proceeding straight	X	X	X	X	X	X	X	X	X
Backing	X	X		X	X	X	X	X	X
Turning right	X	X		X	X	X	X	X	X
Turning left	X	X		X	X	X	X	X	X
"U" turn	X	X		X	X	X	X	X	X
Stopped in traffic	X	X		X	X		X		X
Starting in traffic		X		X		X	X	X	X
Stopping or slowing			X			X	X	X	X
Entering or leaving parking	X		X	X	X	X	X	X	X
# LANES PED CROSSED									
Number ____ 1 thru 5									

Table 2-2 (Continued)

Accident Data Reported by Selected Cities

DATA ITEMS	D.C.	N.Y.	MIAMI	SAN DIEGO	SAN JOSE	AKRON	CLEVE	COLUM	TOLEDO
ACCIDENT SITE CHARAC.									
Nonintersection	Xrc	Xrc	X	X	X	Xrc	Xrc	X	Xrc
Intersection	Xrc	Xrc	X	X	X	X	Xrc	X	Xrc
Ped not in roadway		X	X	X	X	X	X	X	X
Crossing not attempted									
Not in crosswalk	X	X		X	X				
In marked crosswalk					X				
In unmarked crosswalk	X				X				
Ped control ("walk, don't walk") present									
Street lights on	X	X	X				Xrc		
DRIVER ACTIONS									
Failed to signal		X		X			X		
Disobeyed signal/sign	X	X	X	X	X	X	X	X	X
Improper turn	X	X	X	X	X	X	X	X	X
Exceeding lawful speed	X	X	X	X	X	X	X	X	X
Attempted evasive action									
Vision obscured by standing or moving traffic									
Resident of city	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc
Mechanical defect	X	X	X	X	X		X	X	X
Ability impaired, alcohol, etc.	X	X	X	X	X	X	X	X	X
Other, specify	X	X							

Table 2-2 (Continued)

Accident Data Reported by Selected Cities

DATA ITEMS	D.C.	N.Y.	MIAMI	SAN DIEGO	SAN JOSE	AKRON	CLEVE	COLUM	TOLEDO
PEDESTRIAN ACTIONS									
Entered roadway betwn parked cars	X	X		X	X		X		
Entered roadway in front of bus									
Entered roadway behind bus									
Entered roadway in front of stand. traffic									
Crossed against signal									
Going to or from ice cream truck									
Crossing with others									
Walked/ran into vehicle									
Getting on/off vehicle		X	X	X	X	X	X	X	X
Pushing or working on vehicle			X	X		X	X	X	X
Working in roadway		X	X		X	X	X	X	X
Appeared suddenly in path of vehicle									
Ped. resident of city	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc	Xrc
Ability impaired, alcohol, etc.	X	X	X	X	X	X	X	X	X

Identification of Necessary Supplementary Data Items

Once it was determined which data items are routinely collected, it was possible to use Table 2-2 to identify the data items that should be included in a supplementary form if, in fact, we were to collect all of the required data items on each pedestrian accident. Tables 2-3 through 2-8 contain the supplementary data collection forms as used in each of the six study cities. It should be noted that they were printed on blue paper and provided with a bold cross-hatched area to increase their visibility to the investigating officer and thus increase the likelihood of his completing the form for each pedestrian accident he investigated.

Data Collection Procedures

The actual implementation of the expanded data collection system, (i.e., having the supplementary accident report forms completed by the investigating officer) involved a number of practical problems and decisions:

Definition of the accident population

Quality control of collected data

Local collection and storage of data

Central storage, reduction and analysis of the data.

In each sample city it was necessary to define the accident population about which additional data were to be collected. Ideally, of course, we would like to have the complete data for every pedestrian accident occurring in each city. Unfortunately many practical, real world constraints in each of the various cities make this impossible. For example, many cities have Accident Investigation Units (A.I.U.) of specially trained officers who investigate some fraction of all of the accidents. In many cases, this includes most, if not all, of the injury accidents. Since the officers who are not in the A.I.U. would rarely investigate a pedestrian accident, many city police officials felt that it would be impractical to train *all* the officers to collect the supplementary data. Most city police officials were willing to commit only the A.I.U. to the collection of additional data. In working out the accident population definition with the various cities the most critical issues were: (1) securing a relatively unbiased sample of all pedestrian accidents, and (2) assuring that the characteristics of the sample were well defined (replicatable).

In order to determine if additional instructions, item modification, or corrective police training were necessary, the filed accident reports were reviewed when they were received from the various cities. In several cases the supplementary form was modified and reprinted after the first month of data collection. In those cities care was taken so that the formats were compatible.

Table 2-3

Supplementary Form for Akron, Ohio

AKRON FORM 2
(Replaces Form 1; Discard Form 1)

LOCATION

Accident Occurred on _____ St., Ave., Etc.

At Intersection With _____ St., Ave., Etc.

Or, If

Not at Intersection Indicate _____ Number of feet North, South, East or West Of _____ Nearest Intersecting St., Ave., etc.

Accident Number _____ (4-10) Time of collision _____ (18-21)

Date of collision _____ (11-16) Completed by _____

SUPPLEMENTARY PEDESTRIAN DATA

- To be completed for all pedestrian injury accidents
- Check all items that apply
- Forward through normal channels with the regular accident report form
- The following information is being collected for research purposes only

THE ACCIDENT OCCURRED:
42-1 ☐ In a marked crosswalk 42-2 ☐ In an unmarked crosswalk 42-3 ☐ Not in a crosswalk
43-1 ☐ With the street lights on 43-2 ☐ With a pedestrian signal ("Walk, Don't Walk") present

NUMBER OF TRAFFIC LANES:
44- ☐☐ Indicate total number of traffic lanes (do not include parking lanes)

THE PEDESTRIAN WAS STRUCK:
45-1 ☐ In the 1st traffic lane entered 45-5 ☐ In the 5th traffic lane entered
45-2 ☐ In the 2nd traffic lane entered 45-6 ☐ After crossing more than 5 lanes
45-3 ☐ In the 3rd traffic lane entered 45-7 ☐ In the parking lane
45-4 ☐ In the 4th traffic lane entered 45-8 ☐ While not in the roadway

THE DRIVERS VISION WAS BLOCKED BY:
46-1 ☐ Standing traffic
46-2 ☐ A parked vehicle
46-3 ☐ A bus at a bus stop 46-4 ☐ Other

THE DRIVER:
47-1 ☐ Did attempt evasive action, swerved or braked to avoid the pedestrian
49-1 ☐ Attending to oncoming traffic and failed to see the pedestrian
51-1 ☐ Was exceeding the speed limit
52-1 ☐ *Was engaged in a turning or merging maneuver*

THE PEDESTRIAN CROSSED:
55-1 ☐ From behind a parked vehicle 56-1 ☐ Against the signal
57-1 ☐ At a bus stop in front of the bus 57-2 ☐ At a bus stop behind the bus
58-1 ☐ In front of standing traffic

THE PEDESTRIAN WAS:
59-1 ☐ Running 60-1 ☐ Going to or from an ice cream truck or vendor
61-1 ☐ Crossing with other pedestrians 62-1 ☐ Not attempting to cross the roadway
64-1 ☐ Not aware that the vehicle was backing up

THE PEDESTRIAN:
65-1 ☐ Appeared suddenly in the path of the vehicle
66-1 ☐ Walked or ran into the vehicle
69-1 ☐ Attempted evasive action, swerved or slowed to avoid the vehicle

OTHER NOTES OR COMMENTS: _____

COMPLETE FORM FOR EACH PEDESTRIAN ACCIDENT

Table 2-4

Supplementary Form for Miami, Florida

MIAMI FORM 2
(Replaces Form 1, Discard Form 1)

LOCATION

Accident Occurred on _____ St., Ave., Etc.

At Intersection With _____ St., Ave., Etc.

Or, If

Not at Intersection Indicate _____ No. of Feet North, South, East or West Of _____ Nearest Intersecting St., Ave., Etc.

Date of collision _____ Time of collision _____

Accident Number _____ Completed by _____

SUPPLEMENTARY PEDESTRIAN DATA

- To be completed for all pedestrian injury accidents
- Check all items that apply
- Forward through normal channels with the regular accident report form
- The following information is being collected for research purposes only

TYPE OF ROAD:
- 35-1 ☐ Two-way city street
- 35-2 ☐ One-way city street

THE VEHICLE WAS:
- 39-2 ☐ Backing
- 39-5 ☐ "U" Turning
- 39-6 ☐ Stopped in traffic
- 39-7 ☐ Starting in traffic
- 40-1 ☐ Entering or leaving parking space
- 40-2 ☐ Other, specify _____

THE ACCIDENT OCCURRED:
- 42-1 ☐ In a marked crosswalk
- 42-2 ☐ In an unmarked crosswalk
- 42-3 ☐ Not in a crosswalk

NUMBER OF TRAFFIC LANES:
- 44- ☐☐ Indicate total number of traffic lanes (do not include parking lanes

THE PEDESTRIAN WAS STRUCK:
- 45-1 ☐ In the 1st traffic lane entered
- 45-2 ☐ In the 2nd traffic lane entered
- 45-3 ☐ In the 3rd traffic lane entered
- 45-4 ☐ In the 4th traffic lane entered
- 45-5 ☐ In the 5th traffic lane entered
- 45-6 ☐ After crossing more than 5 lanes
- 45-7 ☐ In the parking lane
- 45-8 ☐ While not in the roadway

THE DRIVERS VISION WAS BLOCKED BY:
- 46-1 ☐ Standing traffic
- 46-3 ☐ A bus at a bus stop

THE DRIVER:
- 47-1 ☐ Did attempt evasive action, swerved or braked to avoid the pedestrian
- 49-1 ☐ Was attending to oncoming traffic and failed to see the pedestrian
- 52-1 ☐ Was engaged in a turning or merging maneuver

THE PEDESTRIAN CROSSED:
- 55-1 ☐ From behind a parked vehicle
- 57-1 ☐ At a bus stop in front of the bus
- 57-2 ☐ At a bus stop behind the bus
- 58-1 ☐ In front of standing traffic

THE PEDESTRIAN WAS:
- 59-1 ☐ Running
- 60-1 ☐ Going to or from an ice cream truck or vendor
- 61-1 ☐ Crossing with other pedestrians
- 62-1 ☐ Not attempting to cross the roadway
- 64-1 ☐ Not aware that the vehicle was backing up

THE PEDESTRIAN:
- 65-1 ☐ Appeared suddenly in the path of the vehicle
- 66-1 ☐ Walked or ran into the vehicle
- 69-1 ☐ Attempted evasive action, swerved or slowed to avoid the vehicle

OTHER NOTES OR COMMENTS: _____

COMPLETE FORM FOR EACH PEDESTRIAN ACCIDENT

Table 2-5

Supplementary Form for New York City, N.Y.

Form 2
Replaces Form 1
Discard Form 1
NEW YORK CITY

Date of Accident _____ (11-16)
Pct. of Occurrence _____ (64-67)
Accident No. _____ (4-10)
Completed by _____

SUPPLEMENTARY PEDESTRIAN DATA

Check all items that apply
The following information is being collected for research purposes only

LOCATION: Accident Occurred on _____ St., Ave., Etc.

At Intersection With _____ St., Ave., Etc.

Or, If Not at Intersection Indicate _____ No. of Feet North, South, East or West Of _____ Nearest Intersecting St., Ave., Etc.

TYPE OF ROAD:

- 35-1 ☐ City Street
- 35-2 ☐ One-way city street
- 35-3 ☐ Divided roadway
- 35-4 ☐ Controlled access highway
- 35-6 ☐ Underpass
- 35-7 ☐ Overpass
- 35-8 ☐ Bridge
- 35-9 ☐ Tunnel
- 35-5 ☐ Other, specify _____

TYPE OF AREA:

- 36-1 ☐ Residential
- 36-2 ☐ Business
- 36-3 ☐ Industrial
- 36-4 ☐ Undeveloped
- 36-5 ☐ School
- 36-6 ☐ Parkway
- 36-9 ☐ Other, specify _____

THE ACCIDENT OCCURRED:

- 42-1 ☐ In a marked crosswalk
- 42-2 ☐ In an unmarked crosswalk
- 42-3 ☐ Not in a crosswalk
- 43-2 ☐ With a pedestrian signal ("Walk, Don't Walk") present

NUMBER OF TRAFFIC LANES:

- 44- ☐☐ Indicate total number of traffic lanes (do not include parking lanes)

THE PEDESTRIAN WAS STRUCK

- 45-1 ☐ In the 1st traffic lane entered
- 45-2 ☐ In the 2nd traffic lane entered
- 45-3 ☐ In the 3rd traffic lane entered
- 45-4 ☐ In the 4th traffic lane entered
- 45-5 ☐ In the 5th traffic lane entered
- 45-6 ☐ After crossing more than 5 lanes
- 45-7 ☐ In the parking lane
- 45-8 ☐ While not in the roadway

THE DRIVERS VISION WAS BLOCKED BY:

- 46-1 ☐ Standing traffic
- 46-2 ☐ A parked vehicle
- 46-3 ☐ A bus at a bus stop
- 46-4 ☐ Other, specify _____

THE DRIVER:

- 47-1 ☐ Did attempt evasive action, swerved or braked to avoid the pedestrian
- 49-1 ☐ Was attending to oncoming traffic and failed to see the pedestrian
- 52-1 ☐ Was engaged in a turning or merging maneuver

THE PEDESTRIAN CROSSED:

- 57-1 ☐ At a bus stop in front of the bus
- 57-2 ☐ At a bus stop behind the bus
- 58-1 ☐ In front of standing traffic

THE PEDESTRIAN WAS:

- 59-1 ☐ Running
- 60-1 ☐ Going to or from an ice cream truck or vendor
- 61-1 ☐ Crossing with other pedestrians
- 62-1 ☐ Not attempting to cross the roadway
- 64-1 ☐ Not aware that the vehicle was backing up

THE PEDESTRIAN:

- 65-1 ☐ Appeared suddenly in the path of the vehicle
- 66-1 ☐ Walked or ran into the vehicle
- 67-1 ☐ Was working on or pushing a vehicle
- 69-1 ☐ Attempted evasive action, swerved or slowed to avoid the vehicle

OTHER NOTES OR COMMENTS: _____

Table 2-6

Supplementary Form for San Diego, California

FORM 2
(Replaces Form 1, Discard Form 1)
SAN DIEGO

SUPPLEMENTARY PEDESTRIAN DATA

- To be completed for all pedestrian injury accidents
- Check all items that apply
- Forward through normal channels with the regular accident report form
- The following information is being collected for research purposes only

DATE _____ ACC. NO. _____

ACCIDENT LOCATION _____ H & R NO. _____

THE ACCIDENT OCCURRED:
- 43-1 ☐ With the street lights on
- 43-2 ☐ With a pedestrian signal ("Walk, Don't Walk") present

NUMBER OF TRAFFIC LANES:
- 44- ☐ Indicate total number of traffic lanes (do not include parking lanes)

THE PEDESTRIAN WAS STRUCK:
- 45-1 ☐ In the 1st traffic lane entered
- 45-2 ☐ In the 2nd traffic lane entered
- 45-3 ☐ In the 3rd traffic lane entered
- 45-4 ☐ In the 4th traffic lane entered
- 45-5 ☐ In the 5th traffic lane entered
- 45-6 ☐ After crossing more than 5 lanes
- 45-7 ☐ In the parking lane
- 45-8 ☐ While not in the roadway

THE DRIVERS VISION WAS BLOCKED BY:
- 46-1 ☐ Standing traffic
- 46-2 ☐ A parked vehicle
- 46-3 ☐ A bus at a bus stop
- 46-4 ☐ Other _____

THE DRIVER:
- 47-1 ☐ Did attempt evasive action, swerved or braked to avoid the pedestrian
- 49-1 ☐ Was attending to oncoming traffic and failed to see the pedestrian
- 62-1 ☐ Was engaged in a turning or merging maneuver

THE PEDESTRIAN CROSSED:
- 56-1 ☐ Against the signal
- 57-1 ☐ At a bus stop in front of the bus
- 57-2 ☐ At a bus stop behind the bus
- 58-1 ☐ In front of standing traffic

THE PEDESTRIAN WAS:
- 59-1 ☐ Running
- 60-1 ☐ Going to or from an ince cream truck or vendor
- 61-1 ☐ Crossing with other pedestrians
- 64-1 ☐ Not aware that the vehicle was backing up

THE PEDESTRIAN:
- 65-1 ☐ Appeared suddenly in the path of the vehicle
- 66-1 ☐ Walked or ran into the vehicle
- 69-1 ☐ Attempted evasive action, swerved or slowed to avoid vehicle

TO BE COMPLETED BY THE TRAFFIC ENGINEERING DEPARTMENT

TYPE OF AREA:

RESIDENTIAL
- ☐ Single family
- ☐ Multi-family

COMMERCIAL
- ☐ Offices
- ☐ Stores

- ☐ Industrial
- ☐ School
- ☐ Military Installation

- ☐ Undeveloped
- ☐ Other _____

THE ACCIDENT OCCURRED:
- ☐ In a marked crosswalk
- ☐ In an unmarked crosswalk

COMPLETE FORM FOR EACH PEDESTRIAN ACCIDENT

Table 2-7

Supplementary Form for Toledo, Ohio

TOLEDO FORM 2
(Replaces Form 1; Discard Form 1)

LOCATION

Accident Occurred on _____ St., Ave., Etc.

At Intersection With _____ St., Ave., Etc.

Or, If

Not at Intersection Indicate _____ Number of feet North, South, East or West Of _____ Nearest Intersecting St., Ave., etc.

Accident Number _____ (4-10) Time of collision _____ (18-21)

Date of collision _____ (11-16) Completed by _____

SUPPLEMENTARY PEDESTRIAN DATA

- To be completed for all pedestrian injury accidents
- Check all items that apply
- Forward through normal channels with the regular accident report form
- The following information is being collected for research purposes only

THE ACCIDENT OCCURRED:
42-1 ☐ In a marked crosswalk 42-2 ☐ In an unmarked crosswalk 42-3 ☐ Not in a crosswalk
43-1 ☐ With the street lights on 43-2 ☐ With a pedestrian signal ("Walk, Don't Walk") present

NUMBER OF TRAFFIC LANES:
44- ☐ Indicate total number of traffic lanes (do not include parking lanes)

THE PEDESTRIAN WAS STRUCK:
45-1 ☐ In the 1st traffic lane entered 45-5 ☐ In the 5th traffic lane entered
45-2 ☐ In the 2nd traffic lane entered 45-6 ☐ After crossing more than 5 lanes
45-3 ☐ In the 3rd traffic lane entered 45-7 ☐ In the parking lane
45-4 ☐ In the 4th traffic lane entered 45-8 ☐ While not in the roadway

THE DRIVERS VISION WAS BLOCKED BY:
46-1 ☐ Standing traffic
46-2 ☐ A parked vehicle
46-3 ☐ A bus at a bus stop 46-4 ☐ Other

THE DRIVER:
47-1 ☐ Did attempt evasive action, swerved or braked to avoid the pedestrian
49-1 ☐ Attending to oncoming traffic and failed to see the pedestrian
51-1 ☐ Was exceeding the speed limit
52-1 ☐ Was engaged in a turning or merging maneuver

THE PEDESTRIAN CROSSED:
55-1 ☐ From behind a parked vehicle 56-1 ☐ Against the signal
57-1 ☐ At a bus stop in front of the bus 57-2 ☐ At a bus stop behind the bus
58-1 ☐ In front of standing traffic

THE PEDESTRIAN WAS:
59-1 ☐ Running 60-1 ☐ Going to or from an ice cream truck or vendor
61-1 ☐ Crossing with other pedestrians 62-1 ☐ Not attempting to cross the roadway
64-1 ☐ Not aware that the vehicle was backing up

THE PEDESTRIAN:
65-1 ☐ Appeared suddenly in the path of the vehicle
66-1 ☐ Walked or ran into the vehicle
69-1 ☐ Attempted evasive action, swerved or slowed to avoid the vehicle

OTHER NOTES OR COMMENTS: _____

COMPLETE FORM FOR EACH PEDESTRIAN ACCIDENT

Table 2-8

Supplementary Form for Washington, D.C.

FORM 2 (Replaces Form 1; Discard Form 1)
WASHINGTON, D.C.

Complaint No. _____(4-10)
Completed by _____

SUPPLEMENTARY PEDESTRIAN DATA

- To be completed for all pedestrian injury accidents
- Check all items that apply
- Forward through normal channels with the regular accident report form
- The following information is being collected for research purposes only

TYPE OF ROAD: 35-1 ☐ Two-way surface street 35-2 ☐ One way street 35-3 ☐ Divided roadway 35-4 ☐ Expressway
35-5 ☐ Other, specify_____

TYPE OF AREA: 36-1 ☐ Residential 36-2 ☐ Commercial 36-3 ☐ Industrial 36-4 ☐ Undeveloped 36-9 ☐ Other, specify_____

THE VEHICLE WAS: 39-7 ☐ Starting in traffic 39-8 ☐ Stopping or Slowing

THE ACCIDENT OCCURRED: 41-1 ☐ At an intersection 41-2 ☐ Not at an intersection 43-2 ☐ With a pedestrian signal present

NUMBER OF TRAFFIC LANES: 44- ☐☐ Indicate total number of traffic lanes, do not include parking lanes _____

THE PEDESTRIAN WAS STRUCK:
45-1 ☐ In the 1st traffic lane entered 45-5 ☐ In the 5th traffic lane entered
45-2 ☐ In the 2nd traffic lane entered 45-6 ☐ After crossing more than 5 lanes
45-3 ☐ In the 3rd traffic lane entered 45-7 ☐ In the parking lane
45-4 ☐ In the 4th traffic lane entered 45-8 ☐ While not in the roadway

THE DRIVERS VISION WAS BLOCKED BY: 46-1 ☐ Standing traffic 46-2 ☐ A parked vehicle 46-3 ☐ A bus at a bus stop
46-4 ☐ Other, specify_____

THE DRIVER: 47-1 ☐ Did attempt evasive action, swerved or braked to avoid the pedestrian
49-1 ☐ Was attending to oncoming traffic and failed to see pedestrian
52-1 ☐ Was engaged in a turning or merging maneuver

THE PEDESTRIAN CROSSED: 57-1 ☐ At a bus stop in front of the bus 57-2 ☐ At a bus stop behind the bus
58-1 ☐ In front of standing traffic

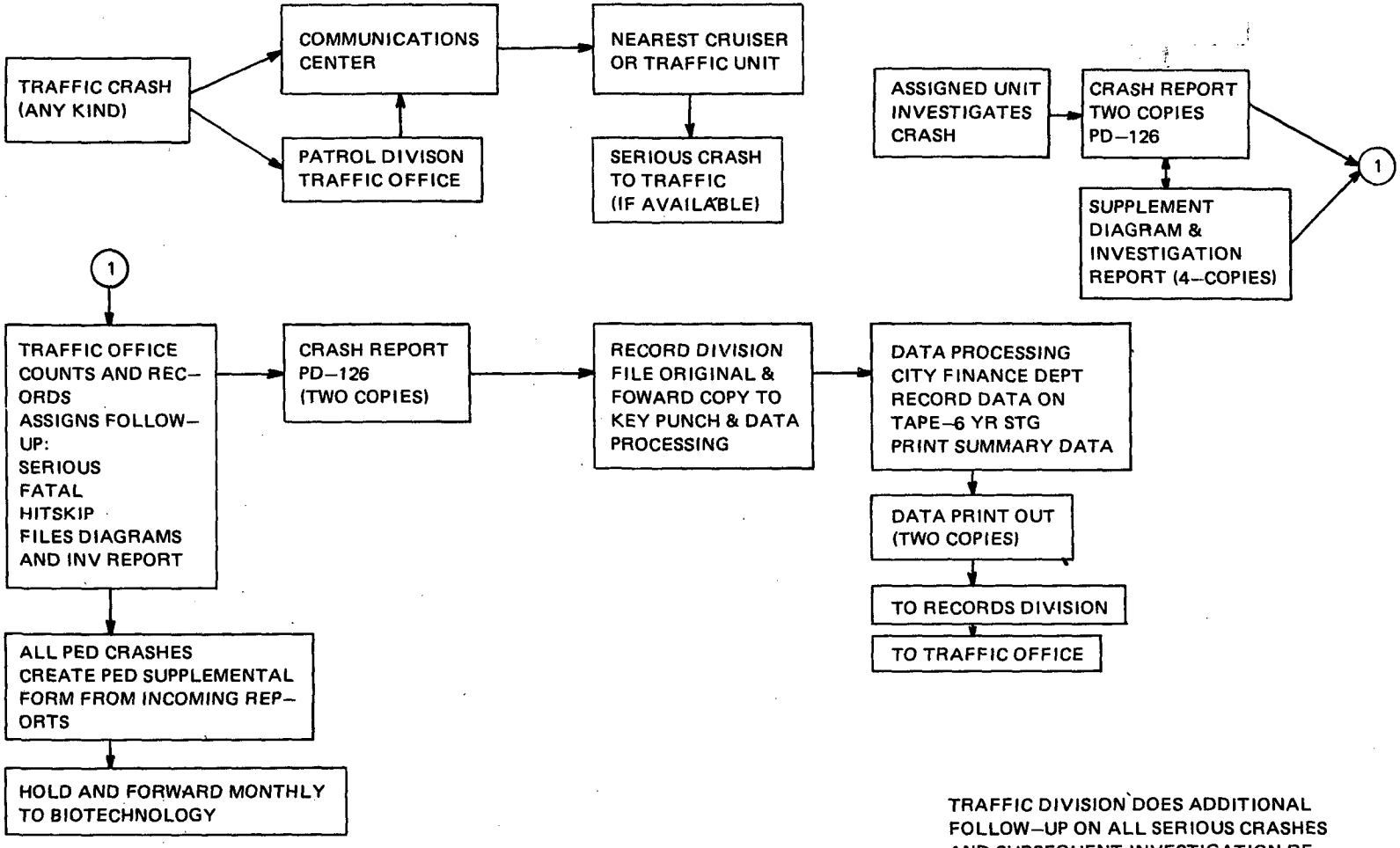
THE PEDESTRIAN WAS: 59-1 ☐ Running 60-1 ☐ Going to or from an ice cream truck or vendor
61-1 ☐ Crossing with other pedestrians 62-2 ☐ Not attempting to cross the roadway
63-1 ☐ Getting in or out of a vehicle 64-1 ☐ Not aware that the vehicle was backing up

THE PEDESTRIAN: 65-1 ☐ Appeared suddenly in the path of the vehicle 66-1 ☐ Walked or ran into the vehicle
67-1 ☐ Was working on or pushing a vehicle 68-1 ☐ Was working on the roadway
69-1 ☐ Attempted evasive action, swerved or slowed to avoid the vehicle

OTHER NOTES OR COMMENTS: _____

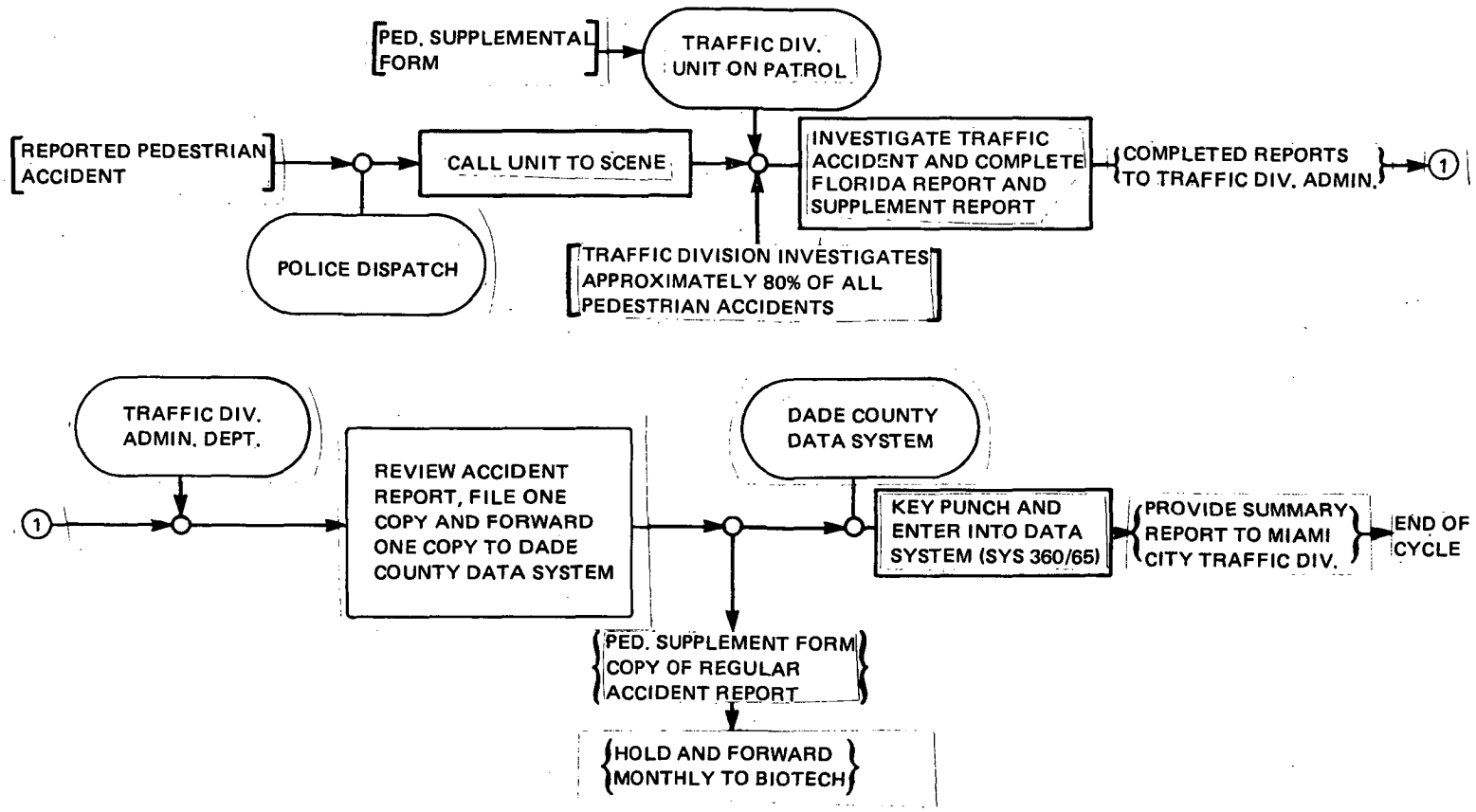
A procedure was developed in each of the sample cities so that the accident data (a copy of the regular police accident report *and* the supplementary form) were processed through appropriate channels and forwarded to BioTechnology Inc. In order to identify the best procedure a flow analysis of each of the city police department's accident records system was made. Figures 2-1 through 2-6 contain these flow charts for each of the cities. Careful examination of these charts will reveal how the data were collected and processed and the type of sample obtained. It can be seen, for example, that in New York we obtained accidents from the Accident Investigation Unit and therefore only got accidents which were either fatal or serious injury accidents. In San Diego some of the information was provided by a secondary source (the City Traffic Engineering Department provided some of the descriptive information on the site characteristics.)

Once the raw data were received from the various cities, the information was put into a machine codable format. The relevant data on the police accident report and the items on the supplementary forms were translated into the Master Coding Form (see Table 2-1). Coding instructions for each city were developed so that the coder could readily identify the source (i.e., police report or supplementary form) and location (i.e., police form item number) of each. The data items on the Master Coding Forms were keypunched onto two 80 column cards and the cards transcribed onto magnetic tape. The analysis programs used were standard tabulation and cross tabulation programs. Intrinsic in the design of the data item was the concept that it is possible to identify an accident as belonging to a particular accident "type" by the presence or absence of certain select descriptors. By using the information contained on the Master Coding Form, it should be possible, utilizing the taxonomy illustrated in Figure 2-7, to determine which accident type a particular accident most closely resembled. This sorting logic was not programmed and tested during this project, however. All accident type coding was done subjectively, following explicit instructions in the appropriate coding manual.



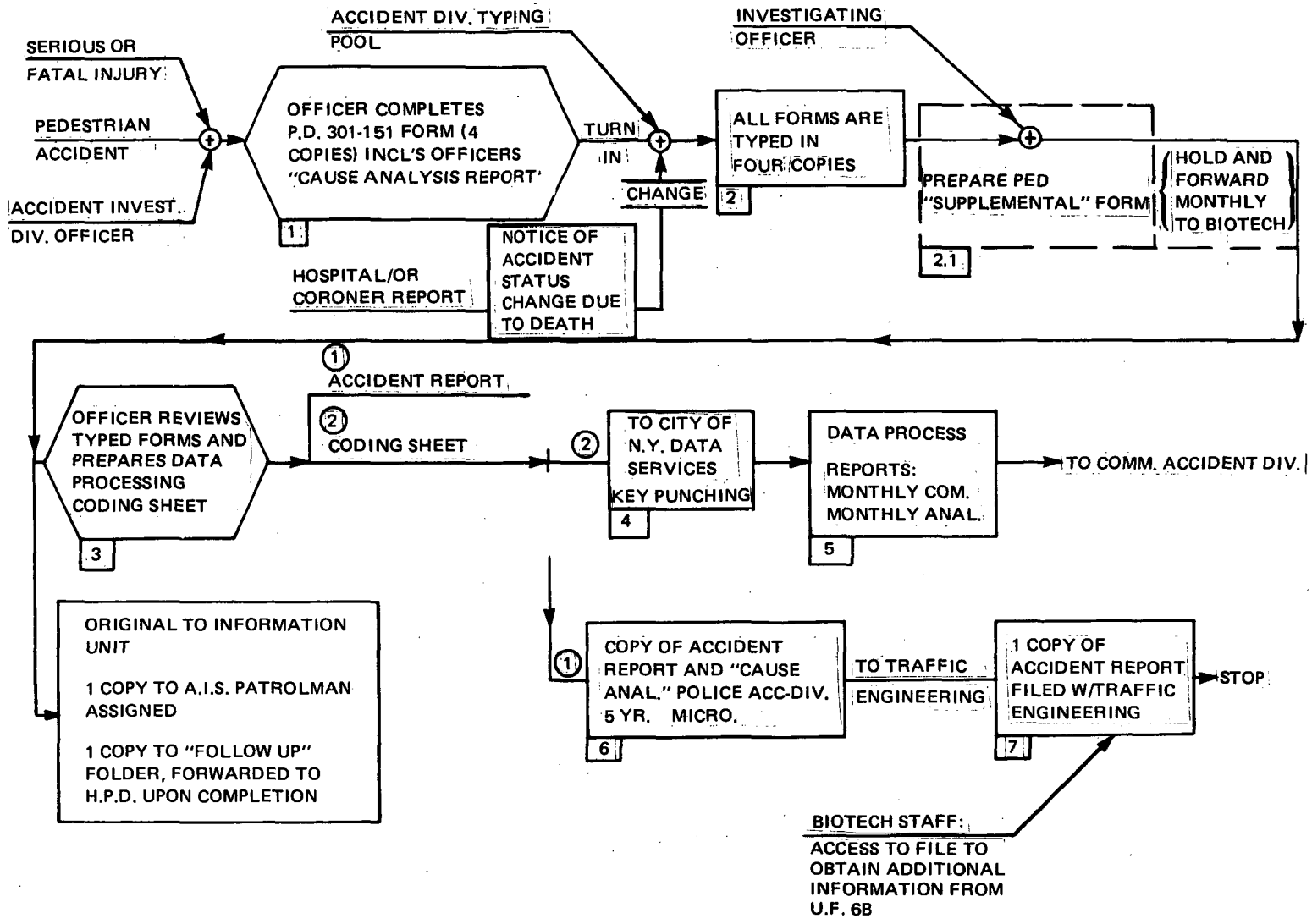
(Showing Interaction with BioTechnology/NHTSA/FHWA Pedestrian Safety Project)

Figure 2-1. Akron Police Department Accident Reporting System .



(Showing Interaction with BioTechnology/NHTSA/FHWA Pedestrian Safety Project)

Figure 2-2. Miami Police Department (City) Accident Reporting System



(Showing Interaction with BioTechnology/NHTSA/FHWA Pedestrian Safety Project)

Figure 2-3. New York City Accident Investigation Division Data Flow

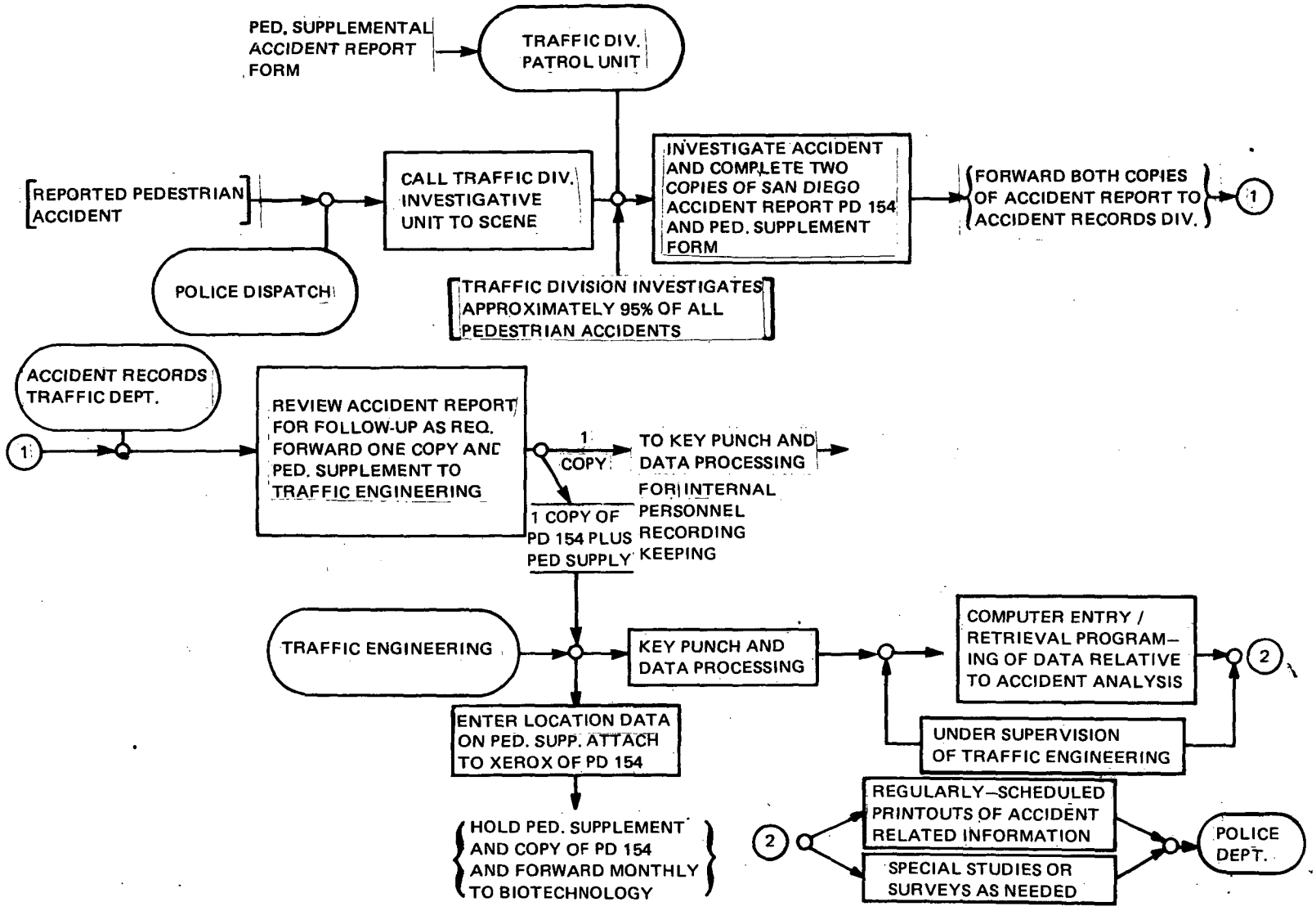
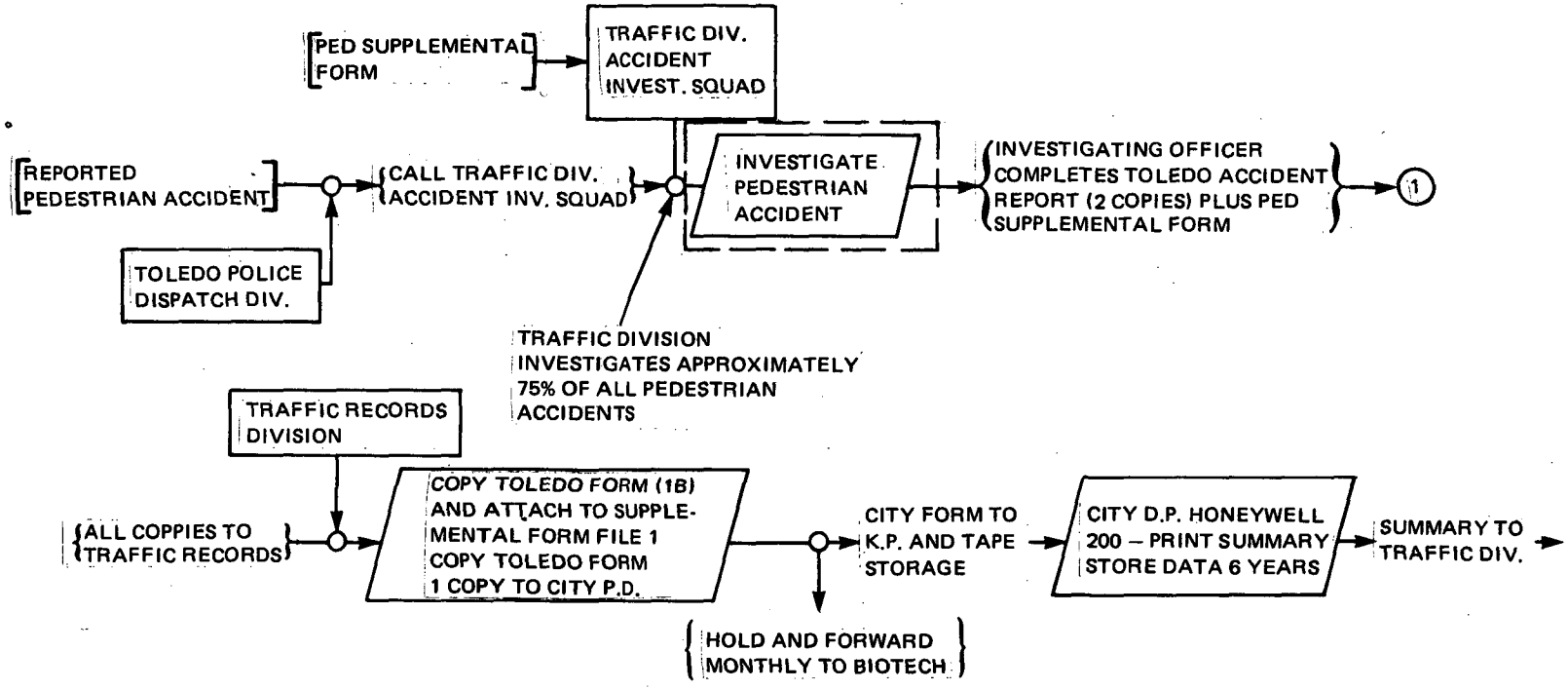
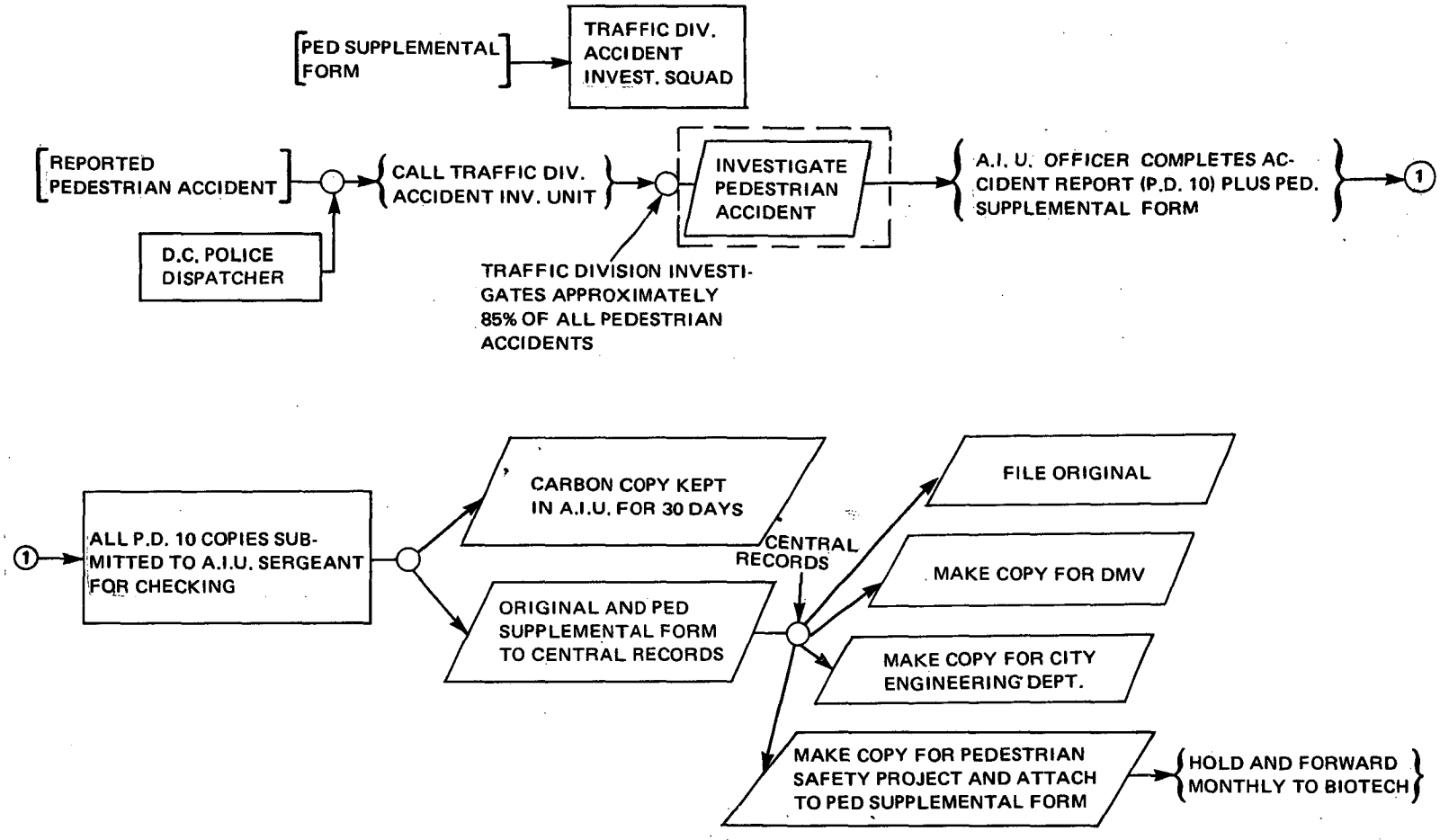


Figure 2-4. San Diego Police Department Accident Investigation Data Flow



(Showing Interaction with BioTechnology/NHTSA/FHWA Pedestrian Safety Project)

Figure 2-5. Toledo Police Department Accident Reporting System



(Showing Interaction with BioTechnology/NHTSA/FHWA Pedestrian Safety Project)
(Prior to Reorganization of Traffic Division)

Figure 2-6. Washington, D.C. Police Department Accident Reporting System

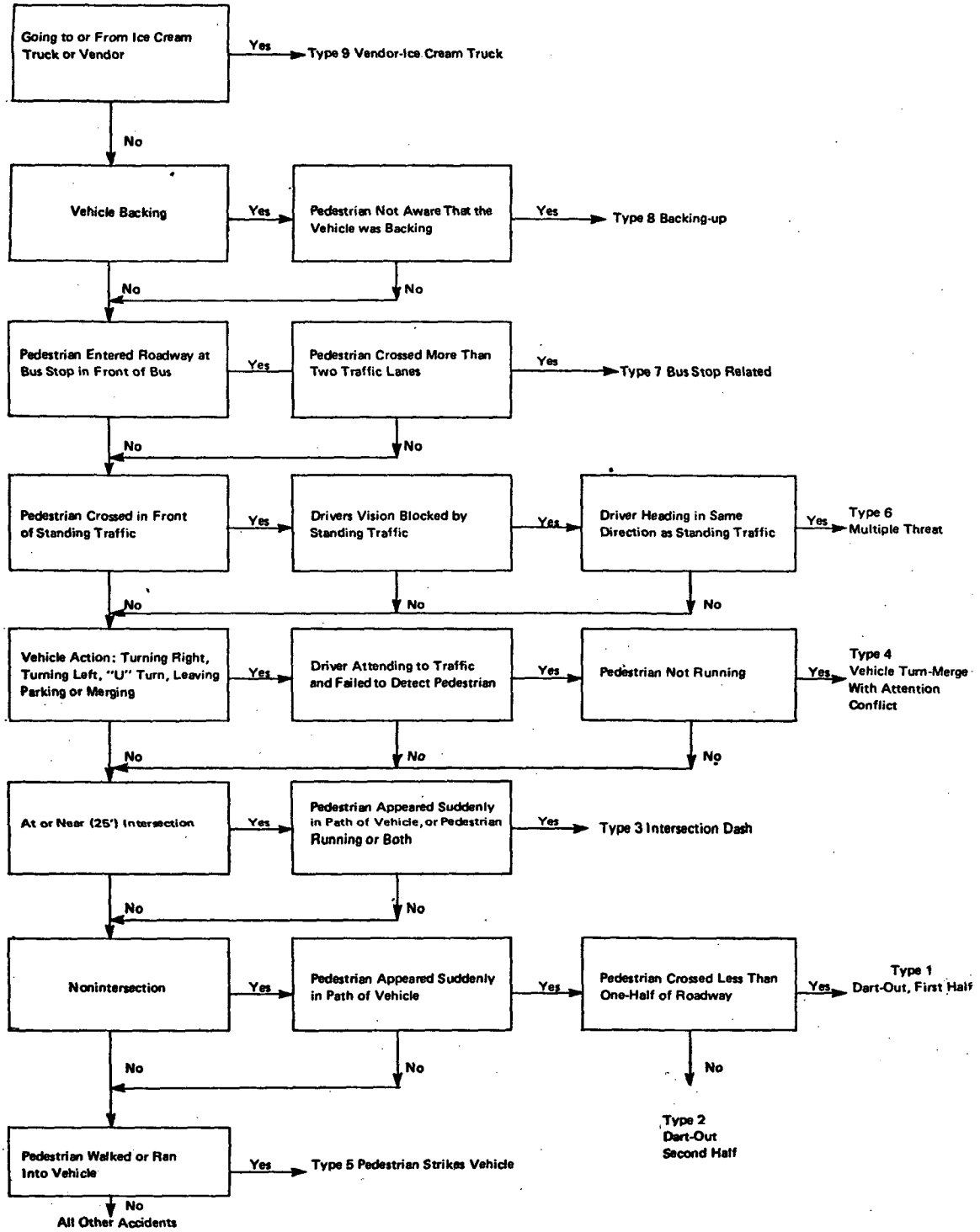


Figure 2-7. Sorting Program Logic – Accident Typing for Nine Aprior Accident Types.

CHAPTER 3

RESULTS

The purposes of the data collection effort could be stated as consisting of two major objectives: (1) to demonstrate that a data collection system consisting of the regular police accident report form and a short supplementary form could provide adequate information to determine the "accident type" of most pedestrian accidents, and (2) to collect, code and perform a cursory analysis on a data base comprised of accident data from six cities for approximately one calendar year. Although it was not the primary purpose of this study to provide descriptive or statistical data on urban pedestrian accidents, such a data base was collected and will be discussed in this Chapter.

The information available on both the regular police accident report and the supplementary form permitted the coding of the accident type in all but 14.1 percent of the cases coded. This compares very favorably with the ORI study where 16.1 percent of the cases were not coded even though interviews were obtained with the participants in many of the cases. However, it must be emphasized that the regular police report was rarely adequate to identify the accident typology. Occasionally the narrative submitted by the officer would inadvertently provide the salient characteristics of a particular accident type, but in the vast majority of cases the specific information contained on the supplementary form was necessary to identify a particular accident type.

During the course of the coding process it became evident that certain items were occasionally misunderstood or improperly applied to certain situations. These minor inconsistencies that were noted during the first month of data collection were used to modify the form so that consistent reliable data could be collected. However, several minor inconsistencies in form usage were noted later in the project. These items have been identified so that they can be clarified in any further applications of the reporting forms.

As was discussed earlier, the system to obtain the supplementary form was tailored to the operational characteristic of each particular city. Not surprisingly, the best information was obtained when the supplementary form was completed by the investigating officer at the scene of the accident. Very useful, although apparently somewhat less complete data were obtained when the supplementary form was completed by an officer who merely reviewed the various reports filed by the investigating officer. Obviously, this latter system could be improved if the investigating officers were informed of the particulars that were being sought in completing the supplementary reports to the pedestrian accidents. In one city using this system, 20 percent of the cases were not coded as opposed to 14.1 percent for the entire sample. However, it should

be mentioned that this same city had a predominance of serious injury and fatal cases and therefore the pedestrian might have not been able to supply the required information.

Characteristics of the Sample

Accident data from six major cities are included in the study sample. Table 3-1 summarizes the distribution of the sample among the six cities. The percentage of the total sample drawn from each of the cities ranges from 11.4 percent from Akron to 27.3 percent from San Diego. The percent of each of the cities' yearly accident toll that was sampled varied from 2 percent of New York City's to 100 percent of San Diego's. The sampling percentage from New York is low because we were working with the Accident Investigation Squad which covered only serious injury and fatal accidents and thus our sample was limited to those accidents only. Midway in the data collection period, the Metropolitan Police Department in Washington, D.C. underwent a major reorganization and the Accident Investigation Unit was decentralized. This produced a drastic cutback in the number of reports received from D.C. and therefore the sample from that city is heavily biased with accidents for the first six months of the year.

Distribution of the Accident Sample

Although no effort was made to obtain either a random or representative sample, the distribution of the sample over several descriptive parameters appears to be fairly reasonable. Table 3-2 shows the distribution of the sample by time of day, day of week, month, and pedestrian's age. Evidently the sample is fairly consistent with established national statistics. Table 3-2 also provides comparison of the BTI sample with the ORI sample on these same parameters. Note that although the ORI sample did not purport to be a representative sample, both the ORI and present samples appear to be fairly similar. Variations that do occur, especially in time of day and age of pedestrian, can be explained by the ORI orientation towards on-scene investigation of peak hour accidents which typically include school-age pedestrians.

Distribution of Accident Types

As mentioned, one of the major purposes of the project was to determine the feasibility of determining accident types from the information being collected. A series of definitions was developed for a number of different accident types. The accident types are defined in Table 3-3. These accident typologies closely follow those developed by Snyder and Knoblauch (1971). Based on the information available, each accident was assigned to an accident type. If there was inadequate information, or a vital attribute of a given accident type was not clearly present (i.e., the documented existence of short-time exposure in the case of a dart-out), then

Table 3-1

Accident Data Sample

CITY	SAMPLE SIZE	PERCENT OF TOTAL SAMPLE	1973 PEDESTRIAN ACCIDENTS (each city)	SAMPLE AS PERCENT OF 1973 ACCIDENTS
Akron	232	11.4	289	80
Miami	245	12.0	495	49
New York	404	19.8	16,600*	2
San Diego	557	27.3	557	100
Toledo	284	13.9	566	50
Wash D.C.	322	15.8	1,603**	20
TOTAL	2,044	100%	20,110	10(Average)

*NYC had 450 ped. fatalities in 1973

**Data taken from 1 July 72 thru 30 June 73

Table 3-2

Distribution of Accident Sample Comparison
of BioTechnology and Operations Research, Inc. Samples

Time of Day	Percent BTI	Percent ORI
2400- 159	3	1
0200- 359	2	0
0400- 559	1	0
0600- 759	4	4
0800- 959	7	4
1000-1159	7	9
1200-1359	9	11
1400-1559	18	28
1600-1759	18	20
1800-1959	17	10
2000-2159	9	5
2200-2359	5	4

Day of Week	Percent BTI	Percent ORI
Sunday	10	8
Monday	14	16
Tuesday	13	16
Wednesday	16	15
Thursday	15	15
Friday	16	16
Saturday	16	14

Month	Percent BTI	Percent ORI
January	9	NOT AVAILABLE
February	12	
March	14	
April	12	
May	12	
June	9	
July	8	
August	4	
September	5	
October	6	
November	4	
December	4	

Pedestrians Age	Percent BTI	Percent ORI
0-4	9	10
5-9	24	30
10-14	10	11
15-19	8	7
20-24	6	6
25-29	5	5
30-34	3	3
35-39	3	3
40-44	3	4
45-49	3	3
50-54	4	3
55-59	3	3
60-64	3	3
65+	13	12

the accident type was not coded. As shown in Table 3-4, all but 14.1 percent of the cases in the sample were assigned to one of the 16 accident types. Also shown is the relative consistency between the present sample and the ORI sample. The increased incidence of the intersection dash type of accident in the BTI sample compared to the ORI sample is interesting but no explanation is apparent. Also, there were fewer Vehicle Turn Merge with Attention Conflict types in the present sample. This is possibly due to an inability to document the attention conflict from secondary information. Interestingly enough, the number of Turning Vehicle accidents (5.6 percent) and the number of Vehicle Turn/Merge accidents (21.7 percent) together slightly exceeds (7.7 percent versus 6.4 percent) the number of Vehicle Turn/Merge with Attention Conflict accidents reported by ORI. The Midblock Dash was an accident type not included in the ORI study but it accounted for 7.2 percent of the BTI sample. It is similar to a Dart-out except that short-time exposure was not clearly documented although the pedestrian was running.

Table 3-3

Accident Type Definitions

01 DART-OUT, FIRST HALF: Midblock, short-time exposure, crossed less than halfway

02 DART-OUT, SECOND HALF: Same as 01 except, crossed more than halfway

03 INTERSECTION DASH: At interseciton, short time exposure or running

04 VEHICLE TURN MERGE WITH ATTENTION CONFLICT: Driver turning and attending to traffic, not pedestrian

05 PED STRIKES VEHICLE: Ped walked or ran into vehicle and not other type

06 MULTIPLE THREAT: Ped struck by vehicle traveling in same direction as other cars that had stopped for ped

07 BUS STOP RELATED: Ped struck while crossing in front of bus standing at a bus stop

08 BACKING-UP: Ped struck by backing-up vehicle but ped not clearly aware of the vehicle movement

09 VENDOR - ICE CREAM TRUCK: Ped struck going to or from a vendor in a vehicle on the street

10 WEIRD: Unusual circumstances, not C/M corrective

11 DISABLED VEHICLE RELATED: Ped struck while working on or next to a disabled vehicle

12 RESULT OF AN AUTO-AUTO CRASH: Ped struck by vehicle(s) as a result of an auto-auto accident

13 MIDBLOCK DASH: Not at intersection, ped running but not short-time exposure (i.e. not 01)

14 TRAPPED: At signalized intersection, ped hit when light changed and traffic started moving (not 06)

15 TURNING VEHICLE: Ped, not running (i,e. not 03), struck by turning vehicle

16 PED NOT IN ROADWAY: Ped struck while not in the roadway, includes cases where vehicle went out of control, (not 08, 11, 12)

Table 3-4

Distribution of Accident Types

Code	Type	BTI Sample	ORI Sample
01	Dart-out; First Half:	21.2	24.1
02	Dart-out; Second Half:	8.8	8.9
03	Intersection Dash:	15.9	8.4
04	Vehicle Turn Merge with Attention Conflict:	2.1	6.4
05	Peds Strikes Vehicle:	2.6	4.0
06	Multiple Threat:	2.8	3.2
07	Bus Stop Related:	1.0	2.6
08	Backing-up:	2.6	1.7
09	Vendor-Ice Cream Truck:	1.7	1.5
10	Weird:	4.8	1.2
11	Disabled Vehicle Related:	1.6	*
12	Result of Auto-Auto Crash:	3.9	2.6
13	Midblock Dash:	7.2	*
14	Trapped:	.8	*
15	Turning Vehicle:	5.6	*
16	Ped Not in Roadway:	3.4	*
	Type not coded	14.1	16.1

*No comparable ORI Accident Type

Table 3-5 shows the distribution of the accident types among the six cities in the sample. Although direct comparisons are not possible because of the variations in sampling techniques between the cities some of the fluctuations are interesting. Washington, D.C. and New York, the largest two cities *and* the only two which were in both this sample and the ORI sample, had the highest frequency of dart-out, first half. San Diego, the only city in a state with "right turn on red" and relatively stringent pedestrian right of way laws, had an increased number of the Turn/Merge Conflict and Multiple Threat types. Miami, for some unknown reason, had the lowest frequency of Dart-out first half, but the highest occurrence of "Secondary" (result of auto-auto) and "not in road" types.

Data Categories

Table 3-6 summarizes the data collected and cross-tabulated by the pedestrian age categories. The data categories that are tabulated include:

Month. The heavy loading in the first half of the year is due to the previously mentioned reorganization of Washington, D.C. Police Department and the processing time involved in receiving reports from New York City which resulted in the exclusion of some NYC accidents from this tabulation. It is unlikely that this loading seriously affects any of the remaining tabulations.

Time of Day. This tabulation shows the distribution of accidents over two-hour time blocks. The accidents tend to peak in the 2-8 p.m. period.

Day of Week. This tabulation shows that accidents are fairly evenly distributed among days of the week with a slight peaking at the end of the week and on Saturday.

Driver's Age. The majority of the drivers (58 percent) were between 21 and 44 years old. This compares to the 1973 NSC Accident Facts as follows:

National Safety Council		BioTechnology	
Driver's Age	Percent	Driver's Age	Percent
Under 20	17.9	17 - 20	16
20 - 24	18.6	21 - 24	16
25 - 34	21.9	25 - 34	26
35 - 44	15.3	35 - 44	10
45 - 54	12.7	45 - 54	13
55 - 64	8.2	55 - 64	8
65 +	5.3	65 +	5
	Σ = 100.0		Σ = 100

Any variations in the above comparisons are probably due to the differences in the urban driving population versus all drivers.

Table 3-5

Percentage Distribution of Accident Types
Among the Sample Cities

Accident Type	D.C.	San Diego	Akron	Toledo	Miami	N.Y.C.	All Cities
Dart-Out 1st Half	26	21	17	17	13	28	21.2
Dart-Out 2nd Half	16	6	4	12	12	6	8.8
Inter Dash	17	12	15	20	11	22	15.9
T/M Conflict	1	4	2	2	2	1	2.1
Ped Strikes Veh.	4	2	4	4	3	0	2.6
Mult. Threat	2	7	3	0	2	0	2.8
Bus Stop	2	1	1	1	2	1	1.0
Backing Up	2	4	2	1	3	1	2.6
Vendor	1	2	1	5	1	1	1.7
Weird	3	4	6	7	4	5	4.8
Disabled Veh.	0	2	2	1	2	2	1.6
Result of Auto-Auto	1	4	2	1	11	6	3.9
Midblock Dash	8	8	9	9	5	3	7.2
Trapped	1	1	3	1	1	1	.8
Turning Veh.	2	7	12	4	7	2	5.6
Not in Road	2	3	4	2	7	3	3.4
Not Coded	10	13	12	12	15	20	14.1

Table 3-6

Summary Percentage for Total Pedestrian Accident
Sample (N = 2044)

	UPPER BOUNDS OF AGE CATEGORIES														
Descriptive Data	4 9	9 24	14 10	19 8	24 6	29 5	34 3	39 3	44 3	49 3	54 4	59 3	64 3	65 Plus 13	Total 100
MONTH															
1	4	6	8	11	10	11	13	7	5	10	10	23	8	13	9
2	5	10	11	13	15	8	12	14	13	16	22	13	11	12	12
3	12	15	14	12	11	20	22	14	16	10	10	12	18	11	14
4	19	15	13	7	6	8	9	18	16	6	12	6	13	12	12
5	16	14	11	13	12	8	10	13	11	7	8	9	16	9	12
6	9	9	8	11	8	11	6	9	6	13	10	7	11	7	9
7	10	7	8	6	7	7	3	11	8	13	8	4	6	8	8
8	9	4	2	4	5	7	3	2	2	6	1	1	3	5	4
9	6	6	7	4	4	2	4	2	8	4	6	6	8	3	5
10	6	8	8	6	9	7	7	0	5	4	7	9	3	5	6
11	2	4	5	5	8	3	4	2	6	3	3	4	0	7	4
12	2	2	4	8	6	6	6	7	5	4	3	6	0	7	4
TIME OF DAY															
2400 – 0159	1	1	1	5	9	12	7	7	10	6	4	3	0	1	3
0200 – 0359	0	1	1	2	5	3	10	11	3	0	3	1	5	0	2
0400 – 0559	0	0	0	1	1	2	1	2	2	0	1	0	3	1	1
0600 – 0759	2	1	4	6	4	7	4	7	6	6	8	6	6	4	4
0800 – 0959	3	8	4	8	6	7	4	9	3	1	7	7	11	11	7
1000 – 1159	12	5	7	5	2	4	4	5	3	10	8	7	14	11	7
1200 – 1359	15	13	8	5	10	9	3	5	3	10	10	12	5	8	9
1400 – 1559	17	29	26	15	11	9	12	9	8	12	7	4	6	18	18
1600 – 1759	24	21	23	15	12	10	13	13	6	10	17	19	11	20	18
1800 – 1959	22	16	12	16	16	10	13	11	19	22	17	25	22	18	17
2000 – 2159	4	6	9	12	12	13	18	7	25	12	10	10	13	6	9
2200 – 2359	0	0	3	11	12	12	9	11	11	10	6	9	3	3	5
DAY OF WEEK															
Sunday	15	8	6	10	9	9	9	11	15	6	6	10	17	9	10
Monday	9	16	14	12	18	14	22	17	8	11	10	12	11	13	14
Tuesday	15	13	16	10	12	12	13	9	18	3	14	15	12	14	13
Wednesday	13	18	15	18	15	14	15	11	13	11	26	21	19	15	16
Thursday	13	17	17	14	12	16	6	15	12	20	12	16	22	16	15
Friday	13	16	23	15	16	14	16	22	13	22	13	10	12	18	16
Saturday	21	13	10	20	19	20	18	15	20	26	19	16	6	15	16

Table 3-6 (Continued)

Summary Percentage for Total Pedestrian Accident
Sample (N = 2044)

	UPPER BOUNDS OF AGE CATEGORIES														
Descriptive Data	4	9	14	19	24	29	34	39	44	49	54	59	64	65 Plus	Total
DRIVER AGE															
17 or less	4	5	7	9	2	4	0	2	2	2	5	2	7	6	5
18 – 20	11	11	13	11	12	7	17	12	11	9	5	8	7	13	11
21 – 24	23	16	13	13	18	15	7	14	11	9	22	15	23	14	16
25 – 34	25	24	24	26	25	27	34	31	30	36	33	30	22	18	26
35 – 44	16	16	21	13	15	17	17	17	18	25	7	23	8	16	16
45 – 54	10	16	11	12	9	15	7	14	4	12	20	10	13	15	13
55 – 64	5	7	7	10	13	10	10	10	11	4	2	11	12	9	8
65 or more	5	4	3	7	5	4	8	0	11	4	7	2	8	8	5
DRIVER SEX															
Male	71	67	70	63	73	67	83	63	72	72	67	72	72	73	70
Female	24	28	19	19	13	12	8	15	18	19	27	15	22	20	21
Hit and Run	6	5	12	18	14	21	9	22	10	9	6	13	6	7	10
PED SEX															
Male	68	62	60	62	59	62	63	76	82	65	58	65	65	50	62
Female	32	38	40	38	41	38	37	24	17	35	42	35	35	50	38
INJURY SEVERITY															
Fatal	6	4	7	7	5	10	6	24	14	11	21	15	27	25	11
Serious	34	32	25	24	33	33	28	33	34	34	31	33	36	35	32
Moderate	38	42	46	33	34	29	40	18	31	35	21	32	17	24	35
Slight	20	20	19	32	25	27	23	25	22	20	21	20	19	15	21
None	2	2	3	4	2	1	3	0	0	0	4	0	0	0	2
LIGHT CONDITIONS															
Daylight	84	85	76	52	46	49	45	42	35	57	62	51	61	70	67
Dawn or Dusk	8	5	5	3	2	1	2	6	5	4	3	6	7	4	5
Dark	8	10	18	44	52	50	53	52	60	39	35	43	31	25	28
WEATHER CONDTIONS															
Clear or Cloudy	97	94	87	88	85	86	79	91	87	80	82	88	72	86	88
Rain	3	4	9	11	12	14	18	9	10	18	12	10	24	12	10
Snow or Sleet	0	1	1	1	2	0	1	0	0	1	6	0	3	1	1
Fog or Mist	0	1	2	0	1	0	1	0	3	0	0	1	1	1	1
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROADWAY CONDITIONS															
Dry	95	91	85	83	85	84	75	87	79	79	79	86	72	83	86
Wet	5	8	14	16	13	16	24	13	19	20	18	14	27	16	13
Snow, Ice, or Mud	0	1	1	1	2	0	1	0	2	1	3	0	1	1	1
Other	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3-6 (Continued)

Summary Percentage for Total Pedestrian Accident Sample (N = 2044)

	UPPER BOUNDS OF AGE CATEGORIES														
Descriptive Data	4	9	14	19	24	29	34	39	44	49	54	59	64	65 Plus	Total
VEHICLE TYPE															
Car	89	85	84	86	85	80	80	81	90	79	84	80	82	85	84
Taxi	2	2	2	1	1	1	6	2	0	4	1	2	0	1	2
Bus	1	3	3	0	2	2	6	0	5	2	1	2	3	1	2
Truck	5	8	6	7	10	15	8	8	3	11	9	11	8	8	8
Other	3	3	3	5	2	1	0	8	2	4	4	6	6	5	4
TYPE OF ROAD															
Two-way	78	81	84	86	75	70	70	58	74	65	74	59	66	67	75
One-way	16	13	7	4	9	11	12	13	9	17	10	13	16	13	12
Divided	4	3	6	5	9	8	13	19	10	11	9	18	7	11	7
Expressway	0	1	0	2	2	5	5	4	5	3	3	1	7	4	2
Other	2	3	3	2	4	6	0	6	2	3	4	9	3	4	4
TYPE OF AREA															
Residential	77	65	47	34	34	28	28	30	32	22	24	14	23	30	43
Commercial	10	7	11	21	31	36	34	32	35	39	26	46	41	31	22
Industrial	0	0	2	0	2	2	0	2	2	2	1	3	0	1	1
Undeveloped	0	1	2	4	2	3	3	2	0	2	1	1	3	2	2
School	1	6	9	6	1	0	0	2	0	3	1	4	5	1	4
Resid.-Comm.	11	21	26	29	26	26	34	27	24	25	35	22	22	31	25
Resid.-Indus.	0	0	0	0	0	0	0	2	0	0	1	1	2	1	1
Comm.-Indus.	1	0	0	1	0	1	0	0	2	3	0	3	0	1	1
Other	1	1	3	6	3	5	1	4	5	5	10	4	5	4	3
TRAFFIC CONTROL															
Traffic Signal	7	12	16	23	30	28	33	31	33	35	53	48	39	37	24
Stop or Yield Sign	3	6	6	6	9	8	7	6	7	15	4	15	6	12	7
None	89	82	76	71	60	62	60	57	58	47	41	37	54	50	67
Other	1	1	2	0	2	1	0	6	2	3	1	0	0	1	1
VEHICLE ACTION															
Going Straight	82	86	81	68	57	62	65	62	71	54	60	54	67	65	72
Backing	3	1	0	4	7	6	6	9	3	5	9	7	4	6	4
Turning Right	3	2	5	5	6	5	6	7	3	12	7	6	3	7	5
Turning Left	2	3	3	6	10	9	13	9	10	15	10	16	13	10	7
"U" Turning	1	0	0	1	1	0	0	2	0	2	0	0	0	0	1
Stopped in Traffic	0	1	0	0	1	2	0	0	0	0	1	0	1	1	1
Starting in Traffic	3	2	4	8	6	4	3	2	5	5	1	4	3	5	4
Stopping or Slowing	4	5	2	3	3	7	1	2	0	3	4	6	3	2	4
Parking	1	1	1	1	2	0	3	4	2	2	1	4	1	2	1
Other	1	1	3	4	7	4	3	4	5	3	4	3	3	3	3

Table 3-6 (Continued)

Summary Percentage for Total Pedestrian Accident Sample (N = 2044)

	UPPER BOUNDS OF AGE CATEGORIES														
Descriptive Data	4	9	14	19	24	29	34	39	44	49	54	59	64	65 Plus	Total
ACCIDENT OCCURRED															
Intersection	15	26	40	42	38	43	51	40	32	60	58	57	49	51	39
Non-intersection	85	74	60	58	62	57	49	60	68	40	42	43	51	49	61
Marked X-walk	5	8	20	20	22	15	28	18	15	24	38	35	22	28	17
Unmarked X-walk	8	14	13	17	13	16	13	4	12	21	16	21	23	23	15
Not in X-walk	87	78	67	63	65	69	59	78	73	55	46	44	55	49	67
Street Lights on	4	7	11	24	21	26	25	15	27	22	18	28	18	9	14
Ped. Signal Present	1	2	5	5	4	5	10	5	3	9	15	7	9	8	5
St. Lights/Ped. Sig.	0	1	0	1	2	1	3	0	5	1	0	0	1	1	1
TRAFFIC LANES															
One	18	10	4	3	2	7	3	2	2	8	5	3	2	3	6
Two	64	65	48	40	37	29	39	24	17	27	18	14	33	29	43
Three	4	5	3	6	9	7	9	12	10	8	9	14	12	8	7
Four	11	15	35	39	35	43	34	51	35	33	50	41	38	32	31
Five	2	2	5	4	6	3	5	4	8	7	3	6	3	4	4
Six	1	2	5	8	11	11	8	8	23	13	15	19	12	13	8
Seven or more	1	1	1	1	0	0	2	0	5	3	0	2	0	1	1
LANE ENTERED															
First	75	58	46	32	24	33	34	26	28	40	22	25	33	33	43
Second	16	30	30	31	37	24	27	31	23	24	25	32	40	33	29
Third	4	4	5	10	9	12	18	10	14	12	16	16	8	13	8
Fourth	1	2	9	7	6	8	0	5	7	2	9	11	5	6	5
Fifth	0	1	2	3	2	2	3	0	7	0	3	0	0	2	2
Sixth or more	0	1	1	1	0	0	0	0	7	2	2	0	2	1	1
Parking	1	1	1	4	5	3	6	14	4	5	6	11	5	3	3
Not in Roadway	3	4	6	13	16	17	11	14	9	16	17	5	7	8	8
VISION BLOCKED BY															
Standing Traffic	5	7	15	12	4	10	4	2	2	3	3	4	3	4	7
Parked Vehicle	45	31	14	5	5	4	4	5	8	3	4	4	4	7	16
Bus in Bus Stop	1	1	1	1	1	0	1	7	2	3	1	1	0	1	1
Other	1	4	5	6	8	3	1	0	5	1	7	10	4	4	4
DRIVER ACTION															
Swerved/Braked	64	69	57	38	29	30	34	14	38	40	42	35	40	38	48
Attending Traffic	9	8	12	11	17	10	12	22	19	12	12	23	16	22	13
Alcohol or Drugs	2	1	1	4	3	7	3	5	5	6	4	1	1	2	2
Speeding	2	1	2	3	2	3	4	2	0	0	3	4	6	2	2
Turning/Merging	6	5	9	16	21	15	18	22	14	25	18	22	15	21	13
Improper Turn	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1
Ran Sign or Sig.	0	1	1	2	0	4	0	0	0	4	1	1	4	1	1

Table 3-6 (Continued)

Summary Percentage for Total Pedestrian Accident
Sample (N = 2044)

	UPPER BOUNDS OF AGE CATEGORIES														
Descriptive Data	4	9	14	19	24	29	34	39	44	49	54	59	64	65 Plus	Total
PED CROSSED															
Behind Parked Vehicle	48	36	18	9	4	7	6	2	5	3	6	6	7	8	19
Against Signal	3	4	4	9	6	2	6	11	5	7	14	14	10	11	7
Bus Stop/Front	1	1	2	2	1	0	1	4	0	1	1	1	1	1	1
Bus Stop/Rear	1	1	1	2	0	0	1	0	0	1	0	0	3	0	1
Front of Standing Traffic	8	7	14	12	10	12	6	5	5	9	6	6	7	6	8
PED ACTION															
Running	54	80	51	36	23	17	20	14	17	13	22	6	7	15	40
To/From Vendor	6	4	1	0	0	0	0	0	0	0	0	0	0	0	2
Crossing with Peds.	8	10	15	20	19	7	16	7	5	12	10	9	10	9	11
Not Crossing	2	6	11	14	25	20	13	29	19	19	19	7	13	8	12
In/out of Vehicle	1	1	1	4	3	4	1	4	5	4	1	0	4	2	2
Unaware Backing Vehicle	3	1	1	3	5	5	6	7	0	4	4	7	3	4	3
Appeared Suddenly	58	57	49	37	33	33	37	25	38	37	28	43	42	42	45
Walked into Vehicle	20	18	13	17	6	10	4	7	5	9	10	7	6	9	13
Working on Vehicle	1	1	1	5	6	3	1	5	5	4	3	1	1	0	2
Working in Roadway	0	0	1	1	4	1	0	5	0	1	3	3	0	1	1
Playing in Roadway	3	4	2	2	1	0	0	0	0	0	0	0	0	0	2
Attempted Evasion	1	2	6	9	7	12	9	5	5	7	1	1	4	4	4
Alcohol/Drugs	0	1	0	2	6	4	16	7	17	16	15	10	7	3	4

Table 3-6 (Continued)

Summary Percentage for Total Pedestrian Accident
Sample (N = 2044)

		UPPER BOUNDS OF AGE CATEGORIES														
ACCIDENT TYPE	$\bar{X}$ Conf	4	9	14	19	24	29	34	39	44	49	54	59	64	65 Plus	Total
D/O First		44	32	18	13	11	14	6	9	21	12	10	12	18	15	21.2
D/O Second		7	12	13	8	9	7	4	5	10	3	4	6	6	6	8.8
Int. Dash		8	17	18	12	8	13	20	9	8	19	19	23	19	22	15.9
T/M Conflict		2	1	1	1	4	2	3	2	3	0	1	9	1	5	2.1
Ped Strike Veh.		2	2	3	5	2	3	3	2	2	4	6	1	3	2	2.6
Mult. Threat		2	2	8	4	1	4	3	0	2	0	1	3	0	3	2.8
Bus Stop		1	1	2	2	1	0	1	4	0	1	1	1	1	1	1.0
Backing-up		3	1	0	2	5	4	6	7	2	4	4	6	0	4	2.6
Vendor		6	4	1	0	0	0	0	0	0	0	0	0	0	0	1.7
Wierd		2	3	6	8	9	4	4	7	11	4	6	4	4	3	4.8
Result of Auto-Auto		0	0	1	4	5	5	1	5	3	4	3	1	0	1	1.6
Secondary		2	2	1	5	8	6	6	7	2	9	11	6	9	3	3.9
Midblock-Dash		17	16	7	5	2	1	1	4	5	1	0	0	1	1	7.2
Trapped		0	1	0	2	3	0	0	0	0	1	0	3	1	1	.8
Turning Veh.		1	1	4	7	5	8	6	7	6	18	11	12	12	8	5.6
Not in Road		1	1	4	5	5	10	4	4	3	4	7	0	1	4	3.4
Not Coded		4	5	14	16	22	17	29	27	24	12	15	13	21	22	14.1

MISSING DATA BY CATEGORY

Descriptive Data	Unknown
Ped Age	3
Month	1
Time of Day	2
Day of Week	3
Driver Age	13
Driver Sex	3
Ped Sex	1
Injury Severity	5
Light Conditions	2
Weather Conditions	1
Roadway Conditions	1
Vehicle Type	5
Type of Road	7

Descriptive Data	Unknown
Type of Area	4
Traffic Control	3
Intersection	3
Crosswalk	5
Traffic Lanes	6
Lane Entered	11

Driver's Sex. Seventy (70 percent) of the drivers involved were male. By way of comparison, Accident Facts lists 72 percent of the drivers involved in all accidents as male.

Pedestrian's Sex. As in the case of the drivers, most (62 percent) of the pedestrians involved were male.

Injury Severity. Most of the cases involved either serious (32 percent) or moderate (35 percent) injury while only 11 percent were fatal. These figures are probably somewhat more severe than nationwide statistics because of the inclusion of only serious injury and fatal accidents from New York City. The injuries are also somewhat more severe than those reported by ORI:

Injury Severity	BioTechnology Sample	Operations Research, Inc. Sample
Fatal	11	13
Serious	32	16
Moderate	35	26
Slight	21	39
None	2	5

It should be noted that there is some variation in the injury severity category definitions used by the various city police departments.

Light Conditions. Most of the accidents occurred during daylight (67 percent) with 28 percent occurring at night and 5 percent at dawn or dusk. The ORI statistics for these categories were 73 percent daylight, 6 percent dawn or dusk, and 21 percent dark.

Weather Conditions. This variable describes the weather at the time of the accident. It was either clear or cloudy in 88 percent of the cases with rain present in 10 percent.

Roadway Conditions. As might be expected, the roadway conditions closely followed the weather conditions; 86 percent dry, 13 percent wet, and 1 percent snow, ice, or mud.

Vehicle Type. The majority of the accidents involved a pedestrian and a car (84 percent). Trucks were involved in 8 percent of the accidents while buses and taxis each accounted for 2 percent.

Type of Roads. Most (75 percent) of the accidents occurred on two-way surface streets while 12 percent occurred on one-way streets. A total of 7 percent happened on divided roadways while only 2 percent happened on freeways or expressways.

Type of Area. Most of the accidents occurred in residential areas of one type or another, with 43 percent happening in strictly residential areas and 25 percent occurring in mixed residential-commercial areas. ORI reported 40 percent occurring in strictly residential areas.

Traffic Control. Not surprisingly, the accidents tended to occur where no traffic control was present (67 percent); however, 24 percent occurred near a traffic signal and 7 percent near a stop or yield sign.

Vehicle Action. Most of the vehicles (72 percent) were proceeding straight when they struck the pedestrians. The ones that were turning were almost evenly distributed between those turning right (5 percent) and those turning left (7 percent).

Accident Occurred. Nonintersection locations were the most frequent (61 percent) accident sites. Most of the accidents (67 percent) did not occur in a crosswalk while 17 percent happened in a marked crosswalk and 15 percent happened in an unmarked crosswalk.

Traffic Lanes. Most (43 percent) of the accidents occurred on two lane roads; four lane roads were the next most common, accounting for 31 percent of the accident sites.

Lane Entered. The pedestrian was most often (43 percent) struck as he entered the first traffic lane. In 29 percent of the cases, he made it into the second lane before being hit. In 8 percent of the accidents, the pedestrian was not in the roadway.

Vision Blocked By. The driver's vision was frequently (16 percent of the cases) blocked by parked vehicles. In 7 percent of the cases, standing traffic blocked the driver's vision.

Driver's Action. In almost half (48 percent) of the cases the driver did attempt evasive action and swerved or braked to avoid the pedestrian. In only 13 percent of the cases, the driver was attending to traffic and failed to see the pedestrian. In 13 percent of cases, the driver was engaged in a turning or merging maneuver; these are, of course, not necessarily the same cases. In only 2 percent of the cases was the driver indicated as being under the influence of alcohol or drugs. In 2 percent of the cases the driver was exceeding the speed limit.

Pedestrian Crossed. In 19 percent of the cases the pedestrian crossed behind a parked vehicle, and in 8 percent of the accidents the pedestrian crossed in front of standing traffic. These frequencies compare favorably with the previous item indicating visual obstructions for the driver. Only 7 percent of the pedestrians crossed against the signal. ORI reported 6.5 percent crossed against the signal.

Pedestrian Action. Sudden appearance was the most frequent (45 percent) pedestrian action; in 40 percent of the cases the pedestrian was running. The pedestrian was indicated to be under the influence of alcohol or drugs in 4 percent of the cases.

Accident Type. The distribution of the various accident types was discussed in an earlier section.

The last section of Table 3-6 shows the frequencies with which information was missing or not coded for each data category. Driver's age was the most frequently missed item, due in large part to the occurrence of hit and run accidents in which the driver is not identified. The "lane entered" category was not completed in 7 percent of the cases. The wording of this item appears to require additional clarification. (Often the response to this item did not correspond to the verbal/pictorial description of the accident.) Likewise the police had some difficulty (or reluctance) in specifying the characteristics of the roadway, i.e., "type of road" and "number of traffic lanes." In the remaining data categories the information was unavailable in less than 5 percent of the cases. The relative completeness of the various data categories is an indication that relatively complete data can be gathered with this technique.

Attachment A

Procedures for an Accident-Based Countermeasure Evaluation

Vital to any experimental evaluation is the determination of the number of observations that is needed to demonstrate statistically the effectiveness or ineffectiveness of the experimental treatment. The use of too few observations might mean that a small, but reliable, effect might go undetected, and too large a sample of observations would not be cost-effective. This section discusses a procedure that could be used to determine the number of installations of a particular countermeasure that should be used if the accident-reducing capability of that countermeasure is to be tested. The derivation necessarily involves making "best guess" estimates on the basis of existing engineering and accident data. Information from Volume I of this report also proved useful in estimating some of the parameters involved, especially with regard to the behavioral effectiveness of certain of the countermeasure concepts, and the logical extension of the concept so that behavioral effectiveness statistics are translated into reasonable accident-reducing effectiveness statistics.

The number of sites (N) needed to test a given countermeasure can be estimated. Let us assume that we will employ an "after only" design with equal sized experimental and control groups.

Now, using the "*t*" test formula, we can solve for N at the .05 level of significance.

(1) $$1.96 = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$$

Where:

X_2 = the experimental group mean

X_1 = the control group mean

S_2^2 = the experimental group variance

S_1^2 = the control group variance

N_2 = the number of experimental blocks

N_1 = the number of control blocks

If $N_1 = N_2$, the denominator becomes

(2) $$\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}} = \sqrt{\frac{S_1^2 + S_2^2}{N}} = \frac{\sqrt{S_1^2 + S_2^2}}{\sqrt{N}}$$

Substituting the above in (1)

(3) $$1.96 = \frac{\bar{X}_1 - \bar{X}_2}{\frac{\sqrt{S_1^2 + S_2^2}}{\sqrt{N}}}$$

and,

(4) $$X_1 - X_2 = 1.96\left(\frac{\sqrt{S_1^2 + S_2^2}}{\sqrt{N}}\right)$$

and,

(5) $$\sqrt{N} = \frac{1.96\sqrt{S_1^2 + S_2^2}}{\bar{X}_1 - \bar{X}_2}$$

and

(6) $$N = \frac{(1.96)^2 (S_1^2 + S_2^2)}{\left(\bar{X}_1 - \bar{X}_2\right)^2}$$

Since an accident is a Bernoulli variable and the means X_1 and X_2 can be expressed as the probabilities that a particular accident type will occur in a given block, we can calculate the variance as $S_1^2 = p_1 q_1$ and $S_2^2 = p_2 q_2$

then,

(7) $$N = \frac{(1.96)^2 (p_1 q_1 + p_2 q_2)}{\left(\bar{X}_1 - \bar{X}_2\right)^2}$$

Further calculations are dependent on making several additional estimates.

- The tendency for a particular accident type to reoccur within both the experimental and control areas the following year must be estimated. This might be called repeat rate.
- The effectiveness of the countermeasure in reducing the occurrence of a particular accident type in the experimental area must be estimated.

Since no firm value for either of these two estimates can be made using available data, the following calculations have been performed with a range of values. Repeat rates of 10 percent, 20 percent, 50 percent, 80 percent, and 100 percent were used. Effectiveness rates of 20 percent, 50 percent, and 80 percent were used depending on the particular countermeasures. The following example used a 10 percent repeat rate and a 20 percent countermeasure effectiveness rate:

As assumed: "Before" $p = .8$, accidents per block. If only 10% of the sites have repeat accident experience then, for the control group
"After" $p_1 = .8 \times 10\%$ or $p = .08$
therefore $q_1 = .92$ and $p_1 q_1 = .0736$
If the treatment is only 20% effective, for the experimental group
"After" $p_2 = .08 - (20\% \times .08) = .08 - .016$
therefore $p_2 = .064$, $q_2 = .936$, and $p_2 q_2 = .0599$.

Substituting these values in equation (7)

$$N = \frac{(1.96)^2 \ (.0736 + .0599)}{(.08 - .064)^2}$$

$$= \frac{(3.8416) \ (.1335)}{(.016)^2} = \frac{.5129}{.000256}$$

$$N = 2003$$

Thus, 2003 experimental countermeasure implementation sites (and a like number of control sites) would be needed to determine that the countermeasure reduced accidents by 20 percent if accidents tend to reoccur normally in only 10 percent of the previous year's accident sites.

Table A-1 was prepared using the previously described procedures.

Table A-1

Number of Sites (Blocks) of Countermeasure Installations
Needed to Demonstrate the Effectiveness of
the Countermeasure at the .05 Level of Significance

Regression Rate (the tendency for a particular accident type to reoccur in a given set of blocks or treatment area the following year)	Treatment Significance (the ability of a given countermeasure to reduce the occurrence of a given accident type)		
	20%	50%	80%
10%	2003	269	84
20%	927	125	39
50%	275	38	12
80%	113	17	5 *
100%	59	10	3 *

*Because these calculations were based on an infinite degrees of freedom, all numbers below about 10 are not reliable. A minimum of 10 sites is considered appropriate in these cases.

Inherent in all of the previous derivations was the concept that in order to get a workable treatment area, it would be necessary to take some blocks that did not have an accident history, hence, for the previous cases, the probability of having an accident on a given block was .8. It is possible to do similar calculations assuming that all of the locations have had an accident so that the "score" for a block would be 1.0 instead of .8. This assumption is particularly applicable to certain countermeasures (i.e., bus stop relocation) where treatment would be applied only to those locations with an accident history. The following example is worked out for a 50 percent repeat rate and a 20 percent countermeasure effectiveness.

"Before" $p = 1.0$
"After" $p_1 = 1.0 \times 50\%$ or .50
Therefore $p_1 = .50$ $q_1 = .50$ $pq = .250$

For a 20% effective treatment

"After" $p_2 = .50 - (.50 \times 20\%) = .40$
therefore $p_2 = .40$ $q_2 = .60$ $pq = .240$

$$N = \frac{(1.96)^2 (.250 + .240)}{(.50 - .40)^2} = \frac{(3.8416)(.490)}{(.10)^2}$$

$$N = 189$$

Table A-2 shows the values obtained when working with this assumption.

Both of these tables were developed using a "t" of 1.96 which is the required "t" for a .05 level with infinite degrees of freedom. The extremely low "N's" found in the lower right portion of the table is the result of this assumption regarding degrees of freedom. For this reason, all numbers lower than approximately 10 (18 degrees of freedom requires a "t" of 2.101 at the .05 level) are deceptive and should not be considered a reliable sample size.

It can be noted that for the relatively low repeat rates a large sample of sites is needed. Several procedures could be considered to select potential sites that exhibit relatively stable accident patterns. For example, if we select for treatment areas only those blocks experiencing a particular type of accident within at least 2 of the last 3 years (i.e., 1971 Yes, 1972 No, 1973 Yes) and we select our sample of blocks in the following ratio:

1. 70 percent of the blocks experience 1 accident a year for 2 of the last 3 years
2. 30 percent of the blocks experience 1 accident a year for each of the 3 years,

Table A-2

Number of Sites (Blocks) of Countermeasure Installations
Needed to Demonstrate the Effectiveness
of the Countermeasure at the .05 Level of Significance*

Regression Rate (the tendency for a particular accident type to reoccur in a given set of blocks or treatment area the following year)	Treatment Significance (the ability of a given countermeasure to reduce the occurrence of a given accident type) 20%	50%	80%
10%	1571	211	66
20%	706	96	30
50%	189	27	8 **
80%	59	10	3 **
100%	15	4 **	1 **

*Based on a treatment area or set of blocks where the probability of having an accident was 1.0.

** Because these calculations were based on an infinite degrees of freedom all numbers below about 10 are not reliable. A minimum of 10 sites is considered appropriate in these cases.

we can then calculate the expected yearly accident rate (AR) for such a combination of blocks.

Expected (AR) = .7(.67) + .3(1)= .77

If sufficient locations are found to be available then we will be able to use the number of sites shown in Tables A-1 and A-2 for the 80 percent repeat rate (.77≈80%).

Using the 80 percent repeat rate figures it is possible to estimate the number of sites that will be needed to test each C/M's effort on each accident type as shown in Tables A-3 and A-4. Table A-3 shows some estimated hypothesized applicabilities of C/M to the various accident types. The "hypothesized effectiveness" shown is considered to be a reasonable estimate based, in part, on the results of the behavioral evaluation of the countermeasures (see Volume I). If we use "N" values from Table A-1 for an 80 percent repeat rate, for example, we can determine the number of sites needed as shown in Table A-4. If each accident type (except types 3, 4, 8 and 9 for which that is no moderately or highly effective C/M) is targeted by *the most* appropriate, most effective C/M, then 167 sites will be needed. If each C/M (except preventive markings, cross walk set back and vendor signals for which the hypothesized applicability to target accident types is very low) is tested on *its most* applicable accident type then a total of 280 sites is needed.

Table A-3

Hypothesized Effectiveness of Countermeasures to Accident Types

Pedestrian Accident Types	COUNTERMEASURES								
	Preventive Markings *	Median Barrier	Crosswalk Set Back *	Midblock Crosswalk	Diagonal Parking	Meter Post Barriers	Stop Line Relocation	Vendor Warning Signals *	Bus Stop Relocation
1. Dart-Out First Half		50		20	50	20			
2. Dart-Out Second Half		80		20	20	20			
3. Intersection Dash									
4. Vehicle Turn/Merge Attention Conflict									
5. Ped Strikes Vehicle						20			
6. Multiple Threat Situation							50		
7. Bus Stop Related									80
8. Vendor-Ice Cream Truck									

*Not found to be effective in the Behavioral Evaluation, see Volume I.

Table A-4

Number of Experimental Sites Needed to Demonstrate the Hypothesized Applicability of Countermeasures to Accident Types

Pedestrian Accident Types	COUNTERMEASURES								
	Preventive Markings	Median Barrier	Crosswalk Set Back	Midblock Crosswalk	Diagonal Parking	Meter Post Barriers	Stop Line Relocation	Vendor Warning Signals	Bus Stop Relocation
1. Dart-Out First Half		17		113	17	113			
2. Dart-Out Second Half		10		113	113	113			
3. Intersection Dash									
4. Vehicle Turn/Merge Attention Conflict									
5. Ped Strikes Vehicle						113			
6. Multiple Threat Situation							17		
7. Bus Stop Related									10
8. Backing Up									
9. Vendor-Ice Cream Truck									

From Table 1
N for 20% Effective C/M=113
N for 50% Effective C/M=17
N for 80% Effective C/M=10