PBCAT
PEDESTRIAN \& BICYCLE CRASH ANALYSIS TOOL VERSION 2.0

8
$\qquad$
$\qquad$
Turner-Fairbank Highway Research Center
McLean, VA 22101-2296

## FOREWORD

Every year, scores of pedestrians and bicyclists are killed or injured in collisions with motor vehicles, exacting a terrible toll on individuals, families, businesses, and communities throughout the country. To respond to this national problem, the transportation community continues to develop innovative approaches to enhance the capacity of State and local coordinators, planners, and engineers to address traffic fatalities and injuries. The Pedestrian and Bicycle Crash Analysis Tool (PBCAT): Version 2.0 offers a dynamic and practical method for recording vital information about pedestrian and bicyclist crashes to produce diverse and useful reports. PBCAT also gives access to engineering, education, and enforcement countermeasures that represent promising procedures for mitigating crashes. The details PBCAT captures about crashes between motor vehicles and pedestrians or bicyclists, and the resources it presents, will further efforts of agencies nationwide to identify and select appropriate practices to improve pedestrian and bicyclist safety.

Michael Trentacoste, Director
Office of Safety Research and Development

## Notice

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in this document. This report does not constitute a standard, specification, or regulation.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names if they appear in the report are here only because they are considered essential to the objective of the document.

## Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

Technical Report Documentation Page


## SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

| Symbol | When You Know | Multiply By | To Find | Symbol |
| :---: | :---: | :---: | :---: | :---: |
| LENGTH |  |  |  |  |
| in | inches | 25.4 | millimeters | mm |
| ft | feet | 0.305 | meters | m |
| yd | yards | 0.914 | meters | m |
| mi | miles | 1.61 | kilometers | km |
| AREA |  |  |  |  |
| in ${ }^{2}$ | square inches | 645.2 | square millimeters | $\mathrm{mm}^{2}$ |
| $\mathrm{ft}^{2}$ | square feet | 0.093 | square meters | $\mathrm{m}^{2}$ |
| $\mathrm{yd}^{2}$ | square yard | 0.836 | square meters | $\mathrm{m}^{2}$ |
| ac | acres | 0.405 | hectares | ha ${ }^{2}$ |
| $m i^{2}$ | square miles | 2.59 | square kilometers | $\mathrm{km}^{2}$ |
| VOLUME |  |  |  |  |
| fl oz | fluid ounces | 29.57 | milliliters | mL |
| gal | gallons | 3.785 | liters | L |
| $\mathrm{ft}^{3}$ | cubic feet | 0.028 | cubic meters | $\mathrm{m}^{3}$ |
| $\mathrm{yd}^{3}$ | cubic yards | 0.765 | cubic meters | $\mathrm{m}^{3}$ |
| NOTE: volumes greater than 1000 L shall be shown in $\mathrm{m}^{3}$ |  |  |  |  |
| MASS |  |  |  |  |
| oz | ounces | 28.35 | grams | g |
| lb | pounds | 0.454 | kilograms |  |
| T | short tons (2000 lb) | 0.907 | megagrams (or "metric ton") | Mg (or "t") |
| TEMPERATURE (exact degrees) |  |  |  |  |
| ${ }^{\circ} \mathrm{F}$ | Fahrenheit | $\begin{aligned} & 5(\mathrm{~F}-32) / 9 \\ & \text { or }(\mathrm{F}-32) / 1 \end{aligned}$ | Celsius | ${ }^{\circ} \mathrm{C}$ |
| ILLUMINATION |  |  |  |  |
| fc | foot-candles | 10.76 | lux |  |
| $f 1$ | foot-Lamberts | 3.426 | candela/m ${ }^{2}$ | $\mathrm{cd} / \mathrm{m}^{2}$ |
| FORCE and PRESSURE or STRESS |  |  |  |  |
| lbf | poundforce | 4.45 | newtons | N |
| lbf/in ${ }^{2}$ | poundforce per square | 6.89 | kilopascals | kPa |


| APPROXIMATE CONVERSIONS FROM SI UNITS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Symbol | When You Know | Multiply By | To Find | Symbol |
| LENGTH |  |  |  |  |
| mm | millimeters | 0.039 | inches | in |
| m | meters | 3.28 | feet | ft |
| m | meters | 1.09 | yards | yd |
| km | kilometers | 0.621 | miles | mi |
| AREA |  |  |  |  |
| $\mathrm{mm}^{2}$ | square millimeters | 0.0016 | square inches | in ${ }^{2}$ |
| $\mathrm{m}_{2}^{2}$ | square meters | 10.764 | square feet | $\mathrm{ft}^{2}$ |
| $\mathrm{m}^{2}$ | square meters | 1.195 | square yards | $\mathrm{yd}^{2}$ |
| ha | hectares | 2.47 | acres |  |
| km ${ }^{2}$ | square kilometers | 0.386 | square miles | $m i^{2}$ |
| VOLUME |  |  |  |  |
| mL | milliliters | 0.034 | fluid ounces | fl oz |
| L | liters | 0.264 | gallons | gal |
| $\mathrm{m}^{3}$ | cubic meters | 35.314 | cubic feet | $\mathrm{ft}^{3}$ |
| $\mathrm{m}^{3}$ | cubic meters | 1.307 | cubic yards | $y d^{3}$ |
| MASS |  |  |  |  |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.202 | pounds | 1 l |
| Mg (or "t") | megagrams (or "metric ton") | 1.103 | short tons (2000 lb) | T |
| TEMPERATURE (exact degrees) |  |  |  |  |
| ${ }^{\circ} \mathrm{C}$ | Celsius | 1.8C+32 | Fahrenheit | ${ }^{\circ} \mathrm{F}$ |
| ILLUMINATION |  |  |  |  |
| Ix | lux | 0.0929 | foot-candles | fc |
| $\mathrm{cd} / \mathrm{m}^{2}$ | candela/m ${ }^{2}$ | 0.2919 | foot-Lamberts | fl |
| FORCE and PRESSURE or STRESS |  |  |  |  |
| N | newtons | 0.225 | poundforce |  |
| kPa | kilopascals | 0.145 | poundforce per square inch | lbf/in ${ }^{2}$ |

[^0]
## TABLE OF CONTENTS

Chapter 1. Product Overview ..... 1
Crash Typing ..... 1
Version 2.0 Features ..... 1
Applications ..... 2
Technical Support. ..... 3
Chapter 2. Software Installation ..... 5
System Requirements ..... 5
Installation Steps ..... 5
Chapter 3. Getting Started: The Basics ..... 7
Layout and Navigation ..... 7
Toolbar ..... 7
Data Entry and Crash Typing Buttons ..... 7
Form Design Buttons ..... 8
Quick Start Steps ..... 8
Step 1—Create New Database ..... 8
Step 2—Select Database and Forms ..... 9
Chapter 4. Application Preferences ..... 11
Data Sources ..... 11
Crash Typing Options ..... 13
Database Fields ..... 15
Crash Typing Fields ..... 18
Age Fields ..... 19
User Profiles ..... 19
Passwords ..... 20
Editing Options ..... 21
Speed Groups ..... 21
Age Groups ..... 23
Chapter 5. Form Creation and Design ..... 25
Forms and Databases ..... 25
Existing Forms ..... 25
Form Creation ..... 26
Adding Fields ..... 28
Adding Text and Group Boxes ..... 28
Deleting Fields ..... 29
Indexing Tabs ..... 29
Saving and Renaming ..... 30
Form Deletion. ..... 30
Form Copying ..... 31
Chapter 6. Data Entry and Crash Typing ..... 33
Data Entry ..... 33
Basic Functions ..... 33
Other Functions ..... 35
Crash Typing Options and Database Fields ..... 36
Pedestrian Location ..... 36
Standard versus Group Typing ..... 37
Database Fields ..... 37
Crash Typing Screens and Definitions ..... 39
Crash Typing Examples ..... 40
Example 1—Bicyclist Crash (Standard Typing) ..... 40
Example 2—Pedestrian Crash (Standard Typing, Location Option Enabled) ..... 49
Example 3—Bicyclist Crash (Group Typing) ..... 60
Chapter 7. Analysis Reports ..... 65
Crash Type Frequency ..... 65
Tables and Graphs ..... 66
Examples ..... 67
Example 1—Bicyclist Crashes—Light Conditions ..... 67
Example 2—Pedestrian Crashes-Crash Types and Pedestrian Age ..... 69
Chapter 8. Database Options ..... 71
Import A Database ..... 71
Export A Database ..... 72
Chapter 9. Countermeasures ..... 75
Pedestrian Countermeasure Matrix ..... 77
Bicyclist Countermeasure Matrix ..... 78
Countermeasure Descriptions ..... 80
Appendix A: Installation Instructions ..... 83
Appendix B: Pedestrian Location Scenarios ..... 91
Appendix C: Crash Types and Crash Groups ..... 95
Appendix D: Database Structure ..... 103
Appendix E: Data Entry Forms. ..... 123
Appendix F: Crash Typing Definitions ..... 135
Appendix G: Crash Typing Examples ..... 155
Appendix H: Pedsafe and Bikesafe Groups ..... 223
References ..... 231

## LIST OF FIGURES

Figure 1. Image. Extract the installation files ..... 5
Figure 2. Image. Use pull-down menus and toolbars for navigation. ..... 7
Figure 3. Image. Step 1. ..... 9
Figure 4. Image. Step 2. ..... 9
Figure 5. Image. Set default database and choose default data entry forms ..... 10
Figure 6. Image. Step 3. ..... 10
Figure 7. Image. Set database options and user profiles ..... 11
Figure 8. Image. Create, add an existing, or remove a database. ..... 12
Figure 9. Image. Search for and open a database to be added. ..... 12
Figure 10. Image. Enable or disable pedestrian location option and group typing options ..... 13
Figure 11. Image. Add, delete, or edit fields in the database. ..... 15
Figure 12. Image. Enter field name, alias, data type, field length, entry type, and default value. ..... 16
Figure 13. Image. Select a field entry type. ..... 16
Figure 14. Image. Edit a field. ..... 17
Figure 15. Image. Set user profiles, passwords, and editing options ..... 19
Figure 16. Image. Create a new profile. ..... 20
Figure 17. Image. Select a profile. ..... 20
Figure 18. Image. Enter a password and hint information ..... 20
Figure 19. Image. Enter a password ..... 21
Figure 20. Image. Set values for speed groups and choose units of measurement. ..... 22
Figure 21. Image. Establish as few as two groups ..... 22
Figure 22. Image. Set values for pedestrian, bicyclist, and motorist age groups. ..... 23
Figure 23. Image. Set values and numbers of groups for three modes. ..... 24
Figure 24. Image. Create, edit, delete, and copy forms. ..... 25
Figure 25. Image. Select forms for editing. ..... 25
Figure 26. Image. Create a form using the New Form function. ..... 27
Figure 27. Image. Create a form using the Edit Form function ..... 27
Figure 28. Image. Insert a field on a form. ..... 28
Figure 29. Image. Insert text and group boxes on a form. ..... 28
Figure 30. Image. Resize a box. ..... 29
Figure 31. Image. Set the sequence of tabs for a new or existing form. ..... 29
Figure 32. Image. Rename and save a form. ..... 30
Figure 33. Image. Overwrite an existing form. ..... 30
Figure 34. Image. Delete a form. ..... 30
Figure 35. Image. Copy a form. ..... 31
Figure 36. Image. Enter pedestrian or bicyclist crash data. ..... 33
Figure 37. Image. Access the Crash Typing function. ..... 34
Figure 38. Image. Save a data entry record. ..... 34
Figure 39. Image. Open a new data entry form. ..... 35
Figure 40. Image. Navigate to, delete, search, and browse records in a table. ..... 35
Figure 41. Image. Search the database for specific records ..... 35
Figure 42. Image. Browse all records in the database. ..... 36
Figure 43. Image. Preview the data form that can be printed. ..... 36
Figure 44. Image. Start the crash typing process. ..... 39
Figure 45. Image. Identify where the crash occurred. ..... 39
Figure 46. Image. Page 1 of Florida Crash Report for example 1. ..... 41
Figure 47. Image. Page 2 of Florida Crash Report for example 1. ..... 42
Figure 48. Image. Page 3 of Florida Crash Report for example 1. ..... 43
Figure 49. Image. Open a bicyclist crash data entry form then begin the crash typing process. ..... 44
Figure 50. Image. Click on Intersection to indicate where crash occurred ..... 44
Figure 51. Image. Indicate where the bicyclist was initially positioned. ..... 45
Figure 52. Image. Indicate travel direction of the bicyclist. ..... 45
Figure 53. Image. Indicate unusual/specific circumstances ..... 46
Figure 54. Image. Indicate initial approach paths. ..... 46
Figure 55. Image. Indicate maneuvers made by the parties. ..... 47
Figure 56. Image. Indicate type of traffic control at the intersection. ..... 47
Figure 57. Image. Describe the circumstances of a sign-controlled intersection crash. ..... 48
Figure 58. Image. Enter crash typing data into the entry form. ..... 48
Figure 59. Image. Page 1 of North Carolina Crash Report for example 2. ..... 50
Figure 60. Image. Page 2 of North Carolina Crash Report for example 2. ..... 51
Figure 61. Image. Page 3 of North Carolina Crash Report for example 2. ..... 52
Figure 62. Images. Pedestrian crash data entry forms. ..... 53
Figure 63. Image. Indicate where the crash occurred. ..... 53
Figure 64. Image. Indicate position of pedestrian when struck. ..... 54
Figure 65. Image. Indicate initial direction of travel of the motorist ..... 54
Figure 66. Image. Indicate the motorist maneuver. ..... 55
Figure 67. Image. Indicate where the crash occurred at the intersection. ..... 55
Figure 68. Image. Select the scenario that illustrates the pedestrian's movement when struck. ..... 56
Figure 69. Image. Indicate no unusual circumstances. ..... 56
Figure 70. Image. Indicate no unusual vehicle types or vehicle actions. ..... 57
Figure 71. Image. Indicate no unusual pedestrian action. ..... 57
Figure 72. Image. Describe the typical pedestrian action in the crash. ..... 58
Figure 73. Image. Describe the circumstances of the crash. ..... 58
Figure 74. Image. Describe the circumstances of the crash in more detail. ..... 59
Figure 75. Image. Enter crash typing data into data entry form. ..... 59
Figure 76. Image. Enable group typing for bicyclist crashes. ..... 60
Figure 77. Image. Open a bicyclist crash data entry form then begin the crash typing process ..... 61
Figure 78. Image. Indicate initial approach paths for bicyclist and motorist. ..... 61
Figure 79. Image. Describe the circumstances of the crash in this case. ..... 62
Figure 80. Image. Enter crash typing data into form. ..... 62
Figure 81. Image. Select analysis options ..... 65
Figure 82. Image. Produce a list of crash types or crash groups in order of frequency. ..... 65
Figure 83. Image. Produce single-variable and multivariate tables ..... 66
Figure 84. Image. Produce a single-variable table. ..... 68
Figure 85. Image. Produce a graph of a single-variable table. ..... 68
Figure 86. Image. Export results to Excel ..... 69
Figure 87. Image. Produce a multivariate table. ..... 69
Figure 88. Image. Present results as percentages. ..... 70
Figure 89. Image. Import and export data. ..... 71
Figure 90. Image. Import a PBCAT Version 1.0 database. ..... 71
Figure 91. Image. Select the database to be imported. ..... 71
Figure 92. Image. Select database and fields to be exported and choose format. ..... 72
Figure 93. Image. Access the PEDSAFE and BIKESAFE Web sites ..... 75
Figure 94. Image. Access the PEDSAFE and BIKESAFE Web sites ..... 76
Figure 95. Image. View countermeasures for 12 pedestrian crash groups ..... 77
Figure 96. Image. View countermeasures for 13 bicyclist crash groups ..... 79
Figure 97. Image. View countermeasure descriptions ..... 81
Figure 98. Step 1. ..... 83
Figure 99. Step 1 completed. ..... 83
Figure 100. Step 2 ..... 83
Figure 101. Step 2—setup file. ..... 83
Figure 102. Step 3 ..... 84
Figure 103. Step 4 ..... 84
Figure 104. Step 5 ..... 84
Figure 105. Step 6 ..... 85
Figure 106. Step 7 ..... 85
Figure 107. Step 8 ..... 85
Figure 108. Step 9 ..... 86
Figure 109. Step 9—sample installation screen. ..... 86
Figure 110. Step 10 ..... 87
Figure 111. Step 11 ..... 87
Figure 112. Step 11—setup file ..... 87
Figure 113. Step 12 ..... 88
Figure 114. Step 13 ..... 88
Figure 115. Step 14 ..... 89
Figure 116. Step 15 ..... 89
Figure 117. Step 16 ..... 90
Figure 118. Motorist traveling straight through. ..... 92
Figure 119. Motorist turning right. ..... 93
Figure 120. Motorist turning left. ..... 94
Figure 121. Ped_All_Data_Milepost Form ..... 124
Figure 122. Ped_All_Data_Refpost Form ..... 125
Figure 123. Ped_All_Data_RouteName Form. ..... 126
Figure 124. Ped_All_Data_LinkNode Form ..... 127
Figure 125. Ped_Crash_Type Form ..... 128
Figure 126. Bike_All_Data_Milepost Form ..... 129
Figure 127. Bike_All_Data_Refpost Form ..... 130
Figure 128. Bike_All_Data_RouteName Form ..... 131
Figure 129. Bike_All_Data_LinkNode Form ..... 132
Figure 130. Bike_Crash_Type Form ..... 133
Figure 131. Codes for North Carolina Commission Report Forms ..... 156
Figure 132. North Carolina Crash Report-Number 1 ..... 157
Figure 133. North Carolina Crash Report-Number 2 ..... 159
Figure 134. North Carolina Crash Report-Number 3 ..... 161
Figure 135. North Carolina Crash Report-Number 4 ..... 163
Figure 136. North Carolina Crash Report—Number 5 ..... 165
Figure 137. North Carolina Crash Report—Number 6 ..... 167
Figure 138. North Carolina Crash Report-Number 7 ..... 169
Figure 139. North Carolina Crash Report-Number 8 ..... 171
Figure 140. North Carolina Crash Report—Number 9 ..... 173
Figure 141. North Carolina Crash Report—Number 10 ..... 175
Figure 142. Florida Crash Report—Report 1 ..... 183
Figure 143. Florida Crash Report—Report 2 ..... 186
Figure 144. Florida Crash Report—Report 3 ..... 189
Figure 145. Florida Crash Report—Report 4 ..... 192
Figure 146. Florida Crash Report—Report 5 ..... 195
Figure 147. Florida Crash Report—Report 6 ..... 198
Figure 148. Florida Crash Report—Report 7 ..... 201
Figure 149. Florida Crash Report—Report 8 ..... 204
Figure 150. Florida Crash Report—Report 9 ..... 207
Figure 151. Florida Crash Report—Report 10 ..... 210

## LIST OF TABLES

Table 1. Values for Crash Typing Fields for Example 1 ..... 49
Table 2. Values for Crash Typing Fields for Example 2 ..... 60
Table 3. Values for Crash Typing Fields for Example 3 ..... 63
Table 4: Pedestrian Crash Types and Crash Groups ..... 96
Table 5. Bicyclist Crash Types and Crash Groups ..... 99
Table 6. Pedestrian Table Structure for PBCAT.MDB Database. ..... 104
Table 7. Bicyclist Table Structure for PBCAT.MDB Database ..... 113
Table 8. Pedestrian Crash Location Definitions ..... 136
Table 9. Bicyclist Crash Location Definitions. ..... 137
Table 10. Pedestrian Crash Type Definitions ..... 139
Table 11. Pedestrian Crash Group Definitions ..... 144
Table 12. Bicyclist Crash Type Definitions ..... 146
Table 13. Bicyclist Crash Group Definitions. ..... 152
Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes ..... 177
Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes ..... 213
Table 16. PEDSAFE—PBCAT Mapping ..... 224
Table 17. BIKESAFE—PBCAT Mapping ..... 227

## CHAPTER 1. PRODUCT OVERVIEW

In 2004, 4,641 pedestrians and 725 bicyclists were killed, accounting for 13 percent of all traffic fatalities in the United States. An additional 68,000 pedestrians and 41,000 bicyclists were reported to be injured as a result of collisions with motor vehicles. ${ }^{1,2}$ The Pedestrian \& Bicycle Crash Analysis Tool (PBCAT) is a software product intended to assist state and local pedestrian and bicycle coordinators, planners, and engineers in addressing pedestrian and bicyclist crash problems.

PBCAT accomplishes this goal through the development and analysis of a database containing details associated with crashes between motor vehicles and pedestrians or bicyclists. One of these details is the crash type, which describes the pre-crash actions of the parties involved. With the database developed, the software can then be used to produce reports and select countermeasures to address the problems identified.

## CRASH TYPING

The development of effective countermeasures to help prevent bicyclist and pedestrian crashes is hindered by insufficient detail on computerized state crash files. Analysis of these data can provide information on where pedestrian and bicyclist crashes occur (city, street, intersection, two-lane road, etc.), when they occur (time of day, day of week, etc.), and characteristics of the victims involved (age, gender, injury severity, etc.). These data cannot provide a sufficient level of detail regarding the sequence of events leading to the crash.

In the 1970s, methods for typing pedestrian and bicycle crashes were developed by the National Highway Traffic Safety Administration to better define the sequence of events and precipitating actions leading to bicycle- and pedestrian-motor vehicle crashes. ${ }^{3,4}$ In the 1990s, the methodologies were applied to over 8,000 pedestrian and bicycle crashes from six States. The results provided a representative summary of the distribution of crash types experienced by pedestrians and bicyclists. ${ }^{5,6,7}$ This method has evolved over time and was refined during development version 1.0 of PBCAT. ${ }^{8}$

## VERSION 2.0 FEATURES

This version of the software has resulted in significant improvements in the functionality of the product and an improved design that makes the product easier to use. Some of the features of Version 2.0 include:

- User-friendly environment and improved navigation-A Microsoft ${ }^{\circledR}$ Windows ${ }^{\circledR}$ operation environment has been adopted and includes pull-down menus and toolbars.
- Form Designer-Users can customize their data entry form for inputting crash data. The form can be designed to match the police crash report used in their community.
- Group Crash Typing—An alternative version of crash typing is available for those users who do not wish to have the level of crash type detail offered in the traditional version.
- Location Data-Users have the option of recording the specific location information (e.g., approach leg and travel direction) for pedestrian crashes occurring at intersections.
- Crash Reports-Single variable and multivariable tables can be produced within the application, and the results can be exported to Excel for further customization and graphic production.
- Countermeasures-Users have access to detailed descriptions of engineering, education, and enforcement countermeasures that are provided to address specific types of crashes.
- Expert System Tools—Links are provided to online expert systems tools for additional help with countermeasure selection.
- Import/Export Capabilities—A conversion utility is included for importing PBCAT 1.0 data sets, and data may be exported in several formats for users who wish to conduct more sophisticated analyses with other applications (e.g., SAS® or Excel®).


## APPLICATIONS

As previously noted, the principal objective of the PBCAT application is to allow agencies to type their pedestrian and bicyclist crashes, and by doing so, be able to better assess the problem and select the most appropriate countermeasures. Crash typing requires the user to have access to the police crash reports. The narrative and diagram of the crash, along with information pertaining to the location, operator characteristics, and contributing factors, are all used to answer questions within the crash typing logic of the program and determine the appropriate crash type. While the crash reports are required for typing purposes, it is not a requirement that all of the information on the crash report be entered in the PBCAT database.

The software is designed to allow users to customize the database and the data entry forms to meet their needs. Some agencies will have hardcopy police crash reports, but will not have an easily accessible database with this information. For these agencies, the PBCAT software can be used to create this database. Forms can be designed to match the police crash report and include the crash typing information desired. The database can also be exported to other applications (e.g., Excel) for more sophisticated analyses.

Other agencies will already have robust databases that include most or all of the information recorded on police-reported crash forms. In these cases, there is no need to enter this information a second time. Instead, the user can develop a customized form to capture the crash typing information produced by PBCAT and any missing variables that may not be included in the primary database. The PBCAT database can be exported to Excel or as a delimited text file and merged with the primary database, using the crash report number as the linking field.

The latter approach has been used for several years in North Carolina. The Department of Transportation (NCDOT) has an extensive crash database that includes all of the variables present on the police crash report. The agency also maintains a database of scanned police crash reports. Each year, the reports involving pedestrians and bicyclists are downloaded, printed, and used to type all crashes. The crash typing database is then exported and merged with the NCDOT crash database. The database is used to analyze pedestrian and bicyclist crashes and produce annual reports on the state of pedestrian and bicyclist safety. The database is also maintained on
a Web site (www.pedbikeinfo.org/pbcat), which allows State and local agencies, as well as the general public, to access a series of standard analysis reports and produce customized queries. This Web site provides one example of how PBCAT may be utilized in assessing pedestrian and bicyclist safety, and at the same, providing an online tool for practitioners to conduct further analyses.

## TECHNICAL SUPPORT

Technical support for PBCAT is provided online at www.walkinginfo.org/pbcat. Users with questions or software problems can contact technical support via e-mail.

## CHAPTER 2. SOFTWARE INSTALLATION

## SYSTEM REQUIREMENTS

PBCAT Version 2.0 is a Microsoft Windows-compliant application that was built to operate on the .NET Framework, requiring that this framework is installed on the user's computer. The software was written in Microsoft Visual C\# ${ }^{\circledR}$ within the Visual Studio ${ }^{\circledR}$. NET development environment. The application database was developed in Microsoft Access 2000, which requires Microsoft Data Access Components (MDAC) 2.6 or higher. The hardware and software requirements for the application include:

- Microsoft Windows XP (preferred) or 2000. All operating systems should be updated with the latest Service Packs, which can be found at http://support.microsoft.com/sp.
- Minimum 256 MB of RAM.
- Minimum 100 MB of free disk space.


## INSTALLATION STEPS

The software can be downloaded from the walking and bicycling Web sites of the Pedestrian and Bicycle Information Center (PBIC), either www.walkinginfo.org/pbcat or www.bicyclinginfo.org/pbcat. It is recommended that the compressed file ( 40 MB ) be downloaded over a broadband connection. It can take up to 2 hours to download over a 56K modem connection. Users without a broadband connection may contact the PBIC to obtain a copy of the software on CD-ROM.

The steps for installing the software are provided on the download page of the Web site and are repeated here:

1. Right-click on the Download button (at the bottom of the screen). Click Save Target As, Save Link As, or Save Link Target As within that menu. Click Save to save the self-extracting file (PBCAT_Version 2.0.exe) to your desktop.
2. Double-click on the downloaded file (PBCAT_Version 2.0.exe) to extract the installation files. The WinZip SelfExtractor window will open as shown in figure 1. Use the Browse button to


Figure 1. Image. Extract the installation files. select the destination folder; click OK. Then click Unzip to extract the files to that folder. A message will appear to indicate that the files were unzipped successfully.
3. Browse to the installation folder and double-click on the Setup.exe file. Follow the instructions on the screen. The application will install the .Net Framework and the necessary version of MDAC if they are not detected.

All screens that appear during the step-by-step installation process are provided in appendix A. For technical support, send an e-mail to pbic@pedbikeinfo.org. The message will be forwarded to the PBCAT technical support staff.

## CHAPTER 3. GETTING STARTED: THE BASICS

## LAYOUT AND NAVIGATION

PBCAT 2.0 has adopted a Windows environment with pull-down menus and toolbars that allow the user to navigate quickly and easily among the various software functions from any screen in the application.


Figure 2. Image. Use pull-down menus and toolbars for navigation.
(See figure 2.) The basic menu functions include:

- File (where application preferences are set).
- Form Design (where data entry forms can be designed).
- Reports (includes the ability to produce single- and multivariable tables).
- Database (includes import/export capabilities).
- Countermeasures (links to external Web applications PEDSAFE and BIKESAFE).
- Help (includes all the information from this manual).


## TOOLBAR

The toolbar located below the menu headings has two distinct functions. First, it is used to access the default database and enter or edit pedestrian and bicyclist data. Second, it is used in the design of data entry forms. The actions initiated by the various buttons are described below.

## Data Entry and Crash Typing Buttons

Access the pedestrian data entry form.
Access the bicyclist data entry form.
Create a new record.
Access crash typing.
Save a record.
Go to the first record in the file.
Go to the last record in the file.
Go to the previous record in the file.

Go to the next record in the file.
Delete a record.
Search the database.
Browse (view the database in a tabular format).

## Form Design Buttons

| $\square$ | Insert group box. |
| :--- | :--- |
|  | Insert text box. |
| $\mathbf{R}$ | Rename form. |
| $\mathbf{I}$ | Index tabs. |
| $\mathbf{\square}$ | Save form. |

## QUICK START STEPS

The steps below allow the user to start data entry and crash typing. Subsequently, the user will be able to generate reports and export the data to Excel for more sophisticated analyses. The countermeasures included in the software may be accessed at any time and do not require data in the system (See chapter 9.). To fully understand all the features of the software, the user is advised to read the entire manual before creating a robust data system.

## Step 1—Create New Database

Click on Preferences within the File menu to access the application preferences for PBCAT. On the Data Sources tab, click Create New, which will open the window shown in figure 3. The new database can be modeled after the default database (PBCAT.MDB) or other existing database that has been developed for Version 2.0 of the application. Select the appropriate option in Step 1 on the screen.


Figure 3. Image. Step 1.
Click Browse in Step 2 to name the new database and choose the location where it will reside, as shown in figure 4. . Enter the file name and click Save. The window shown in figure 4 will close. Click Create in the previous window, and the database will be saved as an Access database with the extension .MDB.

## Step 2—Select Database and Forms

The newly created database will appear in the list of available


Figure 4. Image. Step 2. databases under the Data Sources tab (See figure 5.). Highlight the new database within that window and click Set Default Database. Next, select the forms to be used for pedestrian crash entry and bicyclist crash entry from the dropdown list of available forms. Some databases may contain a single form, while others may include multiple forms. The application default database (PBCAT.MDB) contains multiple forms. Refer to chapter 5 to learn how to create new forms. Click Save to save these changes and Exit to return to the main screen. The other options available on this tab and the other tabs are described in more detail in chapter 4.


Figure 5. Image. Set default database and choose default data entry forms.
Step 3—Enter Data
Click on either the Pedestrian or Bicyclist button on the toolbar to open a data entry form (shown in figure 6) and begin entering data. Use the buttons previously described to create and save records and to access the crash typing application within the software.


Figure 6. Image. Step 3.

## CHAPTER 4. APPLICATION PREFERENCES

User profiles and database options can be customized to meet the needs of any agency or individual user. Preferences for the application can be accessed from the File menu, as shown in figure 7. Once accessed, the user can create and select databases and data entry forms; select,


Figure 7. Image. Set database options and user profiles. create, and edit database fields; establish user profiles; and set range parameters for analysis reports involving age and speed variables. The administrator may also create different profiles for different users for management and security purposes. The remainder of this chapter provides detailed instructions for all options associated with each tab on this window.

## DATA SOURCES

The Data Sources tab includes options for the user to create a new database, add an existing database, or remove a database that is no longer needed. The steps involved in creating a new database were covered in chapter 3 in the section on quick start steps. Also covered in that section were the steps to set the default database and choose default data entry forms for pedestrian and bicyclist crashes. These defaults will be used for data entry when the Pedestrian and Bicyclist buttons are selected on the tool bar. Each database can have more than one form for data entry, so it is important to select the appropriate form in addition to the correct database. More information can be found in chapter 5 on the creation and design of data entry forms.


Figure 8. Image. Create, add an existing, or remove a database.
Special Note: PBCAT.MDB is the default database for the application. The text fields in this database, as well as the aliases for all noncrash type fields, can be changed. Once such changes are made, the original default database that is loaded with the application will no longer exist in the PBCAT directory. However, it can be retrieved from the PBCAT Web site at www.walkinginfo.org/pbcat.

The Add Existing button is used to add to the list of available databases an existing database that was created in this version (Version 2.0) of the software. A click on this button will open a window to allow the user to browse the computer and select the database to be added. Once the file is selected, click Open to add the database to the list. (See figure 9.) This feature will be useful for adding databases when PBCAT is installed on a new local computer. For example, PBCAT may have been installed on a computer for User A, who created a database for typing local pedestrian


Figure 9. Image. Search for and open a database to be added. crashes and saved it to the network drive. Much of the data entry will be done by a second user on a different computer. When PBCAT is installed on the second computer, User B will need to access this network drive and
add this database to the list of available databases by following the steps just described. User B can then set this database as the default database, choose the appropriate data entry forms, and begin entering data. Note, while both users will have access to the same database on the network drive, the application is not designed to allow simultaneous data entry. If there is a need to have multiple data entry personnel, each person can enter data into a unique database. These databases can then be merged within Microsoft Access. Use the Add Existing button to add the merged database to the list of available databases in PBCAT.

Removing a database that is no longer needed or may have been created in error is done by clicking on the database in the list of available databases and then clicking Remove. A confirmation window will appear. A click on Yes will remove the database from the List of Available Databases. However, the Access file will not be deleted. Thus, the database can be added back to the list at a later time. If the file itself needs to be removed, use Windows Explorer to locate and delete the file.

## Crash Typing Options

Crash typing is a part of the data entry process and is accessible after a pedestrian or bicyclist data entry form is opened. Crash typing requires the user to input answers to questions and directives on a series of screens. The number of questions and directives is determined by the crash typing options selected for a particular database. The options available are shown on the Data Sources tab

## Crash Typing Options

$\Gamma$ Enable Pedestrian Location Option
$\Gamma$ Enable Group Typing for Pedestrian Crashes
$\Gamma$ Enable Group Typing for Bicyclist Crashes

Figure 10. Image. Enable or disable pedestrian location option and group typing options. and can be turned on and off by clicking on the adjacent checkboxes, shown in figure 10. Each option is described in more detail in the following sections. Be sure that the database for which options are being set is shown in the Current Default Database window.

## Pedestrian Location

The Pedestrian Location Option provides the user with the ability to add details regarding the specific location of pedestrian crashes at or near intersections. If this option is selected, the crash typing logic includes a series of questions related to the direction and maneuvers of the motorist and pedestrian for intersection and intersection-related crashes. One of the crash typing examples included in chapter 6 makes use of this option.

The answers are stored in the following fields in the database and may prove useful for conducting intersection-level analyses:

- Motorist_Direction (northbound, southbound, eastbound, westbound, unknown).
- Motorist_Maneuver (left turn, right turn, straight, unknown).
- Leg_Intersection (nearside, farside, unknown).
- Pedestrian_Direction (northbound, southbound, eastbound, westbound, unknown).
- Scenario (one of 36 scenarios based on the combination of motorist maneuver, intersection leg where the crash occurred, direction of travel of the pedestrian, and whether the pedestrian was in or out of the crosswalk).

Drawings illustrating the scenarios are provided in appendix B for reference and use in analyses. Only Motorist_Direction (motorist’s initial travel direction before any turns) and Scenario are needed to identify the precise leg of the intersection and the maneuvers of the motorist and pedestrian. If additional variables are preferred to further define location information, the user can add other fields to the database as discussed later in this chapter.

To make use of the pedestrian location data in an analysis involving specific intersections, it will be necessary to sort the data by intersection location, the ease of which will vary depending on the crash referencing system used by an agency. Those localities that use links and nodes will be able to distinguish among intersections by using their node numbers. Others may use a RouteStreet Reference system in which intersections may be located by the combination of the principal street name and the reference street name. Still others may use a Route-Milepost system in which the intersections may be located by the route name and the mileposts.

If intersections cannot be identified easily within an agency's existing crash-roadway referencing system, it may be necessary to add a field in the PBCAT database that can be used as an intersection identifier. This field may be a new customized variable or a renaming of one of the existing user-defined variables. For example, the user could add a field named Intersection ID and use either a unique name or number to identify each intersection. More information on adding database fields is provided later in this chapter.

## Group Typing

The logic for the standard crash typing within PBCAT will produce 56 unique pedestrian crash types and 79 unique bicyclist crash types. Some users may not want the level of detail that is available with these standard crash types;they may select the Group Typing Option for pedestrian and/or bicyclist crashes. If selected, the application will use a different logic that requires the user to answer fewer questions/directives and places each crash into one of 16 pedestrian crash type groups or 20 bicyclist crash type groups.

As an example of the differences in these two options, consider a collision involving a motorist overtaking a bicyclist. Within the standard crash typing logic, the crash may be coded as one of four types: 1) Motorist Overtaking—Undetected Bicyclist, 2) Motorist Overtaking—Bicyclist Swerved, 3) Motorist Overtaking—Misjudged Space, or 4) Motorist Overtaking—Other/ Unknown. If the group typing option were selected, the crash would be coded as Motorist Overtaking Bicyclist. The four detailed crash types available in the standard application are collapsed into the single choice in the group application. Appendix C includes a complete list of all pedestrian and bicyclist crash groups and the unique standard crash types included in each group.

## DATABASE FIELDS

The Database Fields tab allows the user to add, delete, or edit fields in the database. (See figure 11.) The data table that will appear on this screen is for the default database, which can be changed on the Data Sources tab. The user will need to select either the pedestrian or bicyclist table within the default database. Changes made in the pedestrian table will not affect the bicyclist table and vice versa. If the user wishes to make a change in the database for a field that is common to both pedestrian and bicyclist crashes, the change needs to be made in both tables. Appendix D includes complete lists of the fields included in the application's default database (PBCAT.MDB).


Figure 11. Image. Add, delete, or edit fields in the database.
Column widths within the table may be expanded by clicking and dragging the boundary of each column heading. The entire window may be expanded in this same way, both horizontally and vertically. The default order of the fields in the table is alphabetical on the basis of the Alias column. The fields can also be sorted in either alphabetical or numerical order with a click on any of the other columns.

Special Note: The user can modify the database fields at any time. However, making changes to the fields before designing data entry forms will make the form design process easier. If a database field is modified after the form is designed, be sure to review and edit the form afterwards to reflect any changes made to the database.

A click on Add Field opens the window shown in figure 12 and requests the user to enter the following:

- Field Name-variable name used in the database. This field must conform to the SQL column naming convention which only allows alphanumeric and underline characters.
- Alias-descriptive name for the variable, which will be the name displayed in both the data entry forms and reports. This field also prohibits the use of most characters that are not alphanumeric (e.g., periods, commas, apostrophes, and quotes).
- Data Type-text, integer, float, datetime, or memo. A text field is limited to 255 characters, while a memo field has no limit on the number of characters. For purposes of database performance, the use of


Figure 12. Image. Enter field name, alias, data type, field length, entry type, and default value. memo fields should be limited. A good example of a crash report variable that may require a memo field is the officer's narrative of the crash. For fields that will only have numeric entries, the choices are either integer or float. Integer fields can only accept whole numbers, while float fields can accept decimal values. Float fields, like memo fields, should be used sparingly. An example of a variable that may require a float field is milepost if that milepost includes decimals and will be used in computing distances. Finally, date variables should be datetime fields, which will automatically check for valid dates and require entry in an mmddyyyy format.

- Field Length—maximum number of characters that may be entered. This value will affect the size of the data entry box used on forms. The field length can be set for text fields only. Field lengths for new integer, float, datetime, and memo fields are set to $10,16,8$, and unlimited, respectively, and cannot be altered.
- Field Entry Type—singleline editbox, dropdown listbox, or dynamic listbox. (See figure 13.) Singleline editboxes may be used for any variable. Dropdown listboxes are best for variables that have a predetermined set of data entry choices. For example, gender will


Figure 13. Image. Select a field entry type. either be male, female, or unknown. If a dropdown listbox is chosen as the Field Entry Type, the field editing window will expand
to allow the user to enter the list of data entry choices. A Blank choice can be entered with a space and Enter. Dynamic listboxes are best for variables needing a set of entry choices to be created on the fly. Location variables such as city or intersection are good examples of fields that would benefit from dynamic listboxes. As each new city or intersection is entered, it is added to the list of choices for that field.

- Default Value -For any field, the user can define the default text or number that will appear when the data entry form is opened. For dropdown listbox fields, the default will be the first field in the list if no value is entered here. A Blank choice can be entered with a space and Enter.
- Required - the last item in the field editing window is a checkbox to make the field required. Checking this box will force the user to enter a value if the field is included on the data entry form. The only field in PBCAT databases that is always required is Report_Number, and while this field is required, the alias for the field can be changed.

To edit an existing field, select the field by clicking on the appropriate row, and then click Edit Field. (See figure 14.). If the field is currently being used in any data entry form in the default database, a warning message will appear to let the user know an adjustment may need to be made to those forms after editing the field. A click on $O K$ will open the field editing window. An example of when a form adjustment may be required would be if Field Length is changed from 20 to 100. The data entry box will be much larger, and the form may need to be revised to accommodate this larger box. All adjustments are made in Form Design (refer to chapter 5). The arrow keys at the bottom of the field editing window allow the user to move to the prior and next fields and make edits to multiple fields at once.


Figure 14. Image. Edit a field.
To delete a field, select the field in the same way as described for editing. Then click Delete Field. A message will appear indicating that the field and all data for this field will be deletedare you sure? A click on Yes will remove the field from the database; No will cancel the delete operation.

## Crash Typing Fields

The database fields used for crash typing cannot be edited or deleted. These fields are completed by the software when a crash is typed and a record is saved in the data entry mode. The fields that cannot be changed are listed below. While the information is saved to these fields in the database for each typed crash record, not all fields have to be included on the data entry form. For example, if the only crash type information desired by the user is the crash type description, the pedestrian and bicyclist forms can be designed to include Crash_Type_Description and exclude all other fields.

Pedestrian and Bicyclist Fields (present in both data tables)

- Crash_Group_Basic-integer value for crash group.
- Crash_Group_Description-text descriptor for crash group.
- Crash_Group_Expanded-integer value that combines the Crash_Location, Crash_Group_Basic, and other fields related to the pedestrian/bicyclist position and maneuver.
- Crash_Location-integer value for location of the crash.
- Crash_Location_Desc-text descriptor for location of the crash.
- Crash_Type_Basic—integer value for crash type.
- Crash_Type_Description-text descriptor for crash type.
- Crash_Type_Expanded—integer value that combines the Crash_Location, Crash_Type_Basic, and other fields related to the pedestrian/bicyclist position and maneuver.
Pedestrian Fields (not present in the bicyclist table)
- Leg_Intersection - text descriptor to further define the crash location.
- Motorist_Direction-text descriptor to define the travel direction of the motorist.
- Motorist_Maneuver-text descriptor to define the maneuver of the motorist.
- Pedestrian_Direction-text descriptor to define the travel direction of the pedestrian.
- Pedestrian_Position-integer value for pedestrian position.
- Pedestrian_Position_Desc—text descriptor for pedestrian position.
- Scenario-alphanumeric character for defining the crash on the basis of intersection leg, motorist maneuver and direction, and pedestrian direction.

Bicyclist Fields (not present in the pedestrian table)

- Direction_Bicyclist—integer value for bicyclist direction.
- Direction_Bicyclist_Desc—text descriptor for bicyclist direction.
- Position_Bicyclist—integer value for bicyclist position.
- Position_Bicyclist_Desc—text descriptor for bicyclist position.


## Age Fields

The fields for driver, pedestrian, and bicyclist age are computational fields that make use of the date of the crash and birth dates to calculate the age of the parties involved in the collision. If a birth date is not available on the crash report form, but an age is indicated, the age may be entered directly into the age field. The age and date fields used in these computations are as follows:

Field (alias)

- Date_of_Crash (date of crash).
- $D O B$ (pedestrian date of birth or bicyclist date of birth).
- Driver_DOB (driver date of birth).
- Age (pedestrian age or bicyclist age).
- Driver_Age (driver age).


## USER PROFILES

On the User Profiles tab, one can add and delete new user profiles, set passwords, and modify the editing options available to different users (See figure 15.). PBCAT is installed with a single profile for the administrator with all editing options enabled. This profile cannot be deleted. However, the editing options can be changed, and a password can be set for the administrator.


Figure 15. Image. Set user profiles, passwords, and editing options.

To create a new profile, click Add New Profile. A window will open to allow the profile name to be entered and saved (click $O K$ ), as shown in figure 16. Once additional profiles have been added, a Login window will appear when the PBCAT application is launched, and the user can select the appropriate profile from a dropdown list, as shown in figure 17. While it is not necessary to create additional profiles, it may be desirable to do so to limit the editing options available to different users. For example, the administrator will always need access to edit profiles and may be the only person allowed to edit data entry forms. It is desirable to prevent data entry staff from accessing other profiles or the form designer. A profile can be set up for data entry staff to limit their access to these options. (See more on the editing options below.)


Figure 16. Image. Create a new profile.


Figure 17. Image. Select a profile.

## Passwords

A Password can be set for any profile. Click on the profile for which the password is desired, and click Set Password. A window will open where the password, a hint question, and hint answer can be entered. (See figure 18.) Click $O K$ to save the entry. Passwords may be changed or deleted by following these same steps. The new password will be requested on the Login window the next time PBCAT is launched. For profiles


Figure 18. Image. Enter a password and hint information. that do not have passwords, bypass this field, and click $O K$ to start the program.

Special Note: A hint should be something that the user will not forget. All password information is encrypted and cannot be accessed.

If the user has forgotten the password, click on Hint on the Login window to see the hint that was provided. (See figure 19.) A correct answer in the space below the hint will provide the user with access to the application. The user should return to the User Profiles tab in Preferences to change a forgotten password.

## Editing Options

The editing options that may be changed for each user profile are:


Figure 19. Image. Enter a password.

- Profile Editing—allows the user to add or delete profiles, set and change passwords, and change the editing options associated with all profiles.
- Form Editing—allows the user to add, edit, and delete data entry forms.
- Browse Editing-allows the user to view and edit data entry records within the Browse mode (tabular format) of data entry.
- Database Field Editing—allows the user to add, delete, and modify the database fields within application preferences.


## SPEED GROUPS

Accessing the Speed Groups tab within the Application Preferences window allows the user to 1) select the preferred units of measurement for speed-related data and 2 ) establish the speed groupings that will be used in analysis reports. The units of measurement that are used for recording speeds and speed limits can be changed from miles per hour (mi/h) to kilometers per hour ( $\mathrm{km} / \mathrm{h}$ ), which will be necessary for some jurisdictions outside the United States. Use the radio buttons beside MPH and KPH to select the units of choice, as shown in figure 20. Click Restore to Default to change the values being applied (shown in the Min and Max columns) for deriving speed groups to the values shown in the Default column.


Figure 20. Image. Set values for speed groups and choose units of measurement.
The speed groups can be customized to meet the needs of the user. The groups defined on this tab are only used to specify the category ranges for the variable Speed Group within the reports application of the software. Changing the Min and Max values will not affect the speed data for any of the records in the database. This reporting variable is derived from the data entry field

Estimated_Original_Motor_Vehicle_Speed. If this field is not used, or data are not entered for this field, the Speed Group variable will only contain null values when used in reports.

The default values are intended to provide the user with a reasonable means of examining the distribution of speeds of motorists involved in collisions with pedestrians and bicyclists. The user can customize the application to produce groups with different value ranges. This task is accomplished by typing the desired minimum and maximum speed values in the appropriate columns for each group. Between 2 and 10 groups can be created in this manner. The first and last fields in this table must be filled. All others can be blank if only two groups are desired, as shown in figure 21. Click Save after entering all values.
The application will provide an error message


Figure 21. Image. Establish as few as two groups. if any value is present in more than one group. Correct any errors and save again.

## AGE GROUPS

The Age Groups tab allows the user to customize the category ranges for the variables Driver Age Group, Pedestrian Age Group, and Bicyclist Age Group within the reports application of the software. (See figure 22.) Changing the Min and Max values will not affect the age data for any of the records in the database. These reporting variables are derived from the data entry fields Driver Age, Pedestrian Age, and Bicyclist Age. If these fields are not used or data are not entered for these fields, the Group variables will only contain null values when used in reports.


Figure 22. Image. Set values for pedestrian, bicyclist, and motorist age groups.

The default values are intended to provide the user with a reasonable means of examining the distribution of ages of drivers, pedestrians, and bicyclists involved in collisions. The user can customize the application to produce groups with different age ranges. This task is accomplished by typing the desired minimum and maximum ages in the appropriate columns for each group. Between 2 and 10 groups can be created in this manner for each operator type. As shown in figure 23, the first and last fields in this table must be filled. All others can be blank if fewer than 10 groups are desired. Click Save after entering all values. The application will provide an error message if any value is present in more than one group. Correct any errors and save again.


Figure 23. Image. Set values and numbers of groups for three modes.

## CHAPTER 5. FORM CREATION AND DESIGN

PBCAT allows the creation of customized data entry forms to simplify and streamline the data entry process. Customized data entry forms may contain only those database fields that are needed to match local crash reports or specific analysis needs. Furthermore, the data entry forms can be developed to approximate the design of the police crash report forms used in a State or municipality. This feature should enhance usability and reduce the time spent on data entry.

## FORMS AND DATABASES

Forms are embedded in databases in the application. In Preferences under the File menu, the user can select the default database and the forms desired for data entry. (Refer to chapter 3.) The application accesses the selected Default Database when the Form Design menu options are selected. (See figure 24.) The creation of new forms, editing of existing forms, or deletion of forms will be done within that default database. Forms can be copied from one database to another using the Copy Form option, which is covered in a later section of this chapter.

> Special Note: Prior to creating a new form or $\quad$ and copy forms. modifying an existing form, set the desired Default Database and make all changes to the variables in the Database Fields in the Application Preferences. Refer to chapter 3 for further instruction on these steps.

The forms used for data entry also affect analysis abilities. Specifically, the variables available for the creation of reports (tables or charts of crash frequencies or percentages) will only be those included in the form. For example, if Pedestrian Age is not included on the data entry form, it will not appear in the list of variables available for the production of analysis reports. (See chapter 7 for more information on Reports.)

## EXISTING FORMS

The application includes several forms that may be used for data entry as they are currently designed or edited to create different versions of the form. (See figure 25.) The forms included in the default database (PBCAT.MDB) of the application include:


Figure 25. Image. Select forms for editing.

- Ped_All_Data_Milepost—contains all crash typing fields, all crash report fields, and the milepost referencing system fields.
- Ped_All_Data_Refpost-contains all crash typing fields, all crash report fields, and the reference post referencing system fields.
- Ped_All_Data_RouteName-contains all crash typing fields, all crash report fields, and the route/street name referencing system fields.
- Ped_All_Data_LinkNode—contains all crash typing fields, all crash report fields, and the link/node referencing system fields.
- Ped_Crash_Type-contains only the Report_Number field and the crash typing fields.
- Bike_All_Data_Milepost—contains all crash typing fields, all crash report fields, and the milepost referencing system fields.
- Bike_All_Data_Refpost—contains all crash typing fields, all crash report fields, and the reference post referencing system fields.
- Bike_All_Data_RouteName-contains all crash typing fields, all crash report fields, and the route/street name referencing system fields.
- Bike_All_Data_LinkNode—contains all crash typing fields, all crash report fields, and the link/node referencing system fields.
- Bike_Crash_Type-contains only the Report_Number field and the crash typing fields.

The forms containing all database fields may be most helpful to those planning to use PBCAT to store and manage all pedestrian and bicyclist collision data in this application. The forms with crash type information only may be utilized by those users who plan to export crash typing information and merge it with another database that contains other crash data elements. All these forms are shown in appendix E .

In addition to the forms within the PBCAT.MDB database, there are also two forms in the NC_PBCAT.MDB database (also included with the application) that have been customized to match the crash report forms used in North Carolina: NCDMV349-Pedestrian and NCDMV349Bicyclist. These forms represent the type of customization that can be done with the software.

Special Note: Custom design of forms to match the police crash report form may take a few hours to accomplish. However, it only has to be done once and may substantially improve the efficiency and accuracy of data entry.

## FORM CREATION

Forms can be created in two ways. The user can select New Form or Edit Form. A click on the former followed by the selection of either Pedestrian Form or Bicyclist Form will open a window like the one shown in figure 26. The form will be untitled (as shown in the form header) and will include the field Report Number. This field is required in all forms and should be used as the unique identifier for a crash record. It is usually this field that is used to link to databases containing other crash report information. The form will also include a grid that can be used to
help align fields and boxes. The grid can be turned on and off in the Form Design menu. To the right of the form is a list of Available Database Fields that may be added to the form. This list is populated by the Aliases given to the database fields in Preferences and will always include all database fields that are not currently on the form. Thus in the case of a new form, the list will be populated with the entire list of fields available in the database. These two windows can be resized with a click and drag on the edges of the windows and can be moved as needed.


Figure 26. Image. Create a form using the New Form function.
Creation of a form using the Edit Form function requires the user to select the form to be edited from the list of all forms included in the default database. The form window that opens will look very similar to the one shown for creating a new form. The primary differences are 1) the form name and database are provided in the header information, and 2) the form will include significantly more data fields.


Figure 27. Image. Create a form using the Edit Form function.
Creation of a new form using the New Form or Edit Form function is a matter of user preference. If a form exists that includes the majority of the variables desired by the user, and the layout is
satisfactory or only requires small adjustments, the Edit Form function may be the best approach. If a form is being designed to match the layout of a police crash report form, it may be best to use the New Form option, since it is unlikely there is an existing form with a layout similar to what will be required. While creating a form to match the form of a local agency will take time to design and lay out, it is a one-time task that can save significant time during data entry.

## Adding Fields

Adding fields to a new or existing form can be done in one of two ways. The user can use a drag-and-drop function from the Available Database Fields list. (See figure 28.) Simply click on the variable to be added and hold the mouse button down. Drag it to the desired location on the form; the mouse pointer will be the upper left corner of the entry. Release the mouse button, and the field alias and entry space (white box) will be present on the form. Note that once a field is included in the form, it will no longer be in the list, which will ensure no field is included more than once.

The second option for adding a field to a form is to place the mouse pointer at the location where the field is desired and right-click the mouse to access a menu of options, including one that says Insert Database Field. A click on that option produces the same list of available database fields. A click on the desired field places the alias and entry box on the form.


Figure 28. Image. Insert a field on a form.

## Adding Text and Group Boxes

The user can also insert text boxes and group boxes on the form. (See figure 29.) Text boxes can be used as headers or notes within a form or for other purposes where there is a need to provide additional text. These boxes can be up to 100 characters in length. Group boxes can be used to surround several variables that may be part of a group. For example, one can use


Figure 29. Image. Insert text and group boxes on a form. a group box to encompass all the variables that include crash typing information. Group boxes include a title box that allows the group to be named. Inserting a text box or group box can be
done with the right click of a mouse, as previously described for inserting database fields. The toolbar above the form also includes buttons that can be used to insert these boxes. Once inserted, each box can be moved by clicking on the box and dragging it to the desired location on the form. A right click on the inserted box will allow the box to be renamed, deleted, or sent to the back (group box only).

All items on a form-aliases, entry boxes, text boxes, and group boxes-can be moved and resized. Each component can be moved by clicking on the object and dragging it to the new location. (See figure 30.) Each item can be resized by clicking on the object, then clicking on the edge of the highlighted box and dragging to the needed size. Groups of objects can also be moved simultaneously. Hold the control key down while clicking on all


Figure 30. Image. Resize a box. objects to be moved. For the last object selected, keep the mouse button depressed. Drag the group of objects to a new location on the form.

## Deleting Fields

During the course of creating a new form or editing an existing form, there may be a need to delete fields from the form. This is accomplished by clicking on the field (either the alias or entry box), right-clicking the mouse, and clicking Delete. A deleted database field will be added back to the list of available variables. If a field is deleted by mistake, simply add it back to the database using the steps previously described.

## Indexing Tabs

The Tab key is used during data entry to move from one field to the next. The sequence of the tabs for a new or existing form can be set or changed using the Tab Redindexing function. Click on the tool bar button labeled with an "I" or right click on the form (outside a box or field) and select the tab reindexing option. The instructional message shown here will appear. Simply click on the fields in the order desired for data entry. Click Done when the last data entry field is selected, and the order is set. (See figure 31.)


Figure 31. Image. Set the sequence of tabs for a new or existing form.

## Saving and Renaming

A form can be renamed by clicking on the " R " button on the toolbar or by rightclicking on the form and selecting the renaming option. A window will open to allow a new name to be entered for the form. Click $O K$ to save the form under the new name. (See figure 32.) The new form name will appear in the header information.

A form can be saved by clicking the Save button on the toolbar. For a new form that has not yet been saved, a window will open to allow a new name to be entered (same as the window described for renaming). For an existing form, the user will always be prompted as to whether the form should be overwritten, as shown in figure 33. A click on Yes will save the form under the existing form name. A click on No will open the Save Form As window. Cancel will not save the form and will return the user to the form itself.

## Save Form As

Flease enter a name for the new form:
New Fom


Figure 32. Image. Rename and save a form.


Figure 33. Image. Overwrite an existing form.

Special Note: After a form is created, it must be selected as the default data entry form in Application Preferences if it is to be the form used for data entry. (See chapter 3.)

## FORM DELETION

Forms that are not being used for data entry and forms that may have been created in error can be deleted from a database. Select the Delete Form option under the Form Design menu, and select the form to be deleted. (See figure 34.) A click on the form to be deleted will prompt a confirmation message.


Figure 34. Image. Delete a form.

## FORM COPYING

PBCAT features the ability to copy forms from one database to another or from the pedestrian table to the bicyclist table in the same database. (See figure 35.) This feature can expedite form creation by allowing the user to make minor modifications to a form that may already exist in another database or table. As an example, consider an agency (State Y ) that is planning to create a new data entry form and discovers that another agency in the State (City A) is using PBCAT and has created a form that may fulfill State Y needs.


Figure 35. Image. Copy a form. Rather than create a new form, State Y acquires a copy of the database and desired form from City A. State Y can copy that form to their database following the steps shown in the Copy Form window. Select the to/from databases, to/from form types, and the form to be copied. Click Copy to have the form copied to the new database. This form can then be edited by State Y to meet their needs and avoid having to create an entirely new form.

The Copy Form feature also is valuable in the production of almost duplicate agency forms for pedestrian and bicyclist crashes. Since crash reports for both types of crashes will be the same in an agency, the data entry forms will also need to be similar. A form can be created for one type of collision (e.g., pedestrians), and then copied to the bicyclist table and edited to change the few fields that differ between the two modes.

## CHAPTER 6. DATA ENTRY AND CRASH TYPING

The primary purpose of this software product is to allow users to type pedestrian and bicyclist collisions in their community, which may lead to the selection and implementation of countermeasures targeted at specific crash types. This chapter covers the data entry and crash typing aspects of the application and includes several crash typing examples to assist users in understanding the logic of the software.

Prior to entering data in the application, the user should set the appropriate parameters in Preferences: (See chapters 3 and 4.)

- Create a new database and establish it as the default database on the Data Sources tab.
- Select the default pedestrian and bicyclist data entry forms from the lists of available data forms for the default database. If necessary, create a new form or edit one of the existing forms. (See chapter 5.)
- Set the crash typing options on the Data Sources tab. The options include enabling or disabling the pedestrian location option, pedestrian group typing option, and bicyclist group typing option.
- Choose or create the appropriate user profile and associated editing and crash typing options on the User Profiles tab.


## DATA ENTRY

## Basic Functions

Entering data and typing crashes begins by selecting either the Pedestrian or Bicyclist button on the toolbar, as shown in figure 36. A click on either of these buttons will open an empty data entry form and activate the other data entry/crash typing buttons on the toolbar. The form name and the database file name will appear in the header box. The record number will appear in the toolbar at the bottom of the page. The entire data entry form is contained on one scrollable screen. The window can also be maximized to see more fields at once.

The cursor will appear in the first field to be completed. The order of entry for the data will have been established through the Reindexing function when the


Figure 36. Image. Enter pedestrian or bicyclist crash data. form was designed. Proper form design and indexing will enable data entry personnel to tab from field to field in the desired order during data entry. As they become experienced with data entry, it may be more efficient to have a different order of entry. Refer to chapter 5 for instructions on Reindexing within Form Design to make such a change.

Error checks will be performed as data are entered for specific fields. The message received will depend on the field, but examples include:

- Field Report Number error-This field is required and a value must be entered before the user can tab to the next field. While the Report Number field is the only one that is initially required, the same type of message will appear for any other fields that have been established as required by the user in the Database Fields tab of Preferences.
- Field Date of Crash error-The format for this field requires eight characters entered as mmddyyyy. The months and days are also checked for validity. Any other format will not be accepted. This same error checking is used for other dates (e.g., birth dates) in the application.
- Non-integer error-Fields with an integer data type will not accept other types of characters. The error message will indicate this and tell the user to change the data type in Preferences if non-integer characters are desired.
- Field Crash Type Number error-This field is reserved for a value that will be produced when the crash typing is completed. Values cannot be entered directly. This same error message will appear when the user attempts to manually fill any field that is reserved for crash typing.
- Field length error-If the number of characters typed exceeds the field length that was set for a field, an error message will appear indicating this. If necessary, field lengths can be changed in the Database Fields tab of Preferences.

The crash typing function may be accessed at any time during data entry and is done with a click on the Crash Typing button on the toolbar, as shown in figure 37. When the crash typing is completed (i.e., a crash type is accepted after answering the series of questions/directives), the crash typing fields included on the data entry form will be completed. More details on crash typing, including several examples, are provided in a later section of this chapter.

Entries can be saved with a click on the Save Record button in the toolbar, as shown in figure 38. The record can be saved and resaved at any time during data entry. Be sure to save once all data have been entered and the crash typing has been completed. If unsaved changes are made to a record, any attempt to close the data entry window or add a new record will prompt a message asking if the record should be saved.


Figure 37. Image. Access the Crash Typing function.


Figure 38. Image. Save a data entry record.

A new record can be added by clicking on the New Record button, which will open an empty data entry form. (See figure 39.) The record number for the new entry will be shown in the bottom left of the screen.

## Other Functions

The toolbar includes several other functions that may be useful for managing and navigating the database, as shown


Figure 39. Image. Open a new data entry form. in figure 40. The arrow key buttons allow the user to navigate to the previous and next records, as well as the first and last records in the database. The Delete button, denoted by the trash can icon, can be used to delete a record. A click on this button will produce a confirmation window requiring a Yes response to delete the record.


Figure 40. Image. Navigate to, delete, search, and browse records in a table.

The Search button (magnifying glass) allows the user to search the database for a specific record or records. This feature will be most useful when searching for the record of a specific crash using the Report Number field. A click on this button opens a search window. The user can input the value or text to search for and the variable (field) in which to search. A click on Search will produce a list of records that meet the search criteria. In the example shown in figure 41, records are listed that were coded as "M" for the variable Driver Gender.


Figure 41. Image. Search the database for specific records.
The complete database can also be viewed as a table with a click of the Browse button on the toolbar, as shown in figure 42. Enabling browse editing on the User Profiles tab in Preferences allows the user to edit or delete existing records and create new records. A prompt to save changes will appear when the window is closed or browse mode is exited (another click on the Browse button). If browse editing is not enabled, the table can be viewed but not changed.


Figure 42. Image. Browse all records in the database.
Any record in the database can be printed using the Print command under the File menu. The menu also includes options for Page Setup and Print Preview. The latter will generate the form in a window like the one shown in figure 43. This window can be maximized, and there is a zoom option to preview specific sections of the form.

## CRASH TYPING OPTIONS AND DATABASE FIELDS

Crash typing requires the user to input answers to questions and directives on a series of screens. The number of questions and directives is determined by the crash


Figure 43. Image. Preview the data form that can be printed. typing options selected for a particular database. The options available are shown on the Data Sources tab in Preferences and are briefly described below. Refer to chapter 4 for more details on each option and instructions for enabling each one.

## Pedestrian Location

The Pedestrian Location Option allows the user to add details regarding the specific location of pedestrian crashes at or near intersections. The answers are stored in the following fields in the database and may prove useful for conducting intersection-level analyses:

- Motorist_Direction (northbound, southbound, eastbound, westbound, unknown).
- Motorist_Maneuver (left turn, right turn, straight, unknown).
- Leg_Intersection (nearside, farside, unknown).
- Pedestrian_Direction (northbound, southbound, eastbound, westbound, unknown).
- Scenario (one of 36 scenarios based on the combination of motorist maneuver, intersection leg where the crash occurred, direction of travel of the pedestrian, and whether the pedestrian was in or out of the crosswalk).

Illustrations of the scenarios are provided in appendix B for reference and use in analyses. Only Motorist_Direction (motorist’s initial travel direction before any turns) and Scenario are needed to identify the precise leg of the intersection and the maneuvers of the motorist and pedestrian. If additional variables are preferred to further define location information, the user can add other fields to the database, as discussed later in this chapter.

Special Note: To make use of the pedestrian location data in an analysis involving specific intersections, it is necessary to sort the data by intersection location. Refer to chapter $\mathbf{4}$ for a discussion of this issue.

## Standard versus Group Typing

The logic for the standard crash typing within PBCAT will produce 56 unique pedestrian crash types and 79 unique bicyclist crash types. Some users may not want the level of detail that is available with these standard crash types. They may select the group typing option for pedestrian and/or bicyclist crashes on the Data Sources tab within Preferences. (See chapter 4.) If selected, the application will use a different logic that requires the user to answer a lesser number of questions/directives and places each crash into one of 16 pedestrian crash type groups or 20 bicyclist crash type groups.

As an example of the differences in these two options, consider a collision involving a motorist overtaking a bicyclist. Within the standard crash typing logic, the crash may be coded as one of four types: 1) Motorist Overtaking—Undetected Bicyclist, 2) Motorist Overtaking—Bicyclist Swerved, 3) Motorist Overtaking—Misjudged Space, or 4) Motorist OvertakingOther/Unknown. If the group typing option were selected, the crash would be coded as Motorist Overtaking Bicyclist. The four detailed crash types available in the standard application are collapsed into the single choice in the group application. Appendix C includes a complete list of all pedestrian and bicyclist crash groups and the unique standard crash types included in each group.

## Database Fields

The database fields that are completed by the software when a crash is typed and a record is saved in the data entry mode are listed below. These fields cannot be edited or deleted on the Database Fields tab within Preferences. While the information is saved to these fields in the database for each typed crash record, not all fields have to be included on the data entry form. For example, if the only crash type information desired by the user is the crash type description,
the pedestrian and bicyclist forms can be designed to include Crash_Type_Description and exclude all other fields. Refer to chapter 5 for more details on customizing data entry forms.

Pedestrian and Bicyclist Fields (present in both data tables)

- Crash_Group_Basic-integer value for crash group.
- Crash_Group_Description-text descriptor for crash group.
- Crash_Group_Expanded-integer value that combines the Crash_Location, Crash_Group_Basic, and other fields related to the pedestrian/bicyclist position and maneuver.
- Crash_Location-integer value for location of the crash.
- Crash_Location_Desc-text descriptor for location of the crash.
- Crash_Type_Basic—integer value for crash type.
- Crash_Type_Description—text descriptor for crash type.
- Crash_Type_Expanded - integer value that combines the Crash_Location, Crash_Type_Basic, and other fields related to the pedestrian/bicyclist position and maneuver.


## Pedestrian Fields (not present in the bicyclist table)

- Leg_Intersection-text descriptor to further define the crash location.
- Motorist_Direction-text descriptor to define the travel direction of the motorist.
- Motorist_Maneuver-text descriptor to define the maneuver of the motorist.
- Pedestrian_Direction-text descriptor to define the travel direction of the pedestrian.
- Pedestrian_Position—integer value for pedestrian position.
- Pedestrian_Position_Desc-text descriptor for pedestrian position.
- Scenario-alphanumeric character for defining the crash on the basis of intersection leg, motorist maneuver and direction, and pedestrian direction.
Bicyclist Fields (not present in the pedestrian table)
- Bicyclist_Direction—integer value for bicyclist direction.
- Bicyclist_Direction_Desc—text descriptor for bicyclist direction.
- Bicyclist_Position-integer value for bicyclist position.
- Bicyclist_Position_Desc—text descriptor for bicyclist position.


## CRASH TYPING SCREENS AND DEFINITIONS

Crash typing begins with a click on the Crash Typing button on the toolbar, as shown in figure 44, which opens a window with the first question regarding where the crash occurred. (See example for pedestrian crashes in figure 45.) The graphics on the screens provide examples of the circumstances described in the yellow narration boxes. As the cursor is placed over a graphic and the image is highlighted by a blue border, a narrative describing the details associated with that selection is provided in the box.


Figure 44. Image. Start the crash typing process.

Special Note: The graphic is an example and the text description must be read to interpret the differences (sometime subtle) between the options on the screen. Pay particular attention to the NOTES included in the descriptions.

Most of the screens are of the type shown below, with an image as an example of what is being described in the narrative. There are also screens with buttons (like the Unknown/Insufficient Information button below), which also require the user to read the information in the yellow narrative box. In addition, there are some screens that include radio buttons or small rectangular buttons and provide the needed descriptive information next to each button.

Each screen also includes a Close button, which if clicked, will ask the user whether they wish to exit crash typing. There is also a Back button on all screens except the first. Clicking this button will allow the user to return to the prior screen and view the response that was provided to the question on that screen. The application retains the answers provided to each question/directive as a crash is being typed, which allows a user to use the Back button to determine the response to any question in the sequence.


Figure 45. Image. Identify where the crash occurred.

Appendix F includes several tables of definitions related to the pedestrian and bicycle crash typing logic. Understanding the subtleties among some of these definitions may assist the user in understanding the choices available in the logic. Also provided in this appendix are definitions associated with other important selections such as crash location and pedestrian or bicyclist position.

## CRASH TYPING EXAMPLES

Appendix G provides copies of 20 crash reports (10 involving pedestrians and 10 involving bicyclists) and the crash types associated with these reports, as well as the questions/directives and correct responses for the sequence of screens encountered for each crash. Using the program in conjunction with these reports gives the user with the opportunity to practice and sharpen crash typing skills and understand the logic built into the program. These examples may also be used as training materials for someone new to the concept of crash typing.

Following are three examples (one pedestrian and two bicyclist crashes) to illustrate the steps involved in typing a crash and the screens that appear in the application. The first two examples use standard crash typing, while the third illustrates the use of the group typing option. The pedestrian example is completed with the pedestrian location option enabled.

Before answering any questions, read the entire crash report, paying particular attention to the sketches and narratives and looking at the fields related to location, intersection control, and operator characteristics and condition.

## Example 1—Bicyclist Crash (Standard Typing)

This example is from a crash in Florida involving a bicyclist and motorist. A 3-page police crash report is shown in figures 46,47 , and 48 . The first two pages of the report include a description of the location, operator (bicyclist and driver) information, and a number of completed fields describing aspects of the location (e.g., type of traffic control) and contributing factors. The third page features a drawing of the scene and a narrative describing the sequence of events. Read the narrative, study the drawing, and become familiar with the characteristics of the location and operators involved.

Florida Crash Report


Figure 46. Image. Page 1 of Florida Crash Report for example 1.


Figure 47. Image. Page 2 of Florida Crash Report for example 1.


Figure 48. Image. Page 3 of Florida Crash Report for example 1.

As shown in figure 49, click on the Bicyclist button to open a bicyclist crash data entry form.
Click on the Crash Typing button to begin the crash typing process.

Reminder: The screens that appear in this example are for standard crash typing, which means the group typing option was NOT enabled on the User tab in Preferences.

Screen 1—Crash Location
In the time and location section of the crash report (on page 1), the location of the crash is given as "SW 75 Street" at the intersection of "W. Univer. Avenue." A review of the descriptions for the location options on the screen leads to the correct choice of Intersection. (See figure 50.) Click this graphic to advance to the next screen.


Figure 49. Image. Open a bicyclist crash data entry form then begin the crash typing process.


Figure 50. Image. Click on Intersection to indicate where crash occurred.

The next screen asks for the initial position of the bicyclist. The crash report drawing shows the bicyclist (denoted as V1) on the sidewalk. The narrative also notes that the bicyclist "... was southbound on the sidewalk..." Finally, it is noted on page 1 of the crash report that vehicle 1 was traveling on the sidewalk. Thus, the correct answer on this screen is "On a sidewalk, crosswalk, or driveway crossing." Click the radio button next to this text, as shown in figure 51.

## Screen 3—Bicyclist Direction

The next screen asks for information related to where the bicyclist was riding just prior to the crash or prior to making a maneuver that caused the crash. From the drawing of the crash, it can be determined that the bicyclist was riding southbound on the sidewalk next to the northbound motor vehicle traffic. Thus, the correct choice on this screen is "Facing traffic." Click the radio button next to this text, as shown in figure 52.


Figure 51. Image. Indicate where the bicyclist was initially positioned.


Figure 52. Image. Indicate travel direction of the bicyclist.

The next screen asks if the crash was one of several unusual or specific circumstances. After reading the descriptions associated with the five specific crash types on the screen, it is apparent that the correct answer is "None of the Above." As shown in figure 53, click this button to advance to the next screen.

Special Note: In most cases, the answer to this question will be "None of the Above." However, the user should be familiar with each of these unique types of collisions in the event that such a crash does fit the specific circumstances.


Figure 53. Image. Indicate unusual/specific circumstances.

Screen 5—Initial Approach Paths
The approach paths of the two parties is a major decision point in the crash typing logic. The choices are "Crossing Paths" and "Parallel Paths" and are defined as the paths of the two parties prior to the crash and prior to any turns that caused the crash. In this example, the diagram clearly shows the bicyclist and motorist on intersecting paths. As shown in figure 54, click on any of the crossing path graphics (in blue) to advance to the next screen.


Figure 54. Image. Indicate initial approach paths.

The remaining screens prompt the user with a series of questions about the maneuvers of one or both parties involved or about the characteristics of the site of the crash. The question shown here and the choices available are based on prior choicesthe fact that the crash occurred at an intersection and that the two parties were on crossing paths. From the narrative and diagram on page 3 of the crash report,
"Drive/Ride-
Out/Through" is the correct choice. Click on


Figure 55. Image. Indicate maneuvers made by the parties. this graphic, as shown in figure 55.

## Screen 7—Type of Traffic Control

The next screen asks the user to select the type of traffic control present at the intersection. There is a traffic control variable on page 1 of the crash report form; one of the codes entered is for a stop sign. The diagram on the crash also shows a stop sign. Thus, "Stop signs, yield signs, or flashing signals" is the correct choice. Click on the radio button next to that selection, as shown in figure 56.


Figure 56. Image. Indicate type of traffic control at the intersection.

The next screen prompts the user for more details on the basis that the crash occurred at a signcontrolled intersection. After reading all the choices carefully and then reading the narrative of the crash report, the correct choice is "Motorist DriveOut," as shown in figure 57. The key words in the narrative that lead to this decision are that the motorist "...stopped at the stop sign."

Special Note: This is an example of where care must be taken to read the narrative and review the report sketch, as there


Figure 57. Image. Describe the circumstances of a signcontrolled intersection crash. are subtle differences in the definitions of "Drive-Out" and Drive-Through."

## Screen 9—Crash Typing

The final screen that will appear when all required questions and directives have been answered is the crash typing window, which will include the name and number of the crash type. In this example, the crash type is a "Motorist Drive-Out SignControlled Intersection" crash. Clicking Change will return the user to the previous screen and allow the answer to be changed on this screen (or other screens by clicking on the Back button).


Figure 58. Image. Enter crash typing data into the entry form.

As shown in figure 58, clicking Accept will complete the fields on the data entry form and save the crash typing information in the database.

## Completed Crash Typing Fields

The values for the crash typing fields in this example that will appear in the database and on the form (for those fields chosen to be included on the form) are shown in table 1:

Table 1. Values for Crash Typing Fields for Example 1

| Field Name | Alias | Value for This Example |
| :--- | :--- | :--- |
| Crash_Location | Crash Location | 1 |
| Crash_Location_Desc | Crash Location Description | Intersection |
| Crash_Type_Basic | Crash Type Number | 141 |
| Crash_Type_Description | Crash Type Description | Motorist Drive Out—Sign- <br> Controlled Intersection |
| Crash_Type_Expanded | Crash Type Expanded | 132141 |
| Crash_Group_Basic | Crash Group Number | 140 |
| Crash_Group_Description | Crash Group Description | Motorist Failed to Yield-_ <br> Sign-Controlled Intersection |
| Crash_Group_Expanded | Crash Group Expanded | 132140 |
| Bicyclist_Direction | Bicyclist Direction | 2 |
| Bicyclist_Direction_Desc | Bicyclist Direction Position | Facing Traffic |
| Bicyclist_Position | Bicyclist Position | 3 |
| Bicyclist_Position_Desc | Bicyclist Position <br> Description | Sidewalk/Crosswalk/Driveway <br> Crossing |

## Example 2—Pedestrian Crash (Standard Typing, Location Option Enabled)

This example is from a crash in North Carolina involving a pedestrian and motorist. A police crash report is shown in figures 59, 60, and 61. The first page of the report, figure 59, includes a description of the location, operator (pedestrian and driver) information, and a number of completed fields describing aspects of the location (e.g., type of traffic control) and characteristics of the crash. The second page, figure 60, includes contributing factors, a drawing of the scene and a narrative describing the sequence of events. The third page, figure 61, shows the list of codes for the fields used on the report. Read the narrative, study the drawing, and become familiar with the characteristics of the location and operators involved.

North Carolina Crash Report


Figure 59. Image. Page 1 of North Carolina Crash Report for example 2.


Figure 60. Image. Page 2 of North Carolina Crash Report for example 2.

Codes for North Carolina Collision Report Forms


Figure 61. Image. Page 3 of North Carolina Crash Report for example 2.

As shown in figure 62, click on the Pedestrian button to open a pedestrian crash data entry form. Then click on the Crash Typing button to begin the crash typing process.

Reminder: The screens that appear in this example are for standard crash typing, which means the group typing option was NOT enabled on the User tab in Preferences.

## Screen 1—Crash Location

In the time and location section of the crash report (page 1), the location of the crash is given as "Aversboro Rd" 0 feet from "Forest Dr." The crash report drawing shows the


Figure 62. Images. Pedestrian crash data entry forms. collision occurred within an intersection. A review of the descriptions for the location options on the screen leads to the correct choice of Intersection, as shown in figure 63. Click this graphic to advance to the next screen.

Special Note: Pay attention to the notes in the descriptions to correctly assign the location.


Figure 63. Image. Indicate where the crash occurred.

Screen 2—Pedestrian Position—Intersection or Intersection-Related

The next screen asks for the initial position of the bicyclist. The crash report drawing shows the pedestrian in the crosswalk when struck. Thus, the correct answer on this screen is "Within a crosswalk, marked or unmarked." Click the radio button next to this text, as shown in figure 64.

## Special Note: The choices

 shown on this screen are a function of the location selected on the previous screen.FapEDESTRIAN POSITION - INTERSECTION OR INTERSECTON-REL... - - 미 $x$ | What was the position of the pedestrian when struck?
$\checkmark$ Within intersection proper
. Within a crosswalk, marked or unmaked
W
On aroadway, in a travellane
COn a roadway, in a paved shoulder, bike lane, or parking lane
C On a sidewalk, shared use path, or driveway crossing
$\bigcirc$ Other road right-of-way (unpaved shoudder, etc.)
C Other/ unknown


Figure 64. Image. Indicate position of pedestrian when struck.

## Screen 3-Motorist Initial Direction of Travel

With the Pedestrian Location option enabled, the next four screens ask for specific information about the travel directions and maneuvers of the motorist and pedestrian. The first directive requires the initial travel direction of the motorist. From the crash report drawing, it can be determined that the motorist was traveling "Westbound." Click this button, as shown in figure 65.


Figure 65. Image. Indicate initial direction of travel of the motorist.

On this screen, select the maneuver being made by the motorist at the time of the collision. The crash report drawing indicates that the motorist was making a left turn. Thus, the correct choice is "Left turn," as shown in figure 66. Click this button to advance to the next screen.

Screen 5-Motorist Turning Left-Leg of Intersection Where Crash Occurred

The next directive requires


Figure 66. Image. Indicate the motorist maneuver.


Figure 67. Image. Indicate where the crash occurred at the intersection.

The final screen with the Pedestrian Location option enabled requires the user to select the scenario that best describes the direction of travel of the pedestrian and indicates whether the pedestrian was in or out of the crosswalk. A review of the crash report drawing indicates the best choice is the first graphic (denoted as 11a in figure 68). The pedestrian was traveling in the same direction as the motorist and was in the crosswalk. Click this button to advance to the next screen.


Figure 68. Image. Select the scenario that illustrates the pedestrian's movement when struck.

## Screen 7-Unusual

Circumstances Crash

The next screen asks if the crash was one of several unusual circumstances. After reading the descriptions associated with the seven specific crash types on the screen, it is apparent that the correct answer is "None of the Above," as shown in figure 69. Click this button to advance to the next screen.

Special Note: This screen and the next two screens ask questions about very unusual circumstances or very specific actions or vehicle types. In most cases, the answers to these questions will be "None of the Above." However, the user should be familiar with each of these unique types of collisions in the event that such a crash does fit the circumstances described.

The next screen asks whether the crash involved a unique vehicle action (e.g., backing vehicle) or a specific type of vehicle (e.g., disabled vehicle). After reviewing the descriptions, the correct choice is "None of the Above," as shown in figure 70. Click this button to advance to the next screen.

Screen 9—Unusual Pedestrian Action Crash

The next screen asks whether the pedestrian was performing one of six unique actions. These actions are very specific and either related to specific type of vehicle (e.g., buses) or a specific maneuver (e.g., crossing to/from a mailbox). In this example, the crossing was a normal street crossing that did not fall into any of these unique categories. Thus, the correct choice is "None of the Above," As shown in figure 71. Click this button to advance to the next screen.


Figure 70. Image. Indicate no unusual vehicle types or vehicle actions.


Figure 71. Image. Indicate no unusual pedestrian action.

The next screen asks about the pedestrian action at the time of the crash. The majority of pedestrian crashes will fall into one of these four actions. The narrative of the crash report includes a statement from the pedestrian that "...there was an opening in traffic and [she] started to cross the road." Thus, the correct choice is "Crossing the Roadway or In the Roadway," as shown in figure 72. Click this graphic to advance to the next screen.


Figure 72. Image. Describe the typical pedestrian action in the crash.

Screen 11—Crossing/In the Roadway-Intersection
The next screen describes five specific scenarios involving a crossing pedestrian. Read each one carefully. From the crash report drawing and narrative, it is clear that the motorist was turning at the time of the collision. Thus, the correct choice is "Turn/Merge," as shown in figure 73. Click on this graphic to advance to the next screen.


Figure 73. Image. Describe the circumstances of the crash.

The next screen asks for more detail about the paths of the parties involved in the turn-merge crash. The narrative describes, and the crash report drawing shows, that the parties were on parallel paths prior to the collision. The drawing also shows that the motorist turned left and struck the crossing pedestrian. The correct choice is "Left TurnParallel Paths," as shown in figure 74. Click this graphic to advance to the next screen.


Figure 74. Image. Describe the circumstances of the crash in more detail.

## Screen 13-Crash Typing

The final screen that will appear when all required questions and directives have been answered is the crash typing window, which will include the name and number of the crash type. (See figure 75.) In this example, the crash type is "Motorist Left Turn—Parallel Paths." Clicking Change will return the user to the previous screen and allow the answer to be changed on this screen (or other screens by clicking on the Back button). Clicking Accept will complete the fields on the data entry


Figure 75. Image. Enter crash typing data into data entry form. form and save the crash typing information in the database.

## Completed Crash Typing Fields

The values for the crash typing fields in this example that will appear in the database and on the form (for those fields chosen to be included on the form) are shown in table 2.

Table 2. Values for Crash Typing Fields for Example 2

| Field Name | Alias | Value for this Example |  |
| :--- | :--- | :--- | :---: |
| Crash_Location | Crash Location | 1 |  |
| Crash_Location_Desc | Crash Location Description | Intersection |  |
| Crash_Type_Basic | Crash Type Number | 781 |  |
| Crash_Type_Description | Crash Type Description | Motorist Left Turn—Parallel <br> Paths |  |
| Crash_Type_Expanded | Crash Type Expanded | 12781 |  |
| Crash_Group_Basic | Crash Group Number | 790 |  |
| Crash_Group_Description | Crash Group Description | Crossing Roadway_Vehicle <br> Turning |  |
| Crash_Group_Expanded | Crash Group Expanded | 12790 |  |
| Location Option Fields |  |  |  |
| Leg_Intersection | Leg Intersection | Far |  |
| Motorist_Direction | Motorist Direction | West |  |
| Motorist_Maneuver | Motorist Maneuver | Left Turn |  |
| Pedestrian_Direction | Pedestrian Direction | West |  |
| Pedestrian_Position | Pedestrian Position | 2 |  |
| Pedestrian_Position_Desc | Pedestrian Position <br> Description | Crosswalk area |  |
| Scenario | Scenario | 11a |  |

## Example 3—Bicyclist Crash (Group Typing)

This example makes use of the Florida bicyclist crash report used in example 1, but employs the group typing option. This option is set on the Data Sources tab in Preferences. As shown in figure 76, click on the box next to the text "Enable Group Typing for Bicyclist Crashes" to turn on this option. Save this change and Exit the Preferences window.
-Crash Typing Options
I Enable Pedestrian Location Option
I Enable Group Typing for Pedestrian Crashes
Vnable Group Typing for Bicyclist Crashes

Figure 76. Image. Enable group typing for bicyclist crashes.

With the correct options set in Preferences, open a bicyclist crash data entry form with a click on the Bicyclist button. Click on the Crash Typing button to begin the crash typing process. (See figure 77.) These steps are the same regardless of the crash typing options selected.

The first three screens that appear with group typing enabled are the same as the ones that appear with standard group typing. From reviewing the crash report and the example 1 responses, the correct choices are as follows:

Screen 1—Crash Location: Intersection Screen 2—Bicyclist Position: On a Sidewalk, Crosswalk, or Driveway Crossing
Screen 3—Bicyclist Direction: Facing Traffic
Screen 4—Initial Approach Paths
The next screen that appears asks about the approach paths of the two parties involved in the collision. This is the same question that is asked within the standard typing option and is still a major decision point in the crash typing logic. The choices are "crossing paths" and "parallel paths" and are defined as the paths of the two parties prior to the crash and prior to any turns that caused the crash. In this example, the crash report drawing clearly shows the bicyclist and motorist on intersecting paths. As shown in figure 78, click on any of the crossing path graphics (in blue) to advance to the next screen.

## Screen 5—Intersection Crashes-Crossing Paths

The next screen presents five options to describe the circumstances of the crash. After reading the options and reviewing the crash report narrative and drawing, the correct choice is determined to be "Motorist Failed to Yield—Sign-Controlled Intersection," as shown in figure 79. Click on this button to advance to the next screen.


Figure 79. Image. Describe the circumstances of the crash in this case.

## Screen 6-Crash Typing

The final screen that will appear when all required questions and directives have been answered is the crash typing window. With group typing enabled, the answer will include the name and number of the crash group. In this example, the crash group is "Motorist Failed to Yield—Sign-Controlled Intersection." (See figure 80.)
Clicking Change will return the user


Figure 80. Image. Enter crash typing data into form. to the previous screen and allow the answer to be changed on this screen (or other screens by clicking on the Back button). Clicking Accept will complete the fields on the data entry form and save the crash typing information in the database.

## Completed Crash Typing Fields

The values for the crash typing fields in this example that will appear in the database and on the form (for those fields chosen to be included on the form) are in table 3.

Table 3. Values for Crash Typing Fields for Example 3

| Field Name | Alias | Value for this Example |
| :--- | :--- | :--- |
| Crash_Location | Crash Location | 1 |
| Crash_Location_Desc | Crash Location Description | Intersection |
| Crash_Type_Basic | Crash Type Number | These fields will not be filled <br> when the group typing option <br> is enabled. |
| Crash_Type_Description | Crash Type Description |  |

Special Note: Group typing will result in fewer screens and questions or directives that must be answered. In this example, three fewer screens appeared with group typing enabled. The small time savings that result with group typing may not outweigh the advantages of having additional details about crashes that standard crash typing provides. The user needs to be familiar with both options and assess the advantages of each.

## CHAPTER 7. ANALYSIS REPORTS

PBCAT provides limited analysis functions within the software for production of simple data summaries. Analysis options are available through the Reports menu. (See figure 81.) Additionally, any reports created may be exported to Excel with the click of a button for additional analyses or the creation of graphics. For more sophisticated analyses, the entire


Figure 81. Image. Select analysis options. database can be exported to another software application. (See chapter 8.)

## CRASH TYPE FREQUENCY

Crash type frequency reports may be created by selecting this option in the Reports menu. The report produced from this analysis includes a count of crashes by either crash type or crash group. The steps to create this type of report are as follows:
(1) Select the Data Source. This step includes selecting the database from the list of available databases in the dropdown list and choosing the data type (either pedestrian or bicyclist). The database shown when the reports window appears will be the default database that was set in Preferences.


Figure 82. Image. Produce a list of crash types or crash groups in order of frequency.
(2) Set the Report Options. The user has several options for the report being produced. First, choose the Location of Interest. Reports may be produced for all locations, intersections and intersection-related locations, nonintersection locations, or nonroadway locations. Next, set the Min count value, which will be the threshold that must be met in order for a crash type or crash group to be included in the table. As shown in figure 82, a minimum of five crashes were required for any given crash type. Finally, specify whether the results should be produced for individual crash types or for crash groups.
(3) After specifying the report parameters, click Report to produce the table.
(4) If desired, click the Excel button to export the results to an Excel workbook.

## TABLES AND GRAPHS

To create single-variable tables or cross-tabulations of two variables, select the Tables and Graphs option from the Reports menu. The steps for creating customized tables or charts are shown in figure 83. All but the last step are done on the Data Selection tab. The last step is done on the Crash Type tab.
(1) Select the Data Source. This step includes selecting the database from the list of available databases in the dropdown list and choosing the data type (either pedestrian or bicyclist). The database shown when the reports window appears will be the default database that was set in Preferences.


Figure 83. Image. Produce single-variable and multivariate tables.
(2) Make the Variable Selection. For a single-variable (one-way) table, choose a row variable only. For two-way tables, choose a row variable and a column variable. The variables available will be those present on the form selected in step 1.
(3) Specify a date range (month/year in the dropdown list) if desired.
(4) Choose other Presentation Options, such as row and column totals, captions, and percentages (either row or column).
(5) Click on the Crash Type tab if the report should only be produced for a specific set of crash types or crash groups. Note: the default setting will include all crashes in the database, irrespective of the crash type or crash group. However, there may be times when a user wants to look specifically at a characteristic (such as age) for a certain type of crash.
(6) After specifying the report parameters, click Report to produce the table. For one-way tables, a graphical presentation of the report can be produced by clicking Bar Chart. To return to the table, click Report a second time.
(7) If desired, click the Excel button to export the results to an Excel workbook.

## EXAMPLES

Following are two examples that illustrate report production. One of the databases installed with the PBCAT application is named SAMPLE_DATA.MDB. The user is encouraged to use this database and experiment with creating reports.

## Example 1—Bicyclist Crashes—Light Conditions

Step 1: Set Data Source parameters. Using each dropdown list, set database to
"SAMPLE_DATA.MDB," data type to "Bicyclist," and form to "Bicyclist All Data Form."
Step 2: Make the Variable Selection. Choose "Light Conditions" from the dropdown list as the row variable. Leave the column variable blank.

Step 3: Specify Date Range. Be sure the date entries are set to "All."
Step 4: Choose the Presentation Options. Check "Show column total" and "Show caption."
Step 5: Produce the report Click the Report button. The table shown in figure 84 will appear with the caption showing the type of analysis and variable chosen. The number of crashes in each light condition category is presented in the second column, along with the total.


Figure 84. Image. Produce a single-variable table.
Step 6: Produce a graph. Click the Bar Chart button to present the results in a graph. (See figure 85.)


Figure 85. Image. Produce a graph of a single-variable table.

Step 7: Export results. Click Excel to export the results to a Microsoft Excel workbook. (See figure 86.)

## Example 2—Pedestrian Crashes-Crash Types and Pedestrian Age

Step 1: Set Data Source parameters. Using each dropdown list, set database to "SAMPLE_DATA.MDB," data type to "Pedestrian," and form to "Pedestrian All Data Form."


Figure 86. Image. Export results to Excel. Step 2: Make the Variable Selection. Choose "Crash Type Description" from the dropdown list as the row variable. Choose "Pedestrian Age Group" as the column variable. Note: the age groups used in the report will be those set on the Age Groups tab in Preferences.

Step 3: Specify Date Range. Be sure the date entries are set to "All."
Step 4: Choose the Presentation Options. Check "Show row total," "Show column total," and "Show caption."

Step 5: Produce report. Click the Report button. The table shown in figure 87 will appear with the caption showing the type of analysis and variables chosen. The number of crashes for each crash type is shown as distributed across the age groups. Totals are shown for both rows (each crash type) and columns (each age group).


Figure 87. Image. Produce a multivariate table.

Step 6: Change Presentation Options. Check the "Show in percentage" box and click on the "Column" radio button.

Step 7: Produce new report. Click the Report button to produce the report shown in figure 88. The table will appear as before with the caption showing the type of analysis and variables chosen. However, the cells will be filled with column percentages as opposed to frequencies.


Figure 88. Image. Present results as percentages.

## CHAPTER 8. DATABASE OPTIONS

PBCAT allows the user to export a database for use in other applications or import a database that was created in Version 1.0 of the software. These options are accessed from the Database menu. (See figure 89.)


Figure 89. Image. Import and export data.

## IMPORT A DATABASE

The import function is designed to import a database that was created in Version 1.0 of the PBCAT software. Selecting Import from the Database menu produces the window shown in figure 90. The steps for importing are as follows:


Figure 90. Image. Import a PBCAT Version 1.0 database.
Step 1: Select the source database. Click the Browse button to open a window to search for and select the Version 1.0 database. (See figure 91.) Click Open, and the path and file name will be entered on the Import Database window.

Step 2: Select the destination database. Click the Browse button to open a window and enter a name for the converted file within the desired folder. Click Save, and the path and file name will be entered on the Import Database window.


Figure 91. Image. Select the database to be imported.

Step 3: Import the database. Click Import to begin the conversion process. A status bar at the bottom of the window shows the progress of the conversion. When done, a message will appear to indicate that the process was completed successfully.

Step 4: Add the database. Once the database has been converted, it must be added to the list of Available Databases within Preferences before it can be accessed within the application. Refer to the instructions in chapter 4 for more details.

Special Note: Data from other types of crash databases may also be imported into PBCAT. However, such an operation requires a basic understanding of database concepts and structures. The file layout for the PBCAT.MDB database is provided in appendix $\mathbf{D}$ for those users who are interested in this type of import operation.

## EXPORT A DATABASE

The export feature is designed to assist users in a two ways. First, it allows those users requiring more extensive analysis and reporting options to export the data into Excel or a statistical analysis program. Second, it allows the export of specific variables that can be appended to a larger database. An example of the latter may be the export of the crash report number and the crash type variables, which may then be merged with a State or municipal crash database that already contains all other relevant variables.

Selecting Export from the Database menu produces a Database Export window, as shown in figure 92, which allows the user to customize the information to be exported. The steps for exporting are as follows:


Figure 92. Image. Select database and fields to be exported and choose format.
Step 1: Select the database and data type. Choose the database and data type to be exported. The data type will either be pedestrian or bicyclist.

Step 2: Select the form. Choose the form from the list of available forms in the dropdown list. The fields used in the selected form will be used to populate the list of fields available for export.

Step 3: Select the fields to be exported. Place a check next to all fields that are to be exported. All fields are initially selected. Fields can be deselected by clicking on the box and removing the check. The user can also Select All and Select None using the buttons on the right side of the window.

Step 4: Choose header option. Check the box next to Export Column Header if the database should be exported with column headers, which are the database field names.

Step 5: Select the file format. The user defines the type of file to be created upon export by selecting either Excel or a delimited text file with fields separated by either a comma, semicolon, $\sim$, or TAB). The user can also select the Quoted option, which will result in quotes being placed around each variable. This option may be required if there are fields being exported in a delimited format that contain the chosen separator.

Step 6: Preview the file. Prior to exporting the file, the user may view the database to be created by clicking on Preview.

Step 7: Export the file. Click on Export to complete the export process. If Excel is chosen as the file format, the data will be exported into an Excel workbook, which can then be saved. If a delimited format is chosen, a window will open requesting the file name to be entered and saved.

## CHAPTER 9. COUNTERMEASURES

PBCAT is designed to assist agencies with selecting countermeasures to improve pedestrian and bicyclist safety. The application includes links to two FHWA Web sites that feature a substantial number of countermeasures that may be used to mitigate specific crash types. These Web sites are PEDSAFE-Pedestrian Safety Guide and Countermeasure Selection System ${ }^{9}$ (www.walkinginfo.org/pedsafe) and BIKESAFE—Bicycle Countermeasure Selection System ${ }^{10}$ (www.bicyclinginfo.org/bikesafe). (See figure 93.)


Figure 93. Image. Access the PEDSAFE and BIKESAFE Web sites.

These Web sites provide practitioners with the latest information available for improving the safety and mobility of pedestrians and bicyclists. Both sites include interactive tools and are designed to:

- Provide information on countermeasures available for prevention of pedestrian and bicyclist crashes and improving motorist and pedestrian behavior.
- Highlight the purpose, considerations, and cost estimates associated with each countermeasure.
- Provide a decision process to select the most applicable countermeasures for a specific location.
- Provide links to case studies showing various treatments and programs implemented in communities around the country.
- Provide easy access to resources such as statistics, implementation guidance, and reference materials.

A click on either button on the Countermeasures window (See figure 94.) will launch the default browser and access the home page for the selected site. Countermeasures are provided for 12 crash groups in PEDSAFE and 13 crash groups in BIKESAFE. Click on the Crash Type Mapping buttons (in either HTML or PDF) to view tables showing the relationship between PEDSAFE and BIKESAFE groups and the PBCAT crash types and groups. These tables are also included in appendix H .


Figure 94. Image. Access the PEDSAFE and BIKESAFE Web sites.

## PEDESTRIAN COUNTERMEASURE MATRIX

Within the PEDSAFE application, the countermeasures related to the 12 crash groups are presented in an interactive matrix. (See figure 95.) The 49 countermeasures included on the site are organized into seven categories of treatments as follows:

- Pedestrian Facility Design.
- Roadway Design.
- Intersection Design.
- Traffic Calming.
- Traffic Management.
- Signals and Signs.
- Other Measures.


Figure 95. Image. View countermeasures for 12 pedestrian crash groups.

## BICYCLIST COUNTERMEASURE MATRIX

Within the BIKESAFE application, the countermeasures related to the 13 crash groups are presented in an interactive matrix. (See figure 96.) The 50 countermeasures included on the site are organized into nine categories of treatments as follows:

- Shared Roadway.
- On-Road Bike Facilities.
- Intersection Treatments.
- Maintenance.
- Traffic Calming.
- Trails/Mixed-Use Paths.
- Markings, Signs, Signals.
- Education and Enforcement.
- Support Facilities and Programs.


Figure 96. Image. View countermeasures for 13 bicyclist crash groups.

## COUNTERMEASURE DESCRIPTIONS

A click on a cell in either matrix will produce a list of available countermeasures that may be used to address the problems associated with a specific crash group. A click on the countermeasure itself will produce a detailed description of the treatment that includes a discussion of the purpose, considerations, estimated cost, and links to case studies. (See example in figure 97.).

The treatments and programs included on these sites have been in place for an extended period of time or have been proven effective at the time the product was developed. Since that time, new countermeasures continue to be developed, implemented, and evaluated. Thus, practitioners should not necessarily limit their choices to those included on the sites; this material is only a starting point. More information on the latest treatments and programs can be found through many of the Web sites and other resources included in the More Info sections on both sites.

## Right-Turn-on-Red Restrictions:

View Other Signals and Signs Treatments
A permissible Right Turn on Red (RTOR) was introduced in the 1970s as a fuel-saving measure and has sometimes had detrimental effects on pedestrians. While the law requires motorists to come to a full stop and yield to cross-street traffic and pedestrians prior to turning right on red, many motorists do not fully comply with the regulations, especially at intersections with wide turning radii. Motorists are so intent on looking for traffic approaching on their left that they may not be alert to pedestrians approaching on their right. In addition, motorists usually pull up into the crosswalk to wait for a gap in traffic, blocking pedestrian crossing movements. In some instances, motorists simply do not come to a full stop.

One concern that comes up when RTOR is prohibited is that this may lead to higher right-turn-on-green conflicts when there are concurrent signals. The use of the leading pedestrian interval (LPI) can usually best address this issue (see Pedestrian Signal Timing). Where pedestrian volumes are very high, exclusive pedestrian signals should be considered.

Prohibiting RTOR should be considered where and/or when there are high pedestrian volumes. This can be done with a simple sign posting, although there are some options that are more effective than a standard sign. For example, one option is a larger $762-\mathrm{mm}$ by $914-\mathrm{mm}$ ( $30-\mathrm{in}$ by $36-\mathrm{in}$ ) NO TURN ON RED sign, which is more conspicuous. For areas where a right-turn-on-red restriction is needed during certain times, time-of-day restrictions may be appropriate. A variable-message NO TURN ON RED sign is also an option. ${ }^{6}$

## Purpose

- Increase pedestrian safety and decrease crashes with right-turning vehicles.
top of page

```
Considerations
```

- Prohibiting RTOR is a simple, low-cost measure. Together with a leading pedestrian interval, the signal changes can benefit pedestrians with minimal impact on traffic.
- Part-time RTOR prohibitions during the busiest times of the day may be sufficient to address the problem.
- Signs should be clearly visible to right-turning motorists stopped in the curb lane at the crosswalk.

[^1]$\$ 30$ to $\$ 150$ per NO TURN ON RED sign plus installation at $\$ 200$ per sign. Electronic signs have higher costs.

```
top of page
    Case Studies
Orlando, FL
    top of page
top of page
```



Figure 97. Image. View countermeasure descriptions.

## APPENDIX A: INSTALLATION INSTRUCTIONS

This appendix includes step-by-step instructions for installing the software after it has been downloaded from the Web site. All screens that will appear during the installation are shown, including the ones that will appear if the .NET framework or an updated version of the Microsoft ${ }^{\circledR}$ Data Access Components (MDAC) is required.

Step 1 - Double click on the downloaded PBCAT.exe file to open the WinZip ${ }^{\circledR}$ Self-Extractor window. Browse to the folder where the files are to be extracted. Click Unzip (see figure 98). When finished, a window will appear indicating that seven files were unzipped successfully (figure 99).


Figure 98. Step 1.


Figure 99. Step 1 completed.

Step 2 - Browse to the folder where the files were written (unzipped) (figure 100). Double click the setup.exe file as seen in figure 101.


Figure 100. Step 2.


Figure 101. Step 2—setup file.

Step 3 - The installation software will check to see if the .NET framework is installed on the computer. If not, it will be installed as indicated in steps 3 through 6, beginning with this screen. Check the box next to .NET Framework and click Install as shown in figure 102.


Figure 102. Step 3.
Step 4 - A confirmation screen will appear (figure 103). Click Yes.


Figure 103. Step 4.
Step 5 - Read the Microsoft.net License Agreement, choose "I agree," and click Install.


Figure 104. Step 5.

Step 6 - A screen will appear at the completion of the .NET Installation. Click OK (figure 105).


Figure 105. Step 6.
Step 7 - The installation software will also check for the correct version of the MDAC. If detected, Steps 7 through 11 will not be necessary. If the correct version is not detected, the screen in figure 106 will appear. Click Install.


Figure 106. Step 7.
Step 8 - Read the MDAC End User License Agreement (figure 107). Check the "acceptance of terms" box and click Next.


Figure 107. Step 8.

Step 9 - A confirmation screen (figure 108) will appear. Click Finish. Several screens will appear during the installation, including the one shown in figure 109.


Figure 108. Step 9.


Figure 109. Step 9—sample installation screen.

Step 10 - Reboot the computer. Click the radio button, and the the setup application will restart the system now (figure 110). Click Finish.


Figure 110. Step 10.
Step 11 - After rebooting the system, browse to the folder where the files were written (unzipped) again (figure 111). Double click the setup.exe file as shown in figure 112.


Figure 111. Step 11.


Figure 112. Step 11—setup file.

Step 12 - The PBCAT Setup Wizard window will open (figure 113). Click Next.


Figure 113. Step 12.
Step 13 - Select the folder where the program is to be installed (figure 114). Use the Browse button to do so. Click Next.


Figure 114. Step 13.

Step 14 - A conformation screen will appear as seen in figure 115. Click Next.


Figure 115. Step 14.
Step 15 - Figure 116 will appear during the installation that includes a progress bar.


Figure 116. Step 15.

Step 16 - When the installation is completed, click Close. The final screen is in figure 117.


Figure 117. Step 16.

## APPENDIX B: PEDESTRIAN LOCATION SCENARIOS

This appendix includes drawings and descriptions of the 36 Pedestrian Location Scenarios that are possible when the Pedestrian Location Option is enabled within the software. The purpose of this option is to provide users with additional details about the location and travel directions of the motorist and pedestrian for those crashes that occur at intersections. Refer to the section on pedestrian location in chapter 4 to learn more about this crash-typing option.

The scenarios are coded as a combination of a number and letter and are based on the combination of motorist maneuver, intersection leg where the crash occurred, direction of travel of the pedestrian, and whether the pedestrian was in or out of the crosswalk.


Figure 118. Motorist traveling straight through.


Figure 119. Motorist turning right.


Figure 120. Motorist turning left.

## APPENDIX C: CRASH TYPES AND CRASH GROUPS

The tables on the following pages show the crash types and crash groups included in the PBCAT application. These tables also show the crash group to which a specific crash type will be assigned during the typing process.

Table 4: Pedestrian Crash Types and Crash Groups

|  | Crash Group Basic (Crash Group Number) | Crash Group Description (Crash Group Name) | Crash Type Basic (Crash Type Number) | Crash Type Description (Crash Type Name) |
| :---: | :---: | :---: | :---: | :---: |
|  | 100 | Unusual Circumstances | 110 | Assault with Vehicle |
|  |  |  | 120 | Dispute-Related |
|  |  |  | 130 | Pedestrian on Vehicle |
|  |  |  | 140 | Vehicle-Vehicle/Object |
|  |  |  | 150 | Motor Vehicle Loss of Control |
|  |  |  | 160 | Pedestrian Loss of Control |
|  |  |  | 190 | Other Unusual Circumstances |
|  |  |  | 220 | Driverless Vehicle |
|  |  |  | 230 | Disabled Vehicle-Related |
|  |  |  | 240 | Emergency Vehicle-Related |
|  |  |  | 250 | Play Vehicle-Related |
| ¢ |  |  |  |  |
|  | 200 | Backing Vehicle | 211 | Backing Vehicle-Driveway |
|  |  |  | 212 | Backing Vehicle-Driveway/Sidewalk Intersection |
|  |  |  | 213 | Backing Vehicle-Roadway |
|  |  |  | 214 | Backing Vehicle-Parking Lot |
|  |  |  | 219 | Backing Vehicle-Other/Unknown |
|  |  |  |  |  |
|  | 310 | Working or Playing in Roadway | 311 | Working in Roadway |
|  |  |  | 312 | Playing in Roadway |
|  |  |  |  |  |
|  | 340 | Bus-Related | 341 | Commercial Bus-Related |
|  |  |  | 342 | School Bus-Related |
|  |  |  |  |  |
|  | 350 | Unique Midblock | 320 | Entering/Exiting Parked Vehicle |
|  |  |  | 330 | Mailbox-Related |
|  |  |  | 360 | Ice Cream/Vendor Truck-Related |

Table 4: Pedestrian Crash Types and Crash Groups (continued)

| Crash Group Basic (Crash Group Number) | Crash Group Description (Crash Group Name) | Crash Type Basic (Crash Type Number) | Crash Type Description (Crash Type Name) |
| :---: | :---: | :---: | :---: |
| 400 | Walking Along Roadway | 410 | Walking Along Roadway With Traffic-From Behind |
|  |  | 420 | Walking Along Roadway With Traffic-From Front |
|  |  | 430 | Walking Along Roadway Against Traffic-From Behind |
|  |  | 440 | Walking Along Roadway Against Traffic-From Front |
|  |  | 459 | Walking Along Roadway—Direction/Position Unknown |
|  |  |  |  |
| 460 | Crossing Driveway or Alley | 460 | Motorist Entering Driveway or Alley |
|  |  | 465 | Motorist Exiting Driveway or Alley |
|  |  | 469 | Driveway Crossing-Other/Unknown |
|  |  |  |  |
| 500 | Waiting to Cross | 510 | Waiting to Cross-Vehicle Turning |
|  |  | 520 | Waiting to Cross-Vehicle Not Turning |
|  |  | 590 | Waiting to Cross-Vehicle Action Unknown |
|  |  |  |  |
| 600 | Pedestrian in RoadwayCircumstances Unknown | 620 | Walking in Roadway |
|  |  | 610 | Standing in Roadway |
|  |  | 313 | Lying in Roadway |
| 720 | Multiple Threat/Trapped | 710 | Multiple Threat |
|  |  | 730 | Trapped |
|  |  |  |  |
| 740 | Dash/Dart-Out | 741 | Dash |
|  |  | 742 | Dart-Out |
|  |  |  |  |
| 750 | Crossing RoadwayVehicle Not Turning | 760 | Pedestrian Failed to Yield |
|  |  | 770 | Motorist Failed to Yield |

Table 4: Pedestrian Crash Types and Crash Groups (continued)

|  | Crash Group Basic (Crash Group Number) | Crash Group Description (Crash Group Name) | Crash Type Basic (Crash Type Number) | Crash Type Description (Crash Type Name) |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | 781 | Motorist Left Turn-Parallel Paths |
|  |  |  | 782 | Motorist Left Turn-Perpendicular Paths |
|  |  |  | 791 | Motorist Right Turn-Parallel Paths |
|  | 790 | Crossing Roadway-Vehicle | 792 | Motorist Right Turn on Red-Parallel Paths |
|  |  |  | 795 | Motorist Right Turn-Perpendicular Paths |
|  |  |  | 794 | Motorist Right Turn on Red-Perpendicular Paths |
|  |  |  | 799 | Motorist Turn/Merge-Other/Unknown |
| $\varnothing$ |  |  |  |  |
|  | 800 | Off Roadway | 830 | Off Roadway-Parking Lot |
|  | 800 | Off Roadway | 890 | Off Roadway-Other/Unknown |
|  |  |  |  |  |
|  | 910 | Crossing Expressway | 910 | Crossing an Expressway |
|  |  |  |  |  |
|  | 990 | Other/UnknownInsufficient Details | 900 | Other-Unknown Location |
|  |  |  | 680 | Nonintersection-Other/Unknown |
|  |  |  | 690 | Intersection-Other/Unknown |

Table 5. Bicyclist Crash Types and Crash Groups

| Crash Group Basic (Crash Group Number) | Crash Group Description (Crash Group Name) | Crash Type Basic (Crash Type Number) | Crash Type Description (Crash Type Name) |
| :---: | :---: | :---: | :---: |
| 110 | Loss of Control/Turning Error | 121 | Bicyclist Lost Control-Mechanical problems |
|  |  | 122 | Bicyclist Lost Control—Oversteering, Improper Braking, Speed |
|  |  | 123 | Bicyclist Lost Control-Alcohol/Drug Impairment |
|  |  | 124 | Bicyclist Lost Control-Surface Conditions |
|  |  | 129 | Bicyclist Lost Control-Other/Unknown |
|  |  | 131 | Motorist Lost Control-Mechanical problems |
|  |  | 132 | Motorist Lost Control-Oversteering, Improper Braking, Speed |
|  |  | 133 | Motorist Lost Control-Alcohol/Drug Impairment |
|  |  | 134 | Motorist Lost Control-Surface Conditions |
|  |  | 139 | Motorist Lost Control-Other/Unknown |
|  |  | 111 | Motorist Turning Error-Left Turn |
|  |  | 112 | Motorist Turning Error-Right Turn |
|  |  | 113 | Motorist Turning Error-Other |
|  |  | 114 | Bicyclist Turning Error-Left Turn |
|  |  | 115 | Bicyclist Turning Error-Right Turn |
|  |  | 116 | Bicyclist Turning Error-Other |
|  |  |  |  |
| 140 | Motorist Failed to Yield-Sign-Controlled Intersection | 141 | Motorist Drive-out-Sign-Controlled Intersection |
|  |  | 143 | Motorist Drive-through—Sign-Controlled Intersection |
|  |  |  |  |
| 145 | Bicyclist Failed to Yield—Sign-Controlled Intersection | 142 | Bicyclist Ride-out-Sign-Controlled Intersection |
|  |  | 144 | Bicyclist Ride Through-Sign-Controlled Intersection |
|  |  | 147 | Multiple Threat-Sign-Controlled Intersection |

Table 5. Bicyclist Crash Types and Crash Groups (continued)


Table 5. Bicyclist Crash Types and Crash Groups (continued)


Table 5. Bicyclist Crash Types and Crash Groups (continued)

|  | Crash Group Basic (Crash Group Number) | Crash Group Description (Crash Group Name) | Crash Type Basic (Crash Type Number) | Crash Type Description (Crash Type Name) |
| :---: | :---: | :---: | :---: | :---: |
|  | 320 | Motorist Failed to <br> Yield—Midblock | 321 | Motorist Drive-out-Residential Driveway |
|  |  |  | 322 | Motorist Drive-out-Commercial Driveway/Alley |
|  |  |  | 328 | Motorist Drive-out-Other Midblock |
|  |  |  | 329 | Motorist Drive-out-Midblock-Unknown |
|  | 600 | Backing Vehicle | 600 | Backing Vehicle |
| O |  |  |  |  |
|  | 850 | Other/Unusual Circumstances | 510 | Motorist Intentionally Caused |
|  |  |  | 520 | Bicyclist Intentionally Caused |
|  |  |  | 700 | Play Vehicle-Related |
|  |  |  | 800 | Unusual Circumstances |
|  |  |  | 400 | Bicycle Only |
|  |  |  |  |  |
|  | 910 | Nonroadway | 910 | Nonroadway |
|  |  |  |  |  |
|  | 990 | Other/Unknown- | 980 | Unknown Location |
|  | 990 | Insufficient Details | 970 | Unknown Approach Paths |

## APPENDIX D: DATABASE STRUCTURE

The tables on the following pages provide attributes of the fields included in the default database (PBCAT.MDB). The following information is provided for each field:

- Field Name.
- Alias.
- Data Type.
- Field Length.
- Required.
- Field Entry Type.
- Default Value.
- Values.

Refer to the section on Database Fields in chapter 4 to learn how to change the attributes associated with these fields.

Table 6. Pedestrian Table Structure for PBCAT.MDB Database

| Field Name | Alias | Data <br> Type | Field <br> Length | Field Entry <br> Type | Required | Default <br> Value | Values |
| :--- | :--- | :--- | ---: | :--- | :--- | :--- | :--- |
| Approach Link | Approach <br> Link | Text | 10 | Dynamic Listbox | N |  |  |
| Crash Group <br> Description | Crash Group <br> Description | Text | 50 | Singleline <br> Editbox | N |  |  |
| Crash Group Expanded | Crash Group <br> Expanded | Int | 4 | Singleline <br> Editbox | N |  |  |
| Crash Group Basic | Crash Group <br> Number | Int | 4 | Singleline <br> Editbox | N |  |  |
| Crash Location | Crash <br> Location | Int | 4 | Singleline <br> Editbox | N |  |  |
| Crash Location <br> Description | Crash <br> Location <br> Description | Text | 110 | Singleline <br> Editbox | N |  |  |
| Crash Type Description | Crash Type <br> Description | Text | 80 | Singleline <br> Editbox | N |  |  |
| Crash Type Expanded | Crash Type <br> Expanded | Int | 4 | Singleline <br> Editbox | N |  |  |
| Crash Type Basic | Crash Type <br> Number | Int | Singleline <br> Editbox | N |  |  |  |
| Date of Crash | Date of Crash <br> (mmddyyyy | Datetime | 8 | Singleline <br> Editbox | N |  |  |
| Development Type | Development <br> Type | Text | 15 | Dropdown <br> Listbox | N |  | Unknown, Residential, <br> Commercial, <br> Industrial, Retail, <br> Recreational, Mixed <br> Use, Other |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Direction from Reference Street | Direction from <br> Reference Street | Text | 10 | Dropdown Listbox | N |  | Unknown, North, South, East, West |
| Distance from Node | Distance from Node | Float | 16 | Singleline Editbox | N |  |  |
| Distance from Reference Node | Distance from <br> Reference Node | Float | 16 | Singleline Editbox | N |  |  |
| Distance from Reference Street | Distance from Reference Street | Float | 16 | Singleline Editbox | N |  |  |
| Driver Age | Driver Age | Int | 4 | Singleline Editbox | N |  |  |
| Driver Alcohol Drug Use | Driver <br> Alcohol/Drug Use | Text | 25 | Dropdown Listbox | N |  | Unknown, Yes, No |
| Driver Citation1 | Driver <br> Citation 1 | Text | 20 | Singleline Editbox | N |  |  |
| Driver Citation 2 | Driver Citation 2 | Text | 20 | Singleline Editbox | N |  |  |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Driver Contributing Circumstances | Driver <br> Contributing <br> Factors | Text | 25 | Dropdown Listbox | N |  | Unknown, None, Alcohol/Drug Use, Failure to Yield, Improper Passing, Improper Lane Change, Improper Turn, Improper Backing, Right Turn on Red, Improper Equipment, Other |
| Driver DOB | Driver Date of Birth (mmddyyyy) | Datetime | 8 | Singleline Editbox | N |  |  |
| Driver Gender | Driver Gender | Text | 8 | Dropdown Listbox | N |  | Unknown, Male, Female |
| Driver Injury Severity | Driver Injury Severity | Text | 25 | Dropdown Listbox | N |  | Unknown, Fatal (K), Incapacitating (A), Nonincapacitating (B), Possible (C), None(O) |
| Driver Race | Driver Race | Text | 17 | Dropdown Listbox | N |  | Unknown, White, Black, Native American, Hispanic, Other |
| Estimated Original Motor Vehicle Speed | Estimated <br> Original <br> Vehicle <br> Speed | Int | 4 | Singleline Editbox | N |  |  |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Estimated Motor Vehicle Speed at Impact | Estimated Speed at Impact | Int | 4 | Singleline Editbox | N |  |  |
| Fault | Fault | Text | 27 | Dropdown Listbox | N |  | Unknown, Pedestrian at Fault, Motorist at Fault, Both at Fault, Neither at Fault, Cannot Determine Fault |
| GPS Latitude | GPS Latitude | Text | 12 | Singleline Editbox | N |  |  |
| GPS Longitude | GPS <br> Longitude | Text | 12 | Singleline Editbox | N |  |  |
| Hit and Run | Hit and Run | Text | 10 | Dropdown Listbox | N |  | Unknown, Yes, No |
| Jurisdiction_Level_1 | Jurisdiction 1 | Text | 20 | Dynamic Listbox | N |  |  |
| Jurisdiction_Level_2 | Jurisdiction 2 | Text | 20 | Dynamic Listbox | N |  |  |
| Leg Intersection | Leg Intersection | Text | 50 | Singleline Editbox | N |  |  |
| Light Conditions | Light Conditions | Text | 25 | Dropdown Listbox | N |  | Unknown, Daylight, Dawn/Dusk, Dark with Street Lights, Dark without Street Lights |
| Link | Link | Text | 10 | Dynamic Listbox | N |  |  |
| Marked Crosswalk Presence | Marked Crosswalk | Text | 15 | Dropdown Listbox | N |  | Unknown, Yes, No, Not Applicable |
| Mile Km Post | Milepost | Float | 16 | Singleline Editbox | N |  |  |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field <br> Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Motor Vehicle Defects | Motor Vehicle Defects | Text | 10 | Dropdown Listbox | N |  | Unknown, None, Brakes, Lights, Steering, Tires, Other |
| Motor Vehicle Type | Motor <br> Vehicle Type | Text | 20 | Dropdown Listbox | N |  | Unknown, Car, Pickup, Sport Utility, Van/Minivan, Large Truck, Bus/School Bus, Other |
| Motorist Direction | Motorist Direction | Text | 50 | Singleline Editbox | N |  |  |
| Motorist Maneuver | Motorist <br> Maneuver | Text | 50 | Singleline Editbox | N |  |  |
| Number Peds Involved | No. of Peds | Int | 4 | Singleline Editbox | N |  |  |
| Number of Lanes | No. of Through Lanes | Int | 4 | Singleline Editbox | N |  |  |
| Node | Node | Text | 10 | Dynamic Listbox | N |  |  |
| Pedestrian Citation1 | Pedestrian Citation 1 | Text | 20 | Singleline Editbox | N |  |  |
| Pedestrian Citation 2 | Pedestrian Citation 2 | Text | 20 | Singleline Editbox | N |  |  |
| Pedestrian Contributing Circumstances | Pedestrian Contributing Factors | Text | 20 | Dropdown Listbox | N |  | Unknown, None, Alcohol/Drug Use, Failure to Yield, Circumstances, Other |
| Pedestrian Alcohol Drug Use | Pedestrian <br> Alcohol/Drug Use | Text | 10 | Dropdown Listbox | N |  | Unknown, Yes, No |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Age | Pedestrian Age | Int | 4 | Singleline Editbox | N |  |  |
| DOB | Pedestrian Date of Birth (mmddyyyy) | Datetime | 8 | Singleline Editbox | N |  |  |
| Pedestrian Direction | Pedestrian Direction | Text | 50 | Singleline <br> Editbox | N |  |  |
| Gender | Pedestrian Gender | Text | 8 | Dropdown Listbox | N |  | Unknown, Male, Female |
| Injury Severity | Pedestrian Injury Severity | Text | 25 | Dropdown Listbox | N |  | Unknown, Fatal (K), Incapacitating (A), Non-Incapacitating (B), Possible (C), None (O) |
| Pedestrian Position | Pedestrian Position | Int | 4 | Singleline Editbox | N |  |  |
| Pedestrian Position Description | Pedestrian <br> Position <br> Description | Text | 50 | Singleline Editbox | N |  |  |
| Race | Pedestrian Race | Text | 17 | Dropdown Listbox | N |  | Unknown, White, Black, Native American, Hispanic, Other |
| Reference Node | Reference <br> Node | Text | 10 | Dynamic Listbox | N |  |  |
| Reference Post | Reference Post | Float | 16 | Singleline Editbox | N |  |  |
| Reference Street | Reference Street | Text | 20 | Dynamic Listbox | N |  |  |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Report Number | Report Number | Text | 20 | Singleline Editbox | Y |  |  |
| Roadway Alignment | Roadway Alignment | Text | 15 | Dropdown Listbox | N |  | Unknown, Straight, Curve, Not Applicable |
| Roadway Configuration | Roadway Configuration | Text | 20 | Dropdown Listbox | N |  | Unknown, Two-way Undivided, Two-way Divided, One-way, Other |
| Roadway Defects | Roadway Defects | Text | 20 | Dropdown Listbox | N |  | Unknown, None, Ruts/Bumps/Holes, Loose Material, Other |
| Roadwa y Surface Type | Roadway Surface | Text | 10 | Dropdown Listbox | N |  | Unknown, Concrete, Asphalt, Gravel, Other |
| Roadway Terrain | Roadway Terrain | Text | 15 | Dropdown Listbox | N |  | Level, Rolling, <br> Mountainous, Other, <br> Unknown, Not <br> Applicable |
| Roadway Type | Roadway Type | Text | 20 | Dropdown Listbox | N |  | Unknown, Interstate, US Route, State Primary, State Secondary, Local/Municipal, Private Property, Other |
| Route Name MPS | Route Name | Text | 20 | Dynamic Listbox | N |  |  |
| Route Name RPS | Route Name (RPS) | Text | 20 | Dynamic Listbox | N |  |  |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field <br> Length | Field Entry <br> Type | Required | Default <br> Value | Values |
| :--- | :--- | :--- | ---: | :--- | :--- | :--- | :--- |
| Route Number MPS | Route <br> Number | Text | 20 | Dynamic Listbox | N |  |  |
| Route Number RPS | Route <br> Number <br> (RPS) | Text | 20 | Dynamic Listbox | N |  |  |
| Route Street Name | Route/Street <br> Name | Text | 20 | Dynamic Listbox | N |  |  |
| Route Street Number | Route/Street <br> Number | Text | 20 | Dynamic Listbox | N |  |  |
| Scenario | Scenario | Text | 50 | Singleline <br> Editbox | N |  |  |
| School Zone | School Zone | Text | 10 | Dropdown <br> Listbox | N |  | Unknown, Yes, No |
| Speed Limit | Sidewalk <br> Presence | Text | 15 | Dropdown <br> Listbox | N |  | Unknown, Yes, No, <br> Not Applicable |
| Surface Conditions | Speed Limit | Int | Singleline <br> Editbox | N |  |  |  |
| Time of Day | Surface <br> Conditions | Text | 11 | Dropdown <br> Listbox | N |  | Unknown, Dry, Wet, <br> Snow/Ice, Other |
|  | Time of Day <br> (military- <br> hhmm) | Text | 4 | Singleline <br> Editbox | N |  |  |
| Traffic Control | Traffic <br> Control | Text | 25 | Dropdown <br> Listbox | N |  | Unknown, Signals, <br> Signs/Flashing <br> Signals, None, Not <br> Applicable |
| Type of Area | Type of Area | Text | 10 | Dropdown <br> Listbox | N | Unknown, Rural, <br> Urban, Suburban, <br> Mixed |  |

Table 6. Pedestrian Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field <br> Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Unique Pedestrian Characteristic | Unique Pedestrian Characteristic | Text | 25 | Dropdown Listbox | N |  | Unknown, None, Inline/Roller Skates, Skateboard/Scooter, Wheel Chair, Walker/Cane/Crutches, Visual Impairment, Other |
| User Unlimited1 | User Unlimited 1 | Memo | Unlimited | Multiline Editbox | N |  |  |
| User Unlimited 2 | User Unlimited 2 | Memo | Unlimited | Multiline Editbox | N |  |  |
| Use Variable 1 | User Variable 1 | Text | 20 | Singleline Editbox | N |  |  |
| Use Variable 2 | User Variable $2$ | Text | 20 | Singleline Editbox | N |  |  |
| User Variable 3 | User Variable 3 | Text | 20 | Singleline Editbox | N |  |  |
| Use Variable 4 | User Variable $4$ | Text | 20 | Singleline Editbox | N |  |  |
| Weather Conditions | Weather Conditions | Text | 20 | Dropdown Listbox | N |  | Unknown, Clear/Cloudy, Rain, Snow/Sleet/Hail, Fog, Other |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database


Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bike Contributing Circumstances | Bicyclist Contributing Factors | Text | 25 | Dropdown Listbox | N |  | Unknown, None, Alcohol/Drug Use, Failure to Yield, Improper Passing, Improper Lane Change, Improper Turn, Improper Backing, Right Turn on Red, Improper Equipment, Other |
| DOB | Bicyclist Date of Birth (mmddyyyy) | Datetim <br> e | 8 | Singleline Editbox | N |  |  |
| Bicyclist Direction | Bicyclist Direction | Int | 4 | Singleline Editbox | N |  |  |
| Bicyclist Direction Description | Bicyclist Direction Description | Text | 50 | Singleline Editbox | N |  |  |
| Gender | Bicyclist Gender | Text | 10 | Dropdown Listbox | N |  | Unknown, Male, Female |
| Helmet | Bicyclist Helmet Use | Text | 10 | Dropdown Listbox | N |  | Unknown, Yes, No |
| Injury Severity | Bicyclist Injury Severity | Text | 25 | Dropdown Listbox | N |  | Unknown, Fatal (K), Incapacitating (A), Non-Incapacitating (B), Possible (C), None(O) |
| Bicyclist Position | Bicyclist <br> Position | Int | 4 | Singleline Editbox | N |  |  |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Bicyclist Position Description | Bicyclist Position Description | Text | 60 | Singleline Editbox | N |  |  |
| Race | Bicyclist Race | Text | 17 | Dropdown Listbox | N |  | Unknown, White, Black, Native American, Hispanic, Other |
| Bicycle Lane or Paved Shoulder Width | Bike Lane/Paved Shoulder Width | Int | 4 | Singleline Editbox | N |  |  |
| Crash Group Description | Crash Group Description | Text | 100 | Singleline Editbox | N |  |  |
| Crash Group Expanded | Crash Group Expanded | Int | 4 | Singleline Editbox | N |  |  |
| Crash Group Basic | Crash Group Number | Int | 4 | Singleline Editbox | N |  |  |
| Crash Location | Crash Location | Text | 10 | Singleline Editbox | N |  |  |
| Crash Location Description | Crash Location Description | Text | 35 | Singleline Editbox | N |  |  |
| Crash Type Description | Crash Type Description | Text | 80 | Singleline Editbox | N |  |  |
| Crash Type Expanded | Crash Type <br> Expanded | Int | 4 | Singleline Editbox | N |  |  |
| Crash Type Basic | Crash Type <br> Number | Int | 4 | Singleline <br> Editbox | N |  |  |
| Curb Lane Width | Curb Lane <br> Width | Int | 4 | Singleline Editbox | N |  |  |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Date of Crash | Date of Crash (mmddyyyy) | Datetime | 8 | Singleline Editbox | N |  |  |
| Development Type | Development Type | Text | 15 | Dropdown Listbox | N |  | Unknown, Residential, Commercial, Industrial, Retail, Recreational, Mixed Use, Other |
| Direction from Ref Street | Direction from Reference Street | Text | 3 | Dropdown Listbox | N |  | Unknown, North, South, East, West |
| Distance from Node | Distance from Node | Float | 16 | Singleline Editbox | N |  |  |
| Distance from Ref Node | Distance from Reference Node | Float | 16 | Singleline Editbox | N |  |  |
| Distance from Ref Street | Distance from Reference Street | Float | 16 | Singleline Editbox | N |  |  |
| Driver Age | Driver Age | Int | 4 | Singleline Editbox | N |  |  |
| Driver Alcohol Drug Use | Driver Alcohol/Drug Use | Text | 25 | Dropdown Listbox | N |  | Unknown, Yes, No |
| Driver Citation 1 | Driver Citation 1 | Text | 20 | Singleline Editbox | N |  |  |
| Driver Citation 2 | Driver Citation 2 | Text | 20 | Singleline Editbox | N |  |  |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Driver Contributing Circumstances | Driver <br> Contributing <br> Factors | Text | 25 | Dropdown Listbox | N |  | Unknown, None, Alcohol/Drug Use, Failure to Yield, Improper Passing, Improper Lane Change, Improper Turn, Improper Backing, Right Turn on Red, Improper Equipment, Other |
| Driver DOB | Driver Date of Birth (mmddyyyy) | Datetim <br> e | 8 | Singleline Editbox | N |  |  |
| Driver Gender | Driver Gender | Text | 10 | Dropdown Listbox | N |  | Unknown, Male, Female |
| Driver Injury Severity | Driver Injury Severity | Text | 25 | Dropdown Listbox | N |  | Unknown, Fatal (K), Incapacitating (A), NonIncapacitating (B), Possible (C), None (O) |
| Driver Race | Driver Race | Text | 17 | Dropdown Listbox | N |  | Unknown, White, Black, Native American, Hispanic, Other |
| Estimated Original <br> Motor Vehicle Speed | Estimated Original Vehicle Speed | Int | 4 | Singleline Editbox | N |  |  |
| Estimated Motor Vehicle Speed at Impact | Estimated Speed at Impact | Int | 4 | Singleline Editbox | N |  |  |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Fault | Fault | Text | 27 | Dropdown Listbox | N |  | Unknown, Bicyclist at Fault, Motorist at Fault, Both at Fault, Neither at Fault, Cannot Determine Fault |
| GPS Latitude | GPS Latitude | Text | 12 | Singleline Editbox | N |  |  |
| GPS Longitude | GPS Longitude | Text | 12 | Singleline Editbox | N |  |  |
| Hit and Run | Hit and Run | Text | 10 | Dropdown Listbox | N |  | Unknown, Yes, No |
| Jurisdiction Level 1 | Jurisdiction 1 | Text | 20 | Dynamic <br> Listbox | N |  |  |
| Jurisdiction_Level_2 | Jurisdiction 2 | Text | 20 | Dynamic Listbox | N |  |  |
| Light Conditions | Light Conditions | Text | 25 | Dropdown Listbox | N |  | Unknown, Daylight, Dawn/Dusk, DarkStreet Lights, Dark-No Street Lights |
| Link | Link | Text | 10 | Dynamic Listbox | N |  |  |
| Marked Crosswalk Presence | Marked Crosswalk | Text | 20 | Dropdown Listbox | N |  | Unknown, Yes, No, Not Applicable |
| Mile Km Post | Milepost | Float | 16 | Singleline Editbox | N |  |  |
| Motor Vehicle Defects | Motor Vehicle Defects | Text | 10 | Dropdown Listbox | N |  | Unknown, None, Brakes, Lights, Steering, Tires, Other |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Motor Vehicle Type | Motor Vehicle Type | Text | 20 | Dropdown Listbox | N |  | Unknown, Car, Pickup, Sport Utility, Van/Minivan, Large Truck, Bus/School Bus, Other |
| Number Bicyclists Involved | No. of Bicyclists | Int | 4 | Singleline Editbox | N |  |  |
| Number of Lanes | No. of Through Lanes | Int | 4 | Singleline Editbox | N |  |  |
| Node | Node | Text | 10 | Dynamic Listbox | N |  |  |
| Reference Node | Reference Node | Text | 10 | Dynamic Listbox | N |  |  |
| Reference Post | Reference Post | Float | 16 | Singleline Editbox | N |  |  |
| Reference Street | Reference Street | Text | 20 | Dynamic Listbox | N |  |  |
| Report Number | Report Number | Text | 20 | Singleline Editbox | Y |  |  |
| Roadway Alignment | Roadway Alignment | Text | 20 | Dropdown Listbox | N |  | Unknown, Straight, Curve, Not Applicable |
| Roadway Configuration | Roadway Configuration | Text | 20 | Dropdown Listbox | N |  | Unknown, Two-way Undivided, Two-way Divided, One-way, Other |
| Roadway Defects | Roadway Defects | Text | 20 | Dropdown Listbox | N |  | Unknown, None, Ruts/Bumps/Holes, Loose Material, Other |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data <br> Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Roadway Surface Type | Roadway Surface | Text | 10 | Dropdown Listbox | N |  | Unknown, Concrete, Asphalt, Gravel, Other |
| Roadway Terrain | Roadway Terrain | Text | 15 | Dropdown Listbox | N |  | Level, Rolling, Mountainous, Other, Unknown, Not Applicable |
| Roadway Type | Roadway Type | Text | 20 | Dropdown Listbox | N |  | Unknown, Interstate, US Route, State Primary, State Secondary, Local/Municipal, Private Property, Other |
| Route Name MPS | Route Name | Text | 20 | Dynamic Listbox | N |  |  |
| Route Name RPS | Route Name (rps) | Text | 20 | Dynamic Listbox | N |  |  |
| Route Number MPS | Route Number | Text | 20 | Dynamic <br> Listbox | N |  |  |
| Route Number RPS | Route Number (rps) | Text | 20 | Dynamic Listbox | N |  |  |
| Route Street Name | Route/Street Name | Text | 20 | Dynamic <br> Listbox | N |  |  |
| Route Street Number | Route/Street Number | Text | 20 | Dynamic Listbox | N |  |  |
| School Zone | School Zone | Text | 10 | Dropdown Listbox | N |  | Unknown, Yes, No |
| Sidewalk Presence | Sidewalk Presence | Text | 20 | Dropdown Listbox | N |  | Unknown, Yes, No, Not Applicable |

Table 7. Bicyclist Table Structure for PBCAT.MDB Database (continued)

| Field Name | Alias | Data Type | Field Length | Field Entry Type | Required | Default Value | Values |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Speed Limit | Speed Limit | Int | 4 | Singleline <br> Editbox | N |  |  |
| Surface Conditions | Surface Conditions | Text | 11 | Dropdown Listbox | N |  | Unknown, Dry, Wet, Snow/Ice, Other |
| Time of Day | Time of Day (militaryhhmm) | Text | 4 | Singleline Editbox | N |  |  |
| Traffic Control | Traffic Control | Text | 25 | Dropdown Listbox | N |  | Unknown, Signals, Signs/Flashing Signals, None, Not Applicable |
| Type of Area | Type of Area | Text | 10 | Dropdown Listbox | N |  | Unknown, Rural, Urban, Suburban, Mixed |
| User Unlimited1 | User Unlimited 1 | Memo | Unlimited | Multiline Editbox | N |  |  |
| User Unlimited2 | User Unlimited 2 | Memo | Unlimited | Multiline Editbox | N |  |  |
| User Variable 1 | User Variable 1 | Text | 20 | Singleline Editbox | N |  |  |
| User Variable 2 | User Variable 2 | Text | 20 | Singleline Editbox | N |  |  |
| User Variable 3 | User Variable 3 | Text | 20 | Singleline Editbox | N |  |  |
| User Variable 4 | User Variable 4 | Text | 20 | Singleline Editbox | N |  |  |
| Weather Conditions | Weather Conditions | Text | 20 | Dropdown Listbox | N |  | Unknown, Clear/Cloudy, Rain, Snow/Sleet/Hail, Fog, Other |

## APPENDIX E: DATA ENTRY FORMS

This appendix includes the 10 forms that are available in the default database of the application (PBCAT.MDB). Any of these databases may be edited to meet the data entry needs of a State or local agency. Refer to chapter 5 for further instruction. The forms included are as follows:

- Ped_All_Data_Milepost—contains all crash typing fields, all crash report fields, and the milepost referencing system fields.
- Ped_All_Data_Refpost—contains all crash typing fields, all crash report fields, and the reference post referencing system fields.
- Ped_All_Data_RouteName-contains all crash typing fields, all crash report fields, and the route/street name referencing system fields.
- Ped_All_Data_LinkNode-contains all crash typing fields, all crash report fields, and the link/node referencing system fields.
- Ped_Crash_Type-contains only the Report_Number field and the crash typing fields.
- Bike_All_Data_Milepost—contains all crash typing fields, all crash report fields, and the milepost referencing system fields.
- Bike_All_Data_Refpost—contains all crash typing fields, all crash report fields, and the reference post referencing system fields.
- Bike_All_Data_RouteName-contains all crash typing fields, all crash report fields, and the route/street name referencing system fields.
- Bike_All_Data_LinkNode—contains all crash typing fields, all crash report fields, and the link/node referencing system fields.
- Bike_Crash_Type-contains only the Report_Number field and the crash typing fields.

The forms containing "all" database fields may be most useful to those users planning to use PBCAT to store and manage all pedestrian and bicyclist collision data in this application. The forms with crash type information only may be utilized by those users who plan to export the crash typing information and merge it with another database that contains the other crash data elements.


Figure 121. Ped_All_Data_Milepost Form


| Driver Information |  |
| :--- | :--- |
| Driver Date of Birth |  |
| (mmddyyyy |  |
| Driver Age |  |
| Driver Gender | Unknown |
| Driver Race | Unknown |
| Driver Alcohol/Drug Use | Unknown |
| Driver Iniury Severity | Unknown |




| Roadway Features |  |  |
| :--- | :--- | :--- |
| No. of Through Lanes |  |  |
| Roadway Type | Unknown |  |
| Roadway Configuration | Unknown |  |
| Roadway Terrain | Level |  |
| Roadway Alignment | Unknown |  |
| Roadway Surface | Unknown |  |
| Roadway Defects | Unknown |  |
| Traffic Control | Unknown |  |
| Speed Limit |  |  |
| Marked Crosswalk | Unknown |  |
| Sidewalk Presence | Unknown |  |


$\left[\right.$| Environmental Conditions |  |  |
| :--- | :--- | :--- |
| Weather Conditions | Unknown |  |
| Surface Conditions | Unknown |  |
| Light Conditions | Unknown |  |



Figure 122. Ped_All_Data_Refpost Form



| Driver Information |  |
| :--- | :--- |
| Driver Date of Birth |  |
| (mmddyyyy) |  |
| Driver Age |  |
| Driver Gender | Unknown |
| Driver Race | Unknown |
| Driver Alcohol/Drug Use | Unknown |
| Driver Injury Severity | Unknown |



| Pedestrian Date of Birth <br> (mmddyyyl) |  |
| :--- | :--- |
| Pedestrian Age |  |
| Pedestrian Gender |  |
| Pedestrian Race | Unknown |
| Pedestrian Alcohol/Drug Use | Unknown |
| Pedestrian Iniury Severity | Unknown |
| Unique Ped Characteristic | Unknown |



Figure 123. Ped_All_Data_RouteName Form


Figure 124. Ped_All_Data_LinkNode Form

Figure 125. Ped_Crash_Type Form



Figure 126. Bike_All_Data_Milepost Form

| Principal Information |  |
| :--- | :--- |
| Report Number |  |
| Date of Crash |  |
| (mmddyyyy) |  |
| Time of Day |  |
| (military - hhmm) |  |
| No. of Bicyclists |  |
| Hit and Run |  |



Figure 127. Bike_All_Data_Refpost Form


Figure 128. Bike_All_Data_RouteName Form



-Environmental Conditions



Figure 129. Bike_All_Data_LinkNode Form


Figure 130. Bike_Crash_Type Form

## APPENDIX F: CRASH TYPING DEFINITIONS

Contained in this appendix are several tables with definitions for the bicyclist and pedestrian crash types. In addition, there are also tables with definitions for other fields that are completed during the crash typing process (e.g., crash location, pedestrian position, and bicyclist position and direction).

Table 8. Pedestrian Crash Location Definitions

| Crash_Location_Desc (Crash Location) | Crash_Location (Crash Location) | Definition |
| :---: | :---: | :---: |
| Intersection | 1 | The crash occurred within the intersection proper or within the crosswalk area. <br> Note: Driveways controlled by signals or signs should be coded as intersections. Uncontrolled driveways should be coded as nonintersection locations. |
| Intersection-Related | 4 | The crash occurred outside the intersection crosswalk area but within 15 m ( 50 ft ) of the intersection. |
| Nonintersection | 2 | The crash occurred on or along the roadway and more than 15 m ( 50 ft ) away from an intersection. |
| Nonroadway | 3 | The crash occurred off the roadway, including parking lots, driveways, private roads, yards, alleys, and other open areas. Note: Crashes occurring on paved shoulders, sidewalks, or driveway crossings are considered to be "roadway" crashes and should not be placed in the nonroadway classification. |
| Unknown | 9 | There is insufficient information to determine where the crash occurred. |
| Pedestrian Position Definitions |  |  |
| Pedestrian_Position_Desc (Pedestrian Position Description) | Pedestrian_Position (Pedestrian Position) | Definition |
| Intersection | 1 | Within intersection proper |
| Crosswalk area | 2 | Within a crosswalk, marked or unmarked |
| Travel Lane | 3 | On a roadway, in a travel lane |
| Paved Shoulder/Bike Lane/Parking Lane | 4 | On a roadway, in a paved shoulder or bike lane, or parking lane |
| Sidewalk/Shared-Use Path/Driveway Crossing | 5 | On a sidewalk, shared-use path, or driveway crossing |
| Unpaved Right-of-Way | 6 | Other road right-of-way (unpaved shoulder, etc.) |
| Driveway/Alley | 7 | On a driveway or alley |
| Nonroadway-Parking lot/Other | 8 | Other nonroadway areas ( parking lot, non-right-of-way sidewalk or multi-use path, yard, open areas, etc.) |
| Other/Unknown | 9 | Other/unknown |

Table 9. Bicyclist Crash Location Definitions

| Crash_Location_Desc (Crash Location) | Crash_Location (Crash Location) | Definition |
| :---: | :---: | :---: |
|  |  | Where did the crash occur? |
| Intersection | 1 | Intersection-The crash occurred within the intersection proper or within the crosswalk area. <br> Note: Driveways are considered to be nonintersection locations. The exception is signalized commercial driveways which should be coded as intersections. |
| Intersection-Related | 2 | Intersection-Related-The crash occurred outside the intersection proper or crosswalk area but was the related to the presence of the intersection (e.g., the result of queueing traffic). |
| Nonintersection | 3 | Nonintersection Location-The crash occurred outside the intersection proper or crosswalk area and was not related to the presence of any intersection. |
| Nonroadway | 4 | Nonroadway Location-The crash occurred off the street network; this includes parking lots, driveways, alleys, and other open areas. <br> Note: crashes occurring on paved shoulders, sidewalks, or driveway crossings are considered to be "roadway" crashes and should not be placed in the nonroadway classification. |
| Unknown Location | 9 | Unknown/Insufficient Information-There is insufficient information to determine where the crash occurred. |
|  |  | Bicyclist Position Definitions |
| Bicyclist_Position_Desc (Bicyclist Position) | Bicyclist_Position (Bicyclist Position) | Definition |
| Travel Lane | 1 | On a roadway, in a shared travel lane |
| Bike Lane/Paved Shoulder | 2 | On a roadway, in a bicycle lane or on a paved shoulder |
| Sidewalk/Crosswalk/Driv eway Crossing | 3 | On a sidewalk, crosswalk, or driveway crossing |
| Driveway/Alley | 4 | On a separate bicycle/multi-use path |
| Multi-use Path | 5 | On a driveway or alley |
| Nonroadway | 6 | Other nonroadway areas (parking lot, open areas, etc.) |
| Other | 8 | Other (e.g., unpaved shoulder, worn path, etc.) |
| Unknown | 9 | Unknown |

Table 9. Bicyclist Crash Location Definitions (continued)

| Bicyclist Direction Definitions |  |  |
| :--- | :---: | :--- |
| Bicyclist_Direction_Desc <br> (Bicyclist Direction) | Bicyclist_Direction <br> (Bicyclist <br> Direction) |  |
| With Traffic | 1 | With traffic |
| Facing Traffic | 2 | Facing traffic |
| Not Applicable | 3 | Not applicable (e.g., exiting a driveway, parking lot, or other nonroadway area) |
| Unknown | 9 | Unknown |

Table 10. Pedestrian Crash Type Definitions

| Crash_Type_Basic <br> (Crash Type <br> Number) | Crash_Type_Description <br> (Crash Type Description) | Definition |
| :---: | :--- | :--- |
| 110 | Assault with Vehicle | The driver intentionally struck the pedestrian with the vehicle. |
| 120 | Dispute-Related | The pedestrian was struck by a vehicle during a domestic altercation or other <br> dispute. |
| 130 | Pedestrian on Vehicle | The pedestrian was sitting on, leaning against, or clinging to a vehicle which <br> began to move or was moving. |
| 140 | Vehicle-Vehicle/Object | The pedestrian was struck as a result of a prior vehicle-into-vehicle or vehicle- <br> into-object crash. |
| 150 | Motor Vehicle Loss of <br> Control | Vehicle lost control due to mechanical failure, surface conditions, driver error or <br> impairment. |
| 160 | Pedestrian Loss of Control | The pedestrian stumbled, fell, or rolled into path of vehicle due to surface <br> conditions, impairment or other mishap. |
| 190 | Other Unusual <br> Circumstances | The crash involved other unusual circumstances, such as a pedestrian being <br> struck by falling cargo or a loose wheel. |
| 211 | Backing Vehicle- <br> Driveway | The pedestrian was struck in a driveway by a vehicle that was backing with a <br> driver at the controls. |
| 212 | Backing Vehicle- <br> Driveway/Sidewalk <br> Intersection | The pedestrian was struck in a driveway/sidewalk intersection by a vehicle that <br> was backing with a driver at the controls. |
| 213 | Backing Vehicle- <br> Roadway | The pedestrian was struck in a roadway by a vehicle that was backing with a <br> driver at the controls. |
| 214 | Backing Vehicle-Parking <br> Lot | The pedestrian was struck in a parking lot by a vehicle that was backing with a <br> driver at the controls. |
| 219 | Backing Vehicle- <br> Other/Unknown | The pedestrian was struck in another or unknown location by a vehicle that was <br> backing with a driver at the controls. |
| 220 | Driverless Vehicle | The pedestrian was struck by a vehicle that was moving without a driver at the <br> controls or that was set in motion by the actions of a child. |
| 10 |  |  |

Table 10. Pedestrian Crash Type Definitions (continued)

| Crash_Type_Basic <br> (Crash Type <br> Number) | Crash_Type_Description <br> (Crash Type Description) | Definition |
| :---: | :--- | :--- |
| 230 | Disabled Vehicle-Related | The pedestrian was struck while near or next to a disabled vehicle (including a <br> vehicle that had been in a crash) or while walking to or from a disabled vehicle. <br> Note: Crashes involving pedestrians standing near tow trucks responding <br> to the disabled vehicle are also included in this crash type. |
| 240 | Emergency Vehicle- <br> Related | The pedestrian was struck while near an active emergency vehicle, by an active <br> emergency vehicle, or by a vehicle being pursued. |
| 250 | Play Vehicle-Related | The pedestrian was struck while riding a play vehicle that was not a bicycle <br> (e.g., skates, scooter, wagon, sled, etc.). |
| 311 | Working in Roadway | The pedestrian was working in the roadway when struck. |
| 312 | Playing in Roadway | The pedestrian was playing in the roadway when struck. |
| 313 | Lying in Roadway | The pedestrian was lying in the roadway when struck. <br> Entering/Exiting Parked <br> Vehicle |
| 320 | The pedestrian was in the process of getting into or out of a stopped or parked <br> vehicle. Note: Does not include crashes involving pedestrian crossing or <br> other movements that occurred after the pedestrian exited the vehicle. |  |
| 340 | Commercial Bus-Related | Going to/from or standing at a mailbox or newspaper box. <br> The pedestrian was struck crossing in front of a commercial bus stopped at a <br> marked bus stop. |
| 342 | School Bus-Related | The pedestrian was struck going to or from or waiting at a school bus or school <br> bus stop. |
| 360 | Ice Cream/Vendor Truck- <br> Related | The pedestrian was struck going to or from an ice cream truck or other type of <br> vehicle vending from the curb or roadside. |
| 410 | Walking Along Roadway <br> With Traffic-From <br> Behind | The pedestrian was walking/running along the roadway with traffic and was <br> struck from behind. |
| 420 | Walking Along Roadway <br> With Traffic-From Front | The pedestrian was walking/running along the roadway with traffic and was <br> struck from the front. |
| 430 | Walking Along Roadway <br> Against Traffic-From <br> Behind | The pedestrian was walking/running along the roadway against traffic and was <br> struck from behind. |
| 3 |  |  |

Table 10. Pedestrian Crash Type Definitions (continued)

| Crash_Type_Basic (Crash Type Number) | Crash_Type_Description (Crash Type Description) | Definition |
| :---: | :---: | :---: |
| 440 | Walking Along Roadway Against Traffic-From Front | The pedestrian was walking/running along the roadway against traffic and was struck from the front. |
| 459 | Walking Along RoadwayDirection/Position Unknown | The pedestrian was walking/running along the roadway, but there is insufficient information to determine either the position or direction of the pedestrian at the time of the crash. |
| 460 | Motorist Entering Driveway or Alley | The motor vehicle was turning into a driveway or alley and struck the pedestrian on a sidewalk/walkway or driveway crossing. |
| 465 | Motorist Exiting Driveway or Alley | The motor vehicle was exiting a driveway or alley and struck the pedestrian on a sidewalk/walkway or driveway crossing. |
| 469 | Driveway CrossingOther/Unknown | The pedestrian was on a driveway intersection when struck but there were other or unknown circumstances surrounding the crash from those described . |
| 510 | Waiting to Cross-Vehicle Turning | The pedestrian was standing near the curb or roadway edge and waiting to cross the roadway when struck by a turning vehicle. |
| 520 | Waiting to Cross-Vehicle Not Turning | The pedestrian was standing near the curb or roadway edge and waiting to cross the roadway when struck by a vehicle that was not turning. |
| 590 | Waiting to Cross-Vehicle Action Unknown | The pedestrian was standing near the curb or roadway edge and waiting to cross the roadway when struck by a vehicle, but it could not be determined if the vehicle was turning or not. |
| 610 | Standing in Roadway | The pedestrian was standing in the roadway prior to the crash, but the crash cannot be further classified. |
| 620 | Walking in Roadway | The pedestrian was walking in the roadway prior to the crash, but the crash cannot be further classified. |
| 680 | NonintersectionOther/Unknown | The crash occurred at a nonintersection location, but the actions of the pedestrian prior to the crash cannot be determined. |
| 690 | IntersectionOther/Unknown | The crash occurred at an intersection, but the actions of the pedestrian prior to the crash cannot be determined or it cannot be determined who failed to yield. |

Table 10. Pedestrian Crash Type Definitions (continued)

| Crash_Type_Basic (Crash Type Number) | Crash_Type_Description (Crash Type Description) | Definition |
| :---: | :---: | :---: |
| 710 | Multiple Threat | The pedestrian entered the traffic lane in front of stopped or slowing traffic and was struck by a vehicle traveling in the same direction as the stopped or slowing traffic. |
| 730 | Trapped | The pedestrian was struck while crossing at a signalized intersection or signalized mid-block crossing when the light changed and traffic started moving. |
| 741 | Dash | The pedestrian ran into the roadway and was struck by a vehicle whose view of the pedestrian was not obstructed. |
| 742 | Dart-Out | The pedestrian walked or ran into the roadway and was struck by a motorist whose view of the pedestrian was blocked until an instant before impact. |
| 760 | Pedestrian Failed to Yield | The pedestrian failed to yield to the motorist. |
| 770 | Motorist Failed to Yield | The motorist failed to yield to the pedestrian. |
| 781 | Motorist Left TurnParallel Paths | The motorist was initially traveling on a parallel path with the pedestrian before making a left turn and striking the individual. |
| 782 | Motorist Left TurnPerpendicular Paths | The motorist was initially traveling on a crossing path with the pedestrian before making a left turn and striking the individual. |
| 791 | Motorist Right TurnParallel Paths | The motorist was initially travelling on a parallel path with the pedestrian before making a right turn and striking the individual |
| 792 | Motorist Right Turn on Red-Parallel Paths | The motorist was initially traveling on a parallel path with the pedestrian before making a right turn on a red signal, and striking the individual. |
| 794 | Motorist Right Turn on Red-Perpendicular Paths | The motorist was initially traveling on a crossing path with the pedestrian before making a right turn on a red signal, and striking the individual. |
| 795 | Motorist Right TurnPerpendicular Paths | The motorist was initially travelling on a crossing path with the pedestrian before making a right turn and striking the individual. |
| 799 | Motorist Turn/MergeOther/Unknown | The motorist turned or merged, but either the approach paths or turn direction are unknown or do not fit with any of the described circumstances. |
| 830 | Off Roadway-Parking Lot | The motor vehicle struck a pedestrian in a parking lot. |
| 890 | Off RoadwayOther/Unknown | The motor vehicle struck a pedestrian off the roadway, but there were other or unknown circumstances surrounding the crash. |

Table 10. Pedestrian Crash Type Definitions (continued)

| Crash_Type_Basic <br> (Crash Type <br> Number) | Crash_Type_Description <br> (Crash Type Description) | Definition |
| :---: | :--- | :--- |
| 900 | Other-Unknown <br> Location | There is insufficient information to determine where the crash occurred. |
| 910 | Crossing an Expressway | The pedestrian was crossing a limited access expressway or expressway ramp. |

Table 11. Pedestrian Crash Group Definitions

| Crash_Group_Basic (Crash Group Number) | Crash_Group_Desc (Crash Group Description) | Definition |
| :---: | :---: | :---: |
| 100 | Unusual Circumstances | The crash involved a disabled vehicle, emergency vehicle or vehicle in pursuit, play vehicle, driverless vehicle, or the pedestrian was struck intentionally, was clinging to a vehicle, or was struck as a result of other unusual circumstances. |
| 200 | Backing Vehicle | The pedestrian was struck by a vehicle that was backing at the time. |
| 310 | Working or Playing in Roadway | The pedestrian was working or playing in the roadway. |
| 340 | Bus-Related | The pedestrian was struck while crossing/walking to a bus or bus stop or while waiting at a bus stop. |
| 350 | Unique Midblock | The crash was associated with a vendor truck, mailbox, or other roadside 'destination' that was not a bus, or the pedestrian was struck while entering or exiting a parked vehicle. |
| 400 | Walking Along Roadway | The pedestrian was standing or walking along the roadway on the edge of a travel lane, or on a shoulder or sidewalk. |
| 460 | Crossing Driveway or Alley | The pedestrian was crossing a driveway on a sidewalk crossing, shared-use path, shoulder, or edge of the travel lane. |
| 500 | Waiting to Cross | The pedestrian was standing on the curb or near the roadway edge waiting to cross the roadway when struck. |
| 600 | Pedestrian in RoadwayCircumstances Unknown | The pedestrian was standing, walking, or lying in the road right-of-way at an intersection or midblock location but the circumstances do not otherwise fit any previously described or are unknown. |
| 720 | Multiple Threat/Trapped | The pedestrian entered the roadway on a green signal or in front of standing or slowing traffic and was trapped when the signal changed and traffic started moving or was struck by a vehicle traveling in the same direction as the stopped traffic. <br> Note: Multiple threat may occur at nonsignalized locations. |
| 740 | Dash/Dart-Out | The pedestrian either ran into the roadway in front of a motorist whose view of the pedestrian was not obstructed or walked or ran into the road and was struck by a motorist whose view of the pedestrian was blocked until an instant before impact. |

Table 11. Pedestrian Crash Group Definitions (continued)

| Crash_Group_Basic <br> (Crash Group <br> Number) | Crash_Group_Desc <br> (Crash Group <br> Description) | Definition |
| :---: | :--- | :--- |
| 750 | Crossing Roadway- <br> Vehicle Not Turning | The pedestrian was struck while crossing the roadway (not an expressway) by <br> a vehicle that was traveling straight through. |
| 790 | Crossing Roadway- <br> Vehicle Turning | The pedestrian was struck while crossing a non-expressway road by a vehicle <br> that was turning or about to turn. |
| 800 | Off Roadway | The pedestrian was struck in a parking lot, driveway, open area or other or <br> unknown, nonroadway area (vehicle not backing). |
| 910 | Crossing Expressway | The pedestrian was on an expressway or expressway ramp when struck by a <br> motor vehicle. |
| 990 | Other/Unknown- <br> Insufficient Details | The circumstances do not clearly fit any of the situations described or are <br> unknown. |

Table 12. Bicyclist Crash Type Definitions


Table 12. Bicyclist Crash Type Definitions (continued)

| Crash_Type_Basic (Crash Type Number) | Crash_Type_Desc (Crash Type Description) | Definition |
| :---: | :---: | :---: |
| 133 | Motorist Lost ControlAlcohol/Drug Impairment | The motorist lost control due to alcohol or drug impairment. |
| 134 | Motorist Lost Control-Surface Conditions | The motorist lost control due to surface conditions (potholes, ice, etc.). |
| 139 | Motorist Lost ControlOther/Unknown | The motorist lost control due to other or unknown circumstances. |
| 141 | Motorist Drive-out SignControlled Intersection | The motorist was facing the sign or flashing signal and drove into the crosswalk area or intersection and collided with the bicyclist after stopping or yielding. |
| 142 | Bicyclist Ride-out-SignControlled Intersection | The bicyclist was facing the sign or flashing signal and rode into the intersection and collided with the motorist after stopping or yielding. |
| 143 | Motorist Drive-through—SignControlled Intersection | The motorist violated the sign or flashing signal and drove into the crosswalk area or intersection and collided with the bicyclist. |
| 144 | Bicyclist Ride Through SignControlled Intersection | The bicyclist violated the sign or flashing signal and rode into the intersection and collided with the motorist. |
| 147 | Multiple Threat—SignControlled Intersection | The bicyclist entered a sign-controlled intersection in front of standing or slowing traffic and was struck by another vehicle whose view of the bicyclist was blocked. |
| 148 | Sign-Controlled IntersectionOther/Unknown | The crash occurred at a sign-controlled intersection but cannot be further classified. |
| 151 | Motorist Drive-out—Right Turn on Red | The motorist was facing a red signal, stopped, and then drove into the crosswalk area or intersection and collided with the bicyclist while attempting to make a right turn on red. |
| 152 | Motorist Drive-out—Signalized Intersection | The motorist was facing a red signal, stopped, and then drove into the crosswalk area or intersection and collided with the bicyclist. |
| 153 | Bicyclist Ride-out—Signalized Intersection | The bicyclist was facing the red signal, stopped, and then rode into the intersection and collided with the motorist. |
| 154 | Motorist Drive-throughSignalized Intersection | The motorist violated the signal and drove into the crosswalk area or intersection and collided with the bicyclist. |

Table 12. Bicyclist Crash Type Definitions (continued)

| Crash_Type_Basic (Crash Type Number) | Crash_Type_Desc (Crash Type Description) | Definition |
| :---: | :---: | :---: |
| 155 | Bicyclist Ride ThroughSignalized Intersection | The bicyclist violated the signal and rode into the intersection and collided with the motorist. |
| 156 | Bicyclist Failed to ClearTrapped | The bicyclist lawfully entered the intersection on green but did not clear the intersection before the signal changed to green for the cross-street traffic and was struck by a vehicle whose view was not obstructed by standing or stopped traffic. |
| 157 | Bicyclist Failed to ClearMultiple Threat | The bicyclist lawfully entered the intersection on green but did not clear the intersection before the signal changed to green for the cross-street traffic and was struck by a motorist whose view of the bicyclist was obstructed by standing or stopped traffic. |
| 158 | Signalized IntersectionOther/Unknown | The crash occurred at a signal-controlled intersection but cannot be further classified. |
| 159 | Bicyclist Failed to ClearUnknown | The bicyclist failed to clear the intersection and was struck by a motorist, but it is unknown whether the bicyclist was trapped in the intersection by a signal change or if there was a multiple threat situation or other circumstances surrounding the crash. |
| 160 | Crossing Paths—Uncontrolled Intersection | The crash occurred at an intersection not controlled by signs or signals. |
| 180 | Crossing Paths-IntersectionOther/Unknown | The crash involved a bicyclist and motorist on initial crossing paths but cannot be further classified. |
| 211 | Motorist Left Turn-Same Direction | The motorist turned left in front of a bicyclist going in the same direction. |
| 212 | Motorist Left Turn-Opposite Direction | The motorist turned left in front of a bicyclist coming from the opposite direction. |
| 213 | Motorist Right Turn-Same Direction | The motorist turned right in front of a bicyclist going in the same direction. |
| 214 | Motorist Right Turn-Opposite Direction | The motorist turned right in front of a bicyclist coming from the opposite direction. |
| 215 | Motorist Drive-in/Out—Parking | The motorist struck the bicyclist while exiting or entering on-street parking. |

Table 12. Bicyclist Crash Type Definitions (continued)

| Crash_Type_Basic (Crash Type Number) | Crash_Type_Desc (Crash Type Description) | Definition |
| :---: | :---: | :---: |
| 216 | Bus/Delivery Vehicle Pullover | The bicyclist was struck by a bus or delivery vehicle pulling into or away from the curb. |
| 217 | Motorist Right Turn on RedSame Direction | The bicyclist and motorist were initially traveling on parallel paths when the motorist turned right on red in front of a bicyclist traveling in the same direction as the motorist. |
| 218 | Motorist Right Turn on RedOpposite Direction | The bicyclist and motorist were initially traveling on parallel paths when the motorist turned right on red in front of a bicyclist traveling in the opposite direction as the motorist. |
| 219 | Motorist Turn/MergeOther/Unknown | The motorist's turning maneuver is other than those described or is unknown. |
| 221 | Bicyclist Left Turn-Same Direction | The bicyclist turned or merged left in front of a motorist going in the same direction. |
| 222 | Bicyclist Left Turn-Opposite Direction | The bicyclist turned or merged left in front of a motorist coming from the opposite direction. |
| 223 | Bicyclist Right Turn-Same Direction | The bicyclist turned or merged right in front of a motorist going in the same direction. |
| 224 | Bicyclist Right Turn-Opposite Direction | The bicyclist turned or merged right in front of a motorist coming from the opposite direction. |
| 225 | Bicyclist Ride-out—Parallel Path | The bicyclist, initially on a sidewalk or other parallel path, rode into the roadway and into the path of a motor vehicle. |
| 231 | Motorist OvertakingUndetected Bicyclist | The motorist was overtaking the bicyclist and failed to detect the bicyclist. |
| 232 | Motorist OvertakingMisjudged Space | The motorist was overtaking the bicyclist and misjudged the width and distance required to pass the bicyclist. |
| 235 | Motorist Overtaking-Bicyclist Swerved | The bicyclist swerved or moved suddenly into the path of an overtaking vehicle. |
| 239 | Motorist OvertakingOther/Unknown | The motorist was overtaking the bicyclist, but the specific circumstances surrounding the overtaking maneuver do not conform to the other situations described or are unknown. |

Table 12. Bicyclist Crash Type Definitions (continued)


Table 12. Bicyclist Crash Type Definitions (continued)

| Crash_Type_Basic (Crash Type Number) | Crash_Type_Desc (Crash Type Description) | Definition |
| :---: | :---: | :---: |
| 322 | Motorist Drive-outCommercial Driveway/Alley | The motorist drove into the roadway or sidewalk/driveway crossing area and into the path of a bicyclist from a commercial driveway or alley. |
| 328 | Motorist Drive-out-Other Midblock | The motorist drove into the roadway or sidewalk/driveway crossing area and into the path of a bicyclist from a midblock area other than a driveway or alley. |
| 329 | Motorist Drive-outMidblock—Unknown | The motorist drove into the roadway or sidewalk/driveway crossing area and into the path of a bicyclist an unknown midblock area. |
| 357 | Multiple Threat—Midblock | The bicyclist entered the roadway in front of standing or slowing traffic at a mid-block location and was struck by a motorist traveling in the same direction as the stopped traffic, and whose view of the bicyclist was blocked. |
| 380 | Crossing Paths—Midblock— Other/Unknown | The crash involved a bicyclist and motorist on initial crossing paths at a midblock location but cannot be furter classified. |
| 400 | Bicycle Only | The crash involved a bicycle but no motor vehicle. |
| 510 | Motorist Intentionally Caused | The motorist intentionally caused the crash. |
| 520 | Bicyclist Intentionally Caused | The bicyclist intentionally caused the crash. |
| 600 | Backing Vehicle | The crash involved a motor vehicle that was backing and did not involve a play vehicle. |
| 700 | Play Vehicle-Related | The bicyclist was riding a child's vehicle such as a tricycle (not an adult tricycle), bicycle with training wheels, or "Big Wheel" type tricycle. |
| 800 | Unusual Circumstances | There were other unusual circumstances not defined above (e.g., bicyclist struck by falling cargo). |
| 910 | Nonroadway | The crash occurred off the street network (e.g., parking lots, driveways, alleys, trails, and other open areas). <br> Note: crashes occurring on paved shoulders, bike lanes, sidewalks, or driveway crossings are considered to be "roadway" crashes and should not be placed in the nonroadway classification. |
| 970 | Unknown Approach Paths | There is insufficient information to determine the initial approach paths for the two vehicles. |
| 980 | Unknown Location | There is insufficient information to determine where the crash occurred. |

Table 13. Bicyclist Crash Group Definitions

| Crash_Group_Basic (Crash Group Number) | Crash_Group_Desc (Crash Group Description) | Definition |
| :---: | :---: | :---: |
| 110 | Loss of Control/Turning Error | Either the motorist or the bicyclist lost control of their vehicle or made a turning error and inadvertently moved into the path of the other operator. Note: Includes loss of control due to mechanical problems or operator error, or turning errors such as traveling into the opposing lane. |
| 140 | Motorist Failed to Yield-Sign-Controlled Intersection | The motorist drove into the crosswalk area or intersection and collided with the bicyclist. The motorist either violated the sign or did not properly yield right-of-way to the bicyclist. <br> Note: Crashes at traffic circles or roundabouts with yield control are included here. |
| 145 | Bicyclist Failed to Yield-Sign-Controlled Intersection | The bicyclist rode into the intersection and collided with the motorist. The bicyclist either violated the sign or did not properly yield right-of-way to the motorist. <br> Note: Crashes at traffic circles or roundabouts with yield control are included here. |
| 150 | Motorist Failed to YieldSignalized Intersection | The motorist drove into the crosswalk area or intersection and collided with the bicyclist. The motorist either violated the signal or did not properly yield right-of-way to the bicyclist. |
| 158 | Bicyclist Failed to YieldSignalized Intersection | The bicyclist rode into the intersection and collided with the motorist. The bicyclist either violated the signal or did not properly yield right-of-way to the motorist. |
| 190 | Crossing Paths-Other Circumstances | The bicyclist and motorist were on intial crossing paths, but the crash cannot be further classified. |
| 210 | Motorist Left Turn/Merge | The motorist made a left turn or merge into the path of a bicyclist traveling in the same or opposite direction. |
| 215 | Motorist Right Turn/Merge | The motorist made a lright turn or merge into the path of a bicyclist traveling in the same or opposite direction. |
| 219 | Parking/Bus-Related | The bicyclist was struck by a motorist entering or exiting a parking space or by a bus or delivery vehicle pulling into or away from the curb. |
| 220 | Bicyclist Left Turn/Merge | The bicyclist made a left turn or merge into the path of a motor vehicle traveling in the same or opposite direction. |

Table 13. Bicyclist Crash Group Definitions (continued)

| Crash_Group_Basic (Crash Group Number) | Crash_Group_Desc (Crash Group Description) | Definition |
| :---: | :---: | :---: |
| 225 | Bicyclist Right Turn/Merge | The bicyclist made a right turn or merge into the path of a motor vehicle traveling in the same or opposite direction. |
| 230 | Motorist Overtaking Bicyclist | The motorist was overtaking the bicyclist at the time of the crash. |
| 240 | Bicyclist Overtaking Motorist | The bicyclist was overtaking the motorist at the time of the crsah. Note: This group includes crashes involving bicyclists striking parked cars or extended doors. |
| 258 | Head-On | Either operator was going the wrong way, and the two parties collided headon. |
| 290 | Parallel Paths-Other Circumstances | The bicyclist and motorist were on initial parallel paths, but the crash cannot be further classified. |
| 310 | Bicyclist Failed to YieldMidblock | The bicyclist rode into the street from a nonintersection location (including residential or commercial driveway or other midblock location) without yielding to the motorist. |
| 320 | Motorist Failed to YieldMidblock | The motorist drove across the sidewalk or into the street from a nonintersection location (including residential or commercial driveway or other midblock location) without yielding to the bicyclist. |
| 600 | Backing Vehicle | The motorist was backing up at the time the crash occurred. |
| 850 | Other/Unusual Circumstances | There were unusual circumstances surrounding the crash, but the crash cannot be further classified. |
| 910 | Nonroadway | The crash occurred off the road network such as in a parking lot, driveway, on a multi-use path separated from the road right-of-way, in an open grassy area or yard, etc. |
| 990 | Other/UnknownInsufficient Details | There is insufficient information to determine where the crash occurred. |

## APPENDIX G: CRASH TYPING EXAMPLES

Contained in this appendix are 10 pedestrian crash reports and 10 bicycle crash reports that have been typed using PBCAT. These reports may be used as case study exercises for training on how to type crashes with the software. Provided at the end of each set of reports are the sequence of onscreen questions/directives encountered during the crash typing process and the correct responses. The answers shown are based on standard crash typing, not group typing. The report numbers that correspond to the answer sheets are found in the upper right-hand corner of the crash reports.


Figure 131. Codes for North Carolina Commission Report Forms


Figure 132. North Carolina Crash Report-Number 1


Figure 132. North Carolina Crash Report-Number 1 (continued)


Figure 133. North Carolina Crash Report-Number 2


Figure 133. North Carolina Crash Report—Number 2 (continued)


Figure 134. North Carolina Crash Report-Number 3


Figure 134. North Carolina Crash Report—Number 3 (continued)


Figure 135. North Carolina Crash Report—Number 4


Figure 135. North Carolina Crash Report—Number 4 (continued)


Figure 136. North Carolina Crash Report—Number 5


Figure 136. North Carolina Crash Report—Number 5 (continued)


Figure 137. North Carolina Crash Report—Number 6


Figure 137. North Carolina Crash Report—Number 6 (continued)


Figure 138. North Carolina Crash Report—Number 7


Figure 138. North Carolina Crash Report—Number 7 (continued)


OCCUPANT SECTION INSTRUCTIONS: Give iNjury Class, Belt/Helmet Usage, Race/Sex and Age of all occupants in the space corresponding to the seat occupied (see codes at top).


Figure 139. North Carolina Crash Report—Number 8


Figure 139. North Carolina Crash Report—Number 8 (continued)


Figure 140. North Carolina Crash Report—Number 9


Figure 140. North Carolina Crash Report—Number 9 (continued)


Figure 141. North Carolina Crash Report—Number 10


Figure 141. North Carolina Crash Report—Number 10 (continued)

Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes


Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes (continued)


Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{5}$ | Crash Location | Where did the crash occur? | Nonintersection Location |
|  | Ped position-nonintersection | What was the position of the pedestrian <br> when struck? | On a Roadway, in a Travel Lane |
|  | Unusual Circumstances Crash | The crash was the result of which of <br> the following unusual circumstances: | None of the Above |
| Action Crash | Unusual Pedestrian Action Crash | The crash involved which of the <br> following vehicle types or vehicle <br> actions: | The pedestrian was struck while <br> performing which of the following <br> actions: |
| ज. |  | Nonintersection Crash—Typical <br> Pedestrian Action | Which of the following best describes <br> the pedestrian action at the time of the <br> crash? |
|  | Walking Along Roadway <br> Walking Along Roadway - <br> Nonintersection | The pedestrian was: | Walking/running with Traffic and Was <br> Struck from Behind |

Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{6}$ | Crash Location | Ped position—nonintersection | Where did the crash occur? <br> Wedestrian when struck? |
|  | Unusual Circumstances Crash | The crash was the result of which of <br> the following unusual circumstances: | None of the Above |
|  | Unusual Vehicle Type/Vehicle Action <br> Crash | The crash involved which of the <br> following vehicle types or vehicle <br> actions: | None of the Above |
|  | Unusual Pedestrian Action Crash | The pedestrian was struck while <br> performing which of the following <br> actions: | None of the Above |
|  | Nonintersection Crash—Typical <br> Pedestrian Action | Which of the following best describes <br> the pedestrian action at the time of the <br> crash? | Crossing the Roadway or In the <br> Roadway |
|  | Crossing/In Roadway - <br> Nonintersection | Which of the following best describes <br> the circumstances of the crash? | Turn/Merge |
|  | Turn/Merge-Nonintersection <br> the chircumstances of the crash? | Turn/merge-Other/Unknown |  |
| Crash Type: Motorist Turn/Merge-Other/Unknown (Number 799) |  |  |  |

Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{7}$ | Crash Location | Where did the crash occur? | Intersection-related |
|  | Ped position-intersection or <br> intersection-related | What was the position of the <br> pedestrian when struck? | On a Roadway, in a Travel Lane |
|  | Unusual Circumstances Crash | The crash was the result of which of <br> the following unusual circumstances: | None of the Above |
| $\sim$ | Unusual Vehicle Type/Vehicle Action <br> Crash | The crash involved which of the <br> following vehicle types or vehicle <br> actions: | None of the Above |
|  | Unusual Pedestrian Action Crash <br> Pedestrian Action | The pedestrian was struck while <br> performing which of the following <br> actions: | None of the Above |
|  | Crossing/In Roadway-Intersection | Which of the following best describes <br> the pedestrian action at the time of the <br> crash? | Crossing the Roadway or In the <br> Roadway of the following best describes <br> the circumstances of the crash? |
| Crash Type: Dart-Out (Number 742) | Dart-Out |  |  |
| $\mathbf{8}$ | Crash Location | Ped position-Nonintersection | Where did the crash occur? <br> pedestrian when struck? |
|  | Unusual Circumstances Crash | The crash was the result of which of <br> the following unusual circumstances: | None of the Above |
|  | Unusual Vehicle Type/Vehicle Action <br> Crash | The crash involved which of the <br> following vehicle types or vehicle <br> actions: | Disabled Vehicle-Related |

Crash Type: Disabled Vehicle-Related (Number 230)

Table 14. Correct Responses to the Crash Typing Logic for the 10 Sample Pedestrian Crashes (continued)



Figure 142. Florida Crash Report—Report 1


Figure 142. Florida Crash Report—Report 1 (continued)

| EMS INFO FATALS ONLY | Time EMS Notified | Time EMS Notified | $\begin{gathered} \hline \text { County/City Code } \\ 11 / 00 \\ \hline \end{gathered}$ | $\begin{gathered} \hline \text { Date of Crash } \\ 2 / 12 / 92 \end{gathered}$ | Report No. 1 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Diagram | - | Sw 75 gTREET | $\frac{\text { U1 }}{\text { UN' UN }}$ | ATE NOR H AR RG'm |  |
| NARRATIVE |  |  |  |  |  |
| V1, A BICYCLE, WAS SOUTHBOUND ON THE SIDEWALK OF SW 75 STREET. THE DRIVER OF V2 WAS WESTBOUND ON WEST UNIVERSITY AVENUE INTENDING TO MAKE A RIGHT TURN ONTO SW 75 STREET AND HAD STOPPED AT THE STOP SIGN. THE DRIVER OF V2 FAILED TO SEE V1 APPROACHING AS SHE BEGAN TO DRIVE FORWARD, WITH THE FRONT OF V1 STRIKING THE RIGHT FRONT OF V2 AND EJECTING THE OPERATOR OF V1 ONTO THE PAVEMENT. |  |  |  |  |  |

Figure 142. Florida Crash Report—Report 1 (continued)


Figure 143. Florida Crash Report—Report 2


Figure 143. Florida Crash Report—Report 2 (continued)

| EMS INFO FATALS ONLY | Time EMS Notified | Time EMS Notified | $\begin{gathered} \hline \text { County/City Code } \\ 11 / 34 \\ \hline \end{gathered}$ | $\begin{array}{\|c} \hline \text { Date of Crash } \\ 2 / 20 / 92 \end{array}$ | Report No. 2 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Diagram |  |  | DEWALK <br> NEWVELL $]^{-}$ <br> CROSSWALK | INDICATE NOR Wilth ARFD'tio |  |
| NARRATIVE |  |  |  |  |  |
| V1 was Southbound on Newell Drive. V2 was Eastbound on SR24 on the sidewalk on the North side of the road V1 approached the red light at SR24 and did not see V2. V1 went through the crosswalk area and struck V2. Driver V2 refused medical treatment at the scene. |  |  |  |  |  |

Figure 143. Florida Crash Report—Report 2 (continued)


Figure 144. Florida Crash Report—Report 3


Figure 144. Florida Crash Report—Report 3 (continued)

| EMS INFO FATALS <br> ONLY | Time EMS Notified | Time EMS Notified | County/City Code | Date of Crash <br> $3 / 16 / 92$ | Report No. 3 |
| :---: | :---: | :---: | :---: | :---: | :---: |



NARRATIVE
V-1, V-2 were Westbound on SW 4 Avenue. V-1 pulled up to entrance to the driveway, paused for traffic in parking lot and attemped to turn right into parking lot. V-2 approached and collided with V-1. The driver of V-2 was ejected from V-2. The point of impact occurred in the 800 block of SW4 Avenue.

Figure 144. Florida Crash Report—Report 3 (continued)


Figure 145. Florida Crash Report—Report 4


Figure 145. Florida Crash Report—Report 4 (continued)


Figure 145. Florida Crash Report—Report 4 (continued)


Figure 146. Florida Crash Report—Report 5


Figure 146. Florida Crash Report—Report 5 (continued)


Figure 146. Florida Crash Report—Report 5 (continued)


Figure 147. Florida Crash Report—Report 6


Figure 147. Florida Crash Report—Report 6 (continued)


Figure 147. Florida Crash Report—Report 6 (continued)


Figure 148. Florida Crash Report—Report 7


Figure 148. Florida Crash Report—Report 7 (continued)

| EMS INFO FATALS ONLY | Time EMSNotified | Time EMSNotified | $\begin{gathered} \hline \text { County/ City Code } \\ 11 / 00 \\ \hline \end{gathered}$ | $\begin{array}{\|c\|} \hline \text { Date of Crash } \\ 5 / 5 / 92 \end{array}$ | Report No. 7 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| PAREING LOT AT 400 SW 47 ST. |  | (a) | $=\operatorname{sToPsigN}$ <br> 3 <br> $\longrightarrow$ | rivil | atE NORTH ARFOTH' |
| NARRATIVE |  |  |  |  |  |
| V-2 was headed east. V-1 was headed South, started to turn right, saw V-2 then stopped in road in front of V-2 trying to avoid $\mathrm{V}-2$. There were no skid marks. |  |  |  |  |  |

Figure 148. Florida Crash Report—Report 7 (continued)


Figure 149. Florida Crash Report—Report 8


Figure 149. Florida Crash Report—Report 8 (continued)


NARRATIVE
V-1 was Northbound in the correct lane on SR 45. V-2 was riding a tricycle southbound in the northbound lane. An unknown truck was traveling southbound in it's correct lane. V-1 attempted to brake and avoid V-2. V-2 did not leave the roadway. V-2 ran into V-1.

Figure 149. Florida Crash Report—Report 8 (continued)


Figure 150. Florida Crash Report—Report 9


Figure 150. Florida Crash Report—Report 9 (continued)

| EMS INFO FATALS ONLY | Time EMS Notified | Time EMS Notified | $\begin{gathered} \hline \text { County/City Code } \\ 09 / 00 \end{gathered}$ | $\begin{array}{\|c} \hline \text { Date of Crash } \\ 4 / 27 / 92 \end{array}$ | Report No. 9 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| DIAGRAM | MURPHY LANE |  |  |  | ATE NDRTH H ARROW |
| NARRATIVE |  |  |  |  |  |
| $\mathrm{V}-1$ and V -2 were both Eastbound on Murphy Lane when V -1 (a bicycle) turned left from the curb. V-2 collided with V -1 on its right side. $\mathrm{V}-1$ and V -2's drivers were both thrown to the ground. |  |  |  |  |  |

Figure 150. Florida Crash Report—Report 9 (continued)


Figure 151. Florida Crash Report-Report 10


Figure 151. Florida Crash Report-Report 10 (continued)


Figure 151. Florida Crash Report—Report 10 (continued)

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{1}$ | Crash Location | Where did the crash occur? | Intersection |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Sidewalk, Crosswalk, or Driveway Crossing |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck or <br> prior to making any turns which caused <br> the crash? | Facing traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach <br> Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Crossing Paths |
|  | Crossing Path Crash <br> - Intersection | Which of the following best describes the <br> circumstances of the crash? | Drive/Ride-Out/Through |
|  | Type of Traffic <br> Control | What type of traffic control was present at <br> the intersection? | Stop Signs, Yield Signs, or Flashing Signals |
|  | Sign-Controlled <br> Intersection Crash | Which of the following best describes the <br> circumstances of the crash? | Motorist Drive-Out |
| Crash Type: Motorist Drive-Out-Sign-Controlled Intersection (Number 141) |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :---: | :--- | :--- | :--- |
| $\mathbf{2}$ | Crash Location | Where did the crash occur? | Intersection |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Sidewalk, Crosswalk, or Driveway Crossing |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck or <br> prior to making any turns which caused <br> the crash? | Facing traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach <br> Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Crossing Paths |
|  | Crossing Path Crash - <br> Intersection | Which of the following best describes the <br> circumstances of the crash? | Drive/Ride-Out/Through |
|  | Type of Traffic <br> Control | What type of traffic control was present <br> at the intersection? | Traffic signals |
|  | Signal-Controlled <br> Intersection Crash | Which of the following best describes the <br> circumstances of the crash? | Motorist Drive-Out |
|  | Right Turn on Red- <br> Crossing Path | Was the motorist making a right turn on <br> red? | Yes |
| Crash Type: Motorist Drive-Out-Right Turn on Red (No. 151) |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{3}$ | Crash Location | Where did the crash occur? | Nonintersection Location |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Roadway, in a Shared Travel Lane |
| $\sim$ | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck or <br> prior to making any turns which caused <br> the crash? | With traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach <br> Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Parallel Paths |
|  | Parallel Path Crash | Which of the following best describes the <br> circumstances of the crash? | Motorist Turned or Merged |
|  | Motorist Turned or <br> Merged | Which of the following best describes the <br> maneuver of the motorist? | Right Turn-Same Direction |
|  | Right turn on red- <br> same direction | Was motorist making a right turn on red? | No or Unknown |
| Crash Type: Motorist Right Turn-Same Direction (Number 213) |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{4}$ | Crash Location | Where did the crash occur? | Nonintersection Location |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Sidewalk, Crosswalk, or Driveway Crossing |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck or <br> prior to making any turns which caused <br> the crash? | Facing traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describes the <br> crash? | None of the Above |
|  | Initial Approach <br> Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Crossing Paths |
|  | Crossing Path Crash - <br> Nonintersection | Which of the following scenarios best <br> describes the crash? | Motorist Drive-Out |
|  | Motorist Drive-Out - <br> Nonintersection | From where did the motorist come? | Commercial Driveway or Alley |
| Crash Type: Motorist Drive-Out-Commercial Driveway/Alley (Number 322) |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{5}$ | Crash Location | Where did the crash occur? | Nonintersection Location |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Sidewalk, Crosswalk, or Driveway Crossing |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck or <br> prior to making any turns which caused <br> the crash? | Not Applicable |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach <br> Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Crossing Paths |
|  | Crossing Path Crash - <br> Nonintersection | Which of the following scenarios best <br> describes the crash? | Bicyclist Ride-out |
|  | Bicyclist Ride-out - <br> Nonintersection | From where did the motorist come? Other Midblock Location |  |
| Crash Type: Bicyclist Ride-out-Other Midblock (Number 318) |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{6}$ | Crash Location | Where did the crash occur? | Intersection |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Roadway, in a Shared Travel Lane |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck <br> or prior to making any turns which <br> caused the crash? | With traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Parallel Paths |
|  | Parallel Path Crash | Which of the following best describes <br> the circumstances of the crash? | Motorist Turned or Merged |
|  | Motorist Turned or <br> Merged | Which of the following best describes <br> the maneuver of the motorist? | Left Turn-Opposite Direction |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :---: | :--- | :--- | :--- |
| $\mathbf{7}$ | Crash Location | Where did the crash occur? | Nonroadway Location |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | Other Nonroadway Areas (Parking Lot, Open Areas, <br> etc.) |
| Crash Type: Nonroadway (Number 910) |  |  |  |
|  |  |  |  |
| $\mathbf{8}$ | Crash Location | Where did the crash occur? | Nonintersection Location |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Roadway, in a Shared Travel Lane |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck <br> or prior to making any turns which <br> caused the crash? | Facing traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Parallel Paths |
|  | Parallel Path Crash | Which of the following best describes <br> the circumstances of the crash? | Head-On |
|  | Head—on crash | Which operator was traveling in the <br> wrong direction/travel lane? | Bicyclist |
| Crash Type: Head-On-Bicyclist (Number 250) |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)

| Report <br> No. | Screen Header | Question | Correct Response |
| :--- | :--- | :--- | :--- |
| $\mathbf{9}$ | Crash Location | Where did the crash occur? | Nonintersection Location |
|  | Bicyclist Position | What was the initial position of the <br> bicyclist? | On a Roadway, in a Shared Travel Lane |
|  | Bicyclist Direction | In what direction was the bicyclist <br> initially traveling prior to being struck or <br> prior to making any turns which caused <br> the crash? | With traffic |
|  | Unusual/Specific <br> Circumstances | Which of the following unusual or <br> specific circumstances best describe? | None of the Above |
|  | Initial Approach Paths | What were the initial approach paths for <br> the bicyclist and motorist? | Parallel Paths |
|  | Parallel Path Crash | Which of the following best describes <br> the circumstances of the crash? | Bicyclist Turned or Merged |
|  | Bicyclist Turned or <br> Merged | Which of the following scenarios best <br> describes the maneuver of the bicyclist? | Left Turn-Same Direction |
|  |  |  |  |

Table 15. Correct Responses to the Crash Typing Logic for the 10 Sample Bicycle Crashes (continued)


## APPENDIX H: PEDSAFE AND BIKESAFE GROUPS

Shown on the following pages are the relationships between the countermeasure groups used in PEDSAFE (www.walkinginfo.org) and BIKESAFE (www.bicyclinginfo.org) and the crash types and crash groups produced in PBCAT. Refer to chapter 9 for more information on the countermeasures included in these two Web sites.

Table 16. PEDSAFE—PBCAT Mapping

| PEDSAFE <br> Crash Group | PBCAT Crash Group Number | PBCAT Crash Group Name | PBCAT Crash Type Number | PBCAT Crash Type Name |
| :---: | :---: | :---: | :---: | :---: |
| Dart/Dash | 740 | Dash/Dart-Out | 741 | Dash |
|  |  |  | 742 | Dart-Out |
| Multiple Threat/Trapped | 720 | Multiple Threat/Trapped | 710 | Multiple Threat |
|  |  |  | 730 | Trapped |
| Unique <br> Midblock | 350 | Unique Midblock | 320 | Entering/Exiting Parked Vehicle |
|  |  |  | 330 | Mailbox-Related |
|  |  |  | 360 | Ice Cream/Vendor Truck-Related |
| Through |  |  | 760 | Pedestrian Failed to Yield |
| Vehicle at <br> Unsignalized Location | 750 | Crossing Roadway- <br> Vehicle Not Turning | 770 | Motorist Failed to Yield |
| Bus-Related | 340 | Bus-Related | 341 | Commercial Bus-Related |
|  |  |  | 342 | School Bus-Related |
| Turning Vehicle | 790 | Crossing Roadway- <br> Vehicle Turning | 781 | Motorist Left Turn-Parallel Paths |
|  |  |  | 782 | Motorist Left Turn-Perpendicular Paths |
|  |  |  | 791 | Motorist Right Turn-Parallel Paths |
|  |  |  | 792 | Motorist Right Turn on Red-Parallel Paths |
|  |  |  | 795 | Motorist Right Turn-Perpendicular Paths |
|  |  |  | 794 | Motorist Right Turn on Red-Perpendicular Paths |
|  |  |  | 799 | Motorist Turn/Merge-Other/Unknown |
|  | 460 | Crossing Driveway or Alley | 460 | Motorist Entering Driveway or Alley |
|  |  |  | 465 | Motorist Exiting Driveway or Alley |
|  |  |  | 469 | Driveway Crossing-Other/Unknown |

Table 16. PEDSAFE—PBCAT Mapping (continued)

| PEDSAFE <br> Crash Group | PBCAT Crash Group Number | PBCAT Crash Group Name | PBCAT Crash Type Number | PBCAT Crash Type Name |
| :---: | :---: | :---: | :---: | :---: |
| Through | 750 | Crossing RoadwayVehicle Not Turning | 760 | Pedestrian Failed to Yield |
| Vehicle at Signalized Location |  |  | 770 | Motorist Failed to Yield |
| Walking Along Roadway | 400 | Walking Along Roadway | 410 | Walking Along Roadway With Traffic-From Behind |
|  |  |  | 420 | Walking Along Roadway With Traffic-From Front |
|  |  |  | 430 | Walking Along Roadway Against Traffic-From Behind |
|  |  |  | 440 | Walking Along Roadway Against Traffic—From Front |
|  |  |  | 459 | Walking Along Roadway—Direction/Position Unknown |
|  |  |  |  |  |
| Working or |  |  | 311 | Working in Roadway |
| Playing in Roadway | 310 | Roadway | 312 | Playing in Roadway |
|  |  |  |  |  |
|  | 800 | Off | 830 | Off Roadway-Parking Lot |
|  | 800 | Off Roadway | 890 | Off Roadway-Other/Unknown |
| Nonroadway |  |  | 460 | Motorist Entering Driveway or Alley |
|  | 460 | Crossing Driveway or Alley | 465 | Motorist Exiting Driveway or Alley |
|  |  |  | 469 | Driveway Crossing-Other/Unknown |

Table 16. PEDSAFE—PBCAT Mapping (continued)

| PEDSAFE <br> Crash Group | PBCAT <br> Crash Group <br> Number | PBCAT Crash <br> Group Name | PBCAT <br> Crash Type <br> Number | PBCAT Crash Type Name |
| :--- | :---: | :---: | :---: | :--- |

Table 17. BIKESAFE—PBCAT Mapping


Table 17. BIKESAFE—PBCAT Mapping (continued)

| BIKESAFE <br> Crash Group | PBCAT <br> Crash <br> Group <br> Number | PBCAT Crash Group Name | PBCAT <br> Crash Type Number | PBCAT Crash Type Name |
| :---: | :---: | :---: | :---: | :---: |
| Bicyclist Rode <br> Out—Midblock | 310 | Bicyclist Failed to <br> Yield—Midblock | 311 | Bicyclist Ride-out-Residential Driveway |
|  |  |  | 312 | Bicyclist Ride-out-Commercial Driveway/Alley |
|  |  |  | 318 | Bicyclist Ride-out-Other Midblock |
|  |  |  | 319 | Bicyclist Ride-out-Midblock-Unknown |
|  |  |  | 357 | Multiple Threat-Midblock |
|  |  |  |  |  |
| Motorist Tu or Merged L into Path of Bicyclist <br> Motorist Tu or Merged R into Path of Bicyclist | 210 | Motorist Left Turn/Merge | 211 | Motorist Left Turn-Same Direction |
|  |  |  | 212 | Motorist Left Turn-Opposite Direction |
|  | 219 | Parking/Bus- <br> Related | 215 | Motorist Drive-In/Out Parking |
|  |  |  | 216 | Bus/Delivery Vehicle Pullover |
|  | 215 | Motorist Right Turn/Merge | 213 | Motorist Right Turn-Same Direction |
|  |  |  | 217 | Motorist Right Turn on Red-Same Direction |
|  |  |  | 214 | Motorist Right Turn-Opposite Direction |
|  |  |  | 218 | Motorist Right Turn on Red-Opposite Direction |
|  | 219 | Parking/BusRelated | 215 | Motorist Drive-In/Out Parking |
|  |  |  | 216 | Bus/Delivery Vehicle Pullover |
|  |  |  |  |  |
| Bicyclist Turned or Merged Left into Path of Motorist | 220 | Bicyclist Left Turn/Merge | 221 | Bicyclist Left Turn-Same Direction |
|  |  |  | 222 | Bicyclist Left Turn-Opposite Direction |
|  |  |  | 225 | Bicyclist Ride-out-Parallel Path |
|  |  |  |  |  |
| Bicyclist Turned | 225 | Bicyclist Right Turn/Merge | 223 | Bicyclist Right Turn-Same Direction |
| or Merged Right into Path of Motorist |  |  | 224 | Bicyclist Right Turn-Opposite Direction |

Table 17. BIKESAFE—PBCAT Mapping (continued)

| BIKESAFE <br> Crash Group | PBCAT <br> Crash <br> Group <br> Number | PBCAT Crash Group Name | PBCAT <br> Crash Type Number | PBCAT Crash Type Name |
| :---: | :---: | :---: | :---: | :---: |
| Motorist Overtaking Bicyclist | 230 | Motorist Overtaking Bicyclist | 231 | Motorist Overtaking-Undetected Bicyclist |
|  |  |  | 232 | Motorist Overtaking-Misjudged Space |
|  |  |  | 235 | Motorist Overtaking-Bicyclist Swerved |
|  |  |  | 239 | Motorist Overtaking-Other/Unknown |
| Bicyclist <br> Overtaking <br> Motorist | 240 | Bicyclist <br> Overtaking <br> Motorist | 241 | Bicyclist Overtaking-Passing on Right |
|  |  |  | 242 | Bicyclist Overtaking-Passing on Left |
|  |  |  | 243 | Bicyclist Overtaking-Parked Vehicle |
|  |  |  | 244 | Bicyclist Overtaking-Extended Door |
|  |  |  | 249 | Bicyclist Overtaking-Other/Unknown |
| Nonmotor Vehicle Crashes |  |  | 400 | Bicycle Only |
| Miscellaneous (no specific countermeasures provided in BIKESAFE) | 110 | Loss of Control/Turning Error | 121 | Bicyclist Lost Control-Mechanical problems |
|  |  |  | 122 | Bicyclist Lost Control-Oversteering, Improper Braking, Speed |
|  |  |  | 123 | Bicyclist Lost Control-Alcohol/Drug Impairment |
|  |  |  | 124 | Bicyclist Lost Control-Surface Conditions |
|  |  |  | 129 | Bicyclist Lost Control-Other/Unknown |
|  |  |  | 131 | Motorist Lost Control-Mechanical Problems |
|  |  |  | 132 | Motorist Lost Control-Oversteering, Improper Braking, Speed |
|  |  |  | 133 | Motorist Lost Control-Alcohol/Drug Impairment |
|  |  |  | 134 | Motorist Lost Control-Surface Conditions |
|  |  |  | 139 | Motorist Lost Control-Other/Unknown |
|  |  |  | 111 | Motorist Turning Error-Left Turn |

Table 17. BIKESAFE—PBCAT Mapping (continued)

| BIKESAFE <br> Crash Group | PBCAT <br> Crash <br> Group <br> Number | PBCAT Crash Group Name | PBCAT <br> Crash <br> Type <br> Number | PBCAT Crash Type Name |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | 112 | Motorist Turning Error--Right Turn |
|  |  |  | 113 | Motorist Turning Error-Other |
|  |  |  | 114 | Bicyclist Turning Error-Left Turn |
|  |  |  | 115 | Bicyclist Turning Error-Right Turn |
|  |  |  | 116 | Bicyclist Turning Error-Other |
|  | 190 | Crossing PathsOther Circumstances | 148 | Sign-Controlled Intersection-Other/Unknown |
|  |  |  | 158 | Signalized Intersection-Other/Unknown |
|  |  |  | 180 | Crossing Paths-Intersection-Other/Unknown Control |
|  |  |  | 160 | Crossing Paths-Uncontrolled Intersection |
|  |  |  | 380 | Crossing Paths-Midblock-Other/Unknown |
|  | 258 | Head-On | 250 | Head-On-Bicyclist |
|  |  |  | 255 | Head-On-Motorist |
|  |  |  | 259 | Head-On-Unknown |
|  | 290 | Parallel PathsOther Circumstances | 219 | Motorist Turn/Merge-Other/Unknown |
|  |  |  | 280 | Parallel Paths-Other/Unknown |
|  |  |  | 225 | Bicyclist Ride-out-Parallel Path |
|  | 600 | Backing Vehicle | 600 | Backing Vehicle |
|  | 850 | Other/Unusual Circumstances | 510 | Motorist Intentionally Caused |
|  |  |  | 520 | Bicyclist Intentionally Caused |
|  |  |  | 700 | Play Vehicle-Related |
|  |  |  | 800 | Unusual Circumstances |
|  |  |  | 400 | Bicycle Only |
|  | 910 | Nonroadway | 910 | Nonroadway |
|  | 990 | Other/UnknownInsufficient Details | 980 | Unknown Location |
|  |  |  | 970 | Unknown Approach Paths |

## REFERENCES

1. Traffic Safety Facts 2004 Data, Pedestrians (Publication No. DOT HS 809 913), National Center for Statistics and Analysis, National Highway Traffic Safety Administration, Washington, DC, 2005.
2. Traffic Safety Facts 2004 Data, Pedalcyclists (Publication No. DOT HS 809 912), National Center for Statistics and Analysis, National Highway Traffic Safety Administration, Washington, DC, 2005.
3. Snyder, M.B. and R.L. Knoblauch, Pedestrian Safety: The Identification of Precipitating Factors and Possible Countermeasures (Publication No. FH-11-7312), National Highway Traffic Safety Administration, Washington, DC, 1971.
4. Cross, K.D. and G. Fisher, A Study of Bicycle/Motor Vehicle Accidents: Identification of Problem Types and Countermeasure Approaches, Volume I (Publication No. DOT HS803 315), National Highway Traffic Safety Administration, Washington, DC, 1977.
5. Hunter, W.W., J.C. Stutts, W.E. Pein, and C.L. Cox, Pedestrian and Bicycle Crash Types of the Early 1990's (Publication No. FHWA-RD-95-163), Federal Highway Administration, Washington, DC, June 1996.
6. Hunter, W.W., J.C. Stutts, and W.E. Pein, Pedestrian Crash Types: A 1990's Informational Guide (Publication No. FHWA-RD-96-163), Federal Highway Administration, Washington, DC, April 1997.
7. Hunter, W.W., W.E. Pein, and J.C. Stutts, Bicycle Crash Types: A 1990's Informational Guide (Publication No. FHWA-RD-96-104), Federal Highway Administration, Washington, DC, April 1997.
8. Harkey, D.L., J. Mekemson, M.C. Chen, and K.A. Krull, PBCAT: Pedestrian and Bicycle Crash Analysis Tool, Version 1.0, Software and Users Manual (Publication No. FHWA-RD-99-192), Federal Highway Administration, Washington, DC, December 1999.
9. Harkey, D.L. and C.V. Zegeer, PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System (Publication No. FHWA-SA-04-003), Federal Highway Administration, Washington, DC, September 2004.
10. Hunter, W.W., L. Thomas, and J.C. Stutts, BIKESAFE: Bicycle Countermeasure Selection System (Publication No. FHWA-SA-05-006), Federal Highway Administration, Washington, DC, January 2006.


[^0]:    *SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380 (Revised March 2003)

[^1]:    top of page

    Estimeted Cost

